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, California 90802-4213

June 2, 2025

Refer to NMFS No:
WCRO-2024-00982

Ryan J. Wulff
Assistant Regional Administrator
National Marine Fisheries Service, West Coast Region
Sustainable Fisheries Division
501 West Ocean Boulevard
Long Beach, CA 90802

RE: Endangered Species Act Section 7 (a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat (EFH) Response for Consultation on Issuance of a set of Exempted Fishing Permits (EFPs) to test longline-type fishing practices in a portion of the U.S. West Coast Exclusive Economic Zone (EEZ)

Dear Mr. Wulff,

Thank you for your letter of May 7, 2024, requesting initiation of consultation with NOAA's National Marine Fisheries Service (NMFS), West Coast Region (WCR), Protected Resources Division pursuant to section 7 of the Endangered Species Act of 1973 (ESA) (16 U.S.C. 1531 et seq.) for issuing exempted fishing permits (EFPs) under the Magnuson-Stevens Fishery Conservation and Management Act (MSA) to allow the use of longline-type fishing practices to target swordfish (*Xiphias gladius*) and other marketable highly migratory species (HMS) in a portion of the United States (U.S.) West Coast Exclusive Economic Zone (EEZ). Thank you, also, for your request for consultation pursuant to the essential fish habitat (EFH) provisions in Section 305(b) of the MSA (16 U.S.C. 1855(b)) for this action.

The attached Biological Opinion analyzes the potential impacts of the WCR Sustainable Fisheries Divsion's (SFD) Proposed Action to authorize, under EFPs and specific terms and conditions including an adaptive management program, the use of longline-type gear in portions of the U.S. West Coast EEZ off California and Oregon. We determined that the following list of ESA-listed species are likely to be adversely affected as a result of hooking and entanglement by fishing gear deployed by vessels operating under the Proposed Action (EFP vessels), both when they are deep-setting or shallow-setting: East Pacific Distinct Population Segment (DPS) of green sea turtles (*Chelonia mydas*), leatherback sea turtles (*Dermochelys coriacea*), the North Pacific DPS of loggerhead sea turtles (*Caretta caretta*), olive ridley sea turtles (*Lepidochelys olivacea*), and Guadalupe fur seals (*Arctocephalus townsendi*). Based on potential species presence and vulnerability to bycatch in the Proposed Action Area, we also concluded that both giant manta rays (*Mobula birostris*) and oceanic whitetip sharks (*Carcharhinus longimanus*) are likely to be adversely affected as a result of interactions with longline-type fishing gear deployed by EFP vessels. Also, we concur with SFD on the determination that the Proposed Action may affect, but is *not likely to adversely affect* (NLAA): the Central America and the Mexico DPSs of humpback whales (*Megaptera novaeangliae*), sperm whales (*Physeter macrocephalus*), Western North Pacific DPS gray whales (*Eschrichtius robustus*), blue whales (*Balaenoptera musculus*), fin whales (*Balaenoptera physalus*), and North Pacific right whales (*Eubalaena japonica*) that occur in or near the Proposed Action Area because the risks of any effects are discountable. Given additional information available, we also considered and concluded that the Proposed Action is NLAA the Eastern Pacific DPS of scalloped hammerhead shark (*Sphyrna lewini*). Additionally, we concur with SFD that the Proposed Action is NLAA the designated critical habitats for the ESA-listed leatherback sea turtle, the Southern Resident DPS of killer whales (*Orcinus orca*), and both the Central America and the Mexico DPSs of humpback whales. Lastly, we conclude that EFH for Coastal Pelagic Species (CPS) and Pacific Coast Groundfish (PCG), which are protected under the MSA, would not be adversely affected by the Proposed Action, and that any adverse effects to HMS EFH would be minimal. As a result, no additional EFH conservation recommendations are provided.

As a result of this consultation, NMFS PRD concludes that incidental take of East Pacific DPS green sea turtles, leatherback sea turtles, North Pacific Ocean DPS loggerhead sea turtles, olive ridley sea turtles, Guadalupe fur seals, giant manta rays, and oceanic whitetip sharks is reasonably certain to occur, and that the Proposed Action is not likely to jeopardize these ESA-listed species. NMFS SFD is required to comply with the Terms and Conditions of the ESA portion of the Biological Opinion in order to be exempt from the take prohibitions of ESA Section 9 with respect to such incidental take.

Please contact Andrea Dell'Apa in our Long Beach, California, office at 562-980-3250 and/or Andrea.Dellapa@noaa.gov, if you have any questions concerning this consultation, or if you require additional information.

Sincerely,

Chris E Yates

Chris Yates
Assistant Regional Administrator
for Protected Resources

Enclosure

cc: Amber Rhodes, WCR SFD
Tonya Wick, WCR SFD
Rachael Wadsworth, WCR SFD
Administrative File: 151422WCR2024PR00091

Endangered Species Act (ESA) Section 7(a)(2) Biological Opinion on Consideration of a set of Exempted Fishing Permits (EFPs) to Test Longline-Type Fishing Practices in a Portion of the U.S. West Coast Exclusive Economic Zone (EEZ)

NMFS Consultation Number: 2024-00982

Action Agency: NOAA's National Marine Fisheries Service, West Coast Regional Office, Sustainable Fisheries Division

Affected Species and NMFS' Determinations:

ESA-Listed Species	Status	Is Action Likely to Adversely Affect Species?[1]	Is Action Likely to Jeopardize the Species?	Is Action Likely to Adversely Affect Critical Habitat?[1]	Is Action Likely to Destroy or Adversely Modify Critical Habitat?[1]
Marine Mammals					
Blue whale (*Balaenoptera musculus*)[2]	Endangered	No	N.A.	N.A.	N.A.
Fin whale (*B. physalus*)[2]	Endangered	No	N.A.	N.A.	N.A.
Humpback whale – Central America DPS (*Megaptera novaeangliae*)	Endangered	No	N.A.	No	N.A.
Humpback whale – Mexico DPS	Threatened	No	N.A.	No	N.A.
Southern Resident killer whale DPS (*Orcinus orca*)	Endangered	N.A.	N.A.	No	N.A.
North Pacific Right whale (*Eubalaena japonica*)[2]	Endangered	No	N.A.	N.A.	N.A.
Sperm whale (*Physeter macrocephalus*)[2]	Endangered	No	N.A.	N.A.	N.A.
Western North Pacific DPS gray whale (*Eschrichtius robustus*)[2]	Endangered	No	N.A.	N.A.	N.A.
Guadalupe fur seal (*Arctocephalus townsendi*)[2]	Threatened	Yes	No	N.A.	N.A.

Marine Fish – Non-Salmonids					
Giant manta ray (*Manta birostris*)[2]	Threatened	Yes	No	N.A.	N.A.
Oceanic whitetip shark (*Carcharhinus longimanus*)[2]	Threatened	Yes	No	N.A.	N.A.
Scalloped hammerhead shark – Eastern Pacific DPS (*Sphyrna lewini*)[2]	Endangered	No	N.A.	N.A.	N.A.
Sea Turtles					
East Pacific green sea turtle DPS (*Chelonia mydas*)[3]	Threatened	Yes	No	N.A.	N.A.
Leatherback sea turtle (*Dermochelys coriacea*)	Endangered	Yes	No	No	N.A.
North Pacific Ocean DPS Loggerhead sea turtle (*Caretta caretta*)[2]	Endangered	Yes	No	N.A.	N.A.
Olive ridley sea turtle (*Lepidochelys olivacea*)[2]	Threatened/ Endangered	Yes	No	N.A.	N.A.

[1]Please refer to section 2.12 for the analysis of species or critical habitat that are not likely to be adversely affected.
[2]Critical habitat has not been designated for these species along the U.S. West Coast.
[3]Critical habitat designation was proposed for these species.

Consultation Conducted By: National Marine Fisheries Service, West Coast Region, Protected Resources Division

Issued By: Chris E Yates

Chris Yates
Assistant Regional Administrator for Protected Resources
West Coast Region
National Marine Fisheries Service

Date: June 2, 2025

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Acronyms

AIDCP	Agreement on the International Dolphin Conservation Program
ASLL	American Samoa Longline Fishery
BA	Biological Assessment
BIA	Biological Important Area
CA	California
CASWRB	California State Water Resources Control Board
CCE	California Current Ecosystem
CHRT	Critical Habitat Review Team
CITES	Convention on International Trade in Endangered Species
CMM	Conservation and Management Measure
CMS	Convention on the Conservation of Migratory Species of Wild Animals
CPUE	Catch Per Unit Effort
CPPS	Permanent Commission of the South Pacific
CPS	Coastal Pelagic Species
CSTP	NMFS Cooperative Shark Tagging Program
DCS	Decompression Sickness
DDE	Dichlorodiphenyldichloroethane
DEIS	Draft Environmental Impact Statement
DGN	Drift Gillnet Fishery
DIP	Demographically Independent Populations
DQA	Data Quality Act
DRIFTNET ACT	Driftnet Modernization and Bycatch Reduction Act
DPS	Distinct Population Segment
DSBG	Deep-Set Buoy Gear
DSLBG	Deep-Set Linked Buoy Gear
DSLL	Deep-Set Longline
DSSL	Deep-Set Shortline
EA	Environmental Assessment
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
EFP	Exempted Fishing Permit
ENP	Eastern North Pacific
EPO	Eastern Pacific Ocean
ESA	Endangered Species Act
ETP	Eastern Tropical Pacific
FAO	Food and Agriculture Organization
FEIS	Final Environmental Impact Statement
FEP	Fishery Ecosystem Plan
FMP	Fishery Management Plan
GTC	Grupo Tortuguero de las Californias
HAB	Harmful Algal Bloom
HAPC	Habitat Areas of Particular Concern
HMS	Highly Migratory Species
IAC	Inter-American Convention for the Protection and Conservation of Sea Turtles

IATTC	Inter-American Tropical Tuna Commission
ITS	Incidental Take Statement
IUCN	International Union for Conservation of Nature
IUU	Illegal Unreported Unregulated
LAA	Likely to Adversely Affect
LCA	Pacific Loggerhead Conservation Area
MMPA	Marine Mammal Protection Act
MSA	Magnuson-Stevens Fishery Conservation and Management Act
MWSG	Midwater Snap Gear
NE	No Effect
NEC	North Equatorial Countercurrent
NLAA	Not Likely to Adversely Affect
NMFS	National Marine Fisheries Service
NMS	National Marine Sanctuaries
NOAA	National Oceanic and Atmospheric Administration
NSBG	Night-Set Buoy Gear
OR	Oregon
PBFs	Physical or Biological Features
PBR	Potential Biological Removal
PCB	Polychlorinated Biphenyls
PCE	Primary Constituent Element
PCG	Pacific Coast Groundfish
PCGF	Pacific Coast Groundfish Fishery
PDO	Pacific Decadal Oscillation
PFMC	Pacific Fisheries Management Council
PIFSC	Pacific Islands Fishery Science Center
PIRO	Pacific Islands Regional Office
PLCA	Pacific Leatherback Conservation Area
PRD	Protected Resources Division
PSATs	Pop-up Satellite Tags
PVA	Population Viability Analysis
PWSA	Port and Waterways Safety Act
RFMO	Regional Fishery Management Organization
RPM	Reasonable and Prudent Measure
SAR	Stock Assessment Report
SCB	Southern California Bight
SFD	Sustainable Fisheries Division
SRKW	Southern Resident Killer Whale
SSLL	Shallow-Set Longline
STAJ	Sea Turtle Association of Japan
SWFSC	Southwest Fisheries Science Center
TOTAL	Temperature Observations to Avoid Loggerheads
TSS	Traffic Separation Scheme
UME	Unusual Mortality Event
USCG	U.S. Coast Guard
USFWS	U.S. Fish and Wildlife Service

VMS	Vessel Monitoring System
WA	Washington
WCPFC	Western and Central Pacific Fisheries Commission
WCPO	West and Central Pacific Ocean
WCR	West Coast Region
WNP	Western North Pacific
WPFMC	Western Pacific Fishery Management Council
WPO	Western Pacific Ocean
WWF	World Wildlife Fun
XLBG	Extended Linked Buoy Gear

1. INTRODUCTION

This Biological Opinion (Opinion) provides an analysis of a Proposed Action by the National Oceanic and Atmospheric Administration's (NOAA) National Marine Fisheries Service (NMFS) to issue exempted fishing permits (EFPs), as authorized under 50 CFR 600.745(b), for the use of longline-type gear in the United States (U.S.) Exclusive Economic Zone (EEZ) off California (CA) and Oregon (OR). The use of longline-type gear to target swordfish (*Xiphias gladius*) and other pelagic highly migratory species (HMS) is currently prohibited in this area.

1.1. Background

Fisheries for HMS that occur in the U.S. West Coast EEZ and adjacent waters off the coasts of Washington (WA), OR, and CA are authorized by NMFS under the Magnuson-Stevens Fishery Conservation and Management Act (MSA) and must comply with other applicable federal statutes such as the ESA and the Marine Mammal Protection Act (MMPA). Specifically, these fisheries are managed under the HMS Fishery Management Plan (FMP; PFMC 2016; PFMC 2023) and implementing regulations. Consistent with the HMS FMP, any necessary conservation and management measures are adopted on a biennial basis through the Pacific Fisheries Management Council (PFMC or Council). These measures are implemented through the federal rulemaking process and sent to the U.S. Secretary of Commerce, through NMFS, for review and approval. Additional measures can be adopted on an emergency basis outside of the Council's bi-annual process.

At present, three commercial gear types used for commercial harvest of swordfish and other HMS in the U.S. West Coast EEZ are authorized under the HMS FMP: drift gillnet (DGN), harpoon, and the newly authorized deep-set buoy gear (DSBG; 88 FR 29545, May 8, 2023[1]). Other authorized fisheries that can result in swordfish catches outside of the U.S. West Coast EEZ include the California-based deep-set longline fishery (targeting mainly tuna), and the tropical tuna fisheries using purse seine, including the coastal purse seine fishery (small vessels) that concentrates on small pelagic species, but which also harvests northern bluefin (*Thunnus orientalis*) and yellowfin tuna (*Thunnus albacares*) when they migrate into the U.S. West Coast EEZ. DGN fishery vessels provided the majority of domestic swordfish landed to the U.S. West Coast until the mid-2000s; after which time Hawaii-based shallow-set longline (SSLL) vessels provided the majority of swordfish landings. Currently under the HMS FMP, SSLL fishing is prohibited east of 150º W, and only deep-set longline (DSLL) fishery is authorized on the high seas outside the U.S. West Coast EEZ. Except for the harpoon fishery, these fisheries (i.e., DGN

[1] On May 8, 2023, following the Council's recommendation, NMFS published a final rule (88 FR 29545) implementing Amendment 6 to HMS FMP, which authorizes DSBG as a legal gear type for targeting swordfish and catching other HMS in federal waters off of CA and OR. The rule establishes a limited entry permit system for fishing DSBG within federal waters of the Southern California Bight (SCB) and an open access permit system for fishing the gear in federal waters outside of the SCB. The rule includes definitions for two configurations of DSBG, "standard" and "linked", and specifies limited entry permitting procedures and requirements for use of the gear.

and DSBG) are multi-species and rely on revenues from other HMS, like tunas and thresher sharks, in addition to swordfish.

On December 29, 2022, President Joseph Biden signed the Driftnet Modernization and Bycatch Reduction Act (Driftnet Act).[2] This Act amends the MSA to add mesh size of 14 inches or greater to the definition of large-scale driftnet fishing at MSA §3(25), 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 directs NMFS to "consult with the Pacific Fishery Management Council on a strategy to phase out the use of large mesh driftnets and permit the use of alternative fishing methods to increase the economic viability of the West Coast-based swordfish fishery while minimizing bycatch to the maximum extent possible." During the five years from enactment to the December 2027 prohibition of the use of DGN gear, NMFS must conduct a transition program (§206(i)) to phase out use of the gear and compensate fishery participants for the cost of fishery-related permits, gear forfeiture, and purchase of alternative gear.

Since June 2014, the Council has expressed an interest in testing gear types or methods that could serve as an alternative to using DGN fishery to catch swordfish in the U.S. West Coast EEZ, or to test different approaches to contemporary DGN fishery management practices. On March 20, 2015, the Council made recommendations to NMFS to consider issuing EFPs for the use of DSBG and "modified"[3] longline gear in the U.S. West Coast EEZ off CA and OR (PFMC 2015). DSBG EFP fishing began in 2015, and was recently authorized under the HMS FMP through regulations that became effective on June 7, 2023 (88 FR 29545, May 8, 2023).

In April 2019, NMFS issued an EFP to two longline vessels to target swordfish and other HMS using modified longline gear (both SSLL and DSLL) in the EEZ off CA and OR; this EFP was litigated in federal court in California and vacated (see *Consultation History* Section 1.2). Since authorization of DSBG and issuance of the 2019 "modified" longline EFP, applicants have expressed continued interest in fishing with modified longline gear and testing measures used in the Hawaii-based longline fisheries (SSLL and DSLL), as well as other mitigation measures specific to operations within the U.S. West Coast EEZ. The Council also reviewed additional

[2] The Driftnet Act sunsets the fishery by December 2027, after which there will be no additional sets of large mesh DGN gear in federal waters. Furthermore, the Act changes potential incentives for permit holders within the five-year period before the fishery sunsets, such as to: 1) increase the incentive for DGN permit holders to fish DGN gear before use of the gear is prohibited; or 2) increase the incentive for DGN permit holders to transition their fishing interests to alternative gears before the use of DGN gear is prohibited, or both.

[3] The term "modified", as meant by the WCR SFD and this Opinion, relates to the evolution of longline fishing gear since the longline regulations under HMS FMP were implemented in 2004. At that time, the Council was preparing the original HMS FMP for NMFS review, and the proposed longline fishing practices were absent of mitigation measures (i.e., circle hooks and mackerel-type bait) being used in the Hawaii-based longline fisheries. Ultimately, regulations to implement the HMS FMP prohibited fishing vessels to target swordfish with SSLL gear east of 150° W longitude and to fish with DSLL gear inside Federal waters off the U.S. West Coast. 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).

EFP applications proposing to test other types of gear configurations using horizontal mainlines, such as “midwater snap gear (MWSG)” and “deep-set extended linked buoy gear (XLBG).” All the applicants expressly stated their interest in innovating a gear type to fish offshore waters, in areas outside of the Southern California Bight (SCB), where harpoon and DSBG have not proven easy to fish in the harsher prevailing weather and sea conditions.

The Proposed Action to issue EFPs is needed because fishing with longline gear is currently prohibited in the U.S. West Coast EEZ by Federal regulation at 550 CFR 660.712(a). Furthermore, regulations prohibit targeting swordfish with longline gear (shallow setting) west of 150° W longitude (see 50 CFR 660.712(b)). Additionally, regulations under the ESA (50 CFR 223.206(d)(9)) prohibit targeting swordfish with longline gear on the high seas east of 150° W longitude. These prohibitions were implemented 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. 2007a).

NMFS prepared the Opinion and incidental take statement (ITS) portions of this document in accordance with section 7(b) of the ESA of 1973 (16 USC 1531 et seq.), and implementing regulations at 50 CFR 402.

We also completed an essential fish habitat (EFH) consultation on the Proposed Action, in accordance with section 305(b)(2) of the MSA (16 U.S.C. 1801 et seq.) and implementing regulations at 50 CFR part 600.

We completed pre-dissemination review of this document using standards for utility, integrity, and objectivity in compliance with applicable guidelines issued under the Data Quality Act (DQA) (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001, Public Law 106-554). The document will be available within 2 weeks at the NOAA Library Institutional Repository [https://repository.library.noaa.gov/welcome]. A complete record of this consultation is on file at the West Coast Regional Office, Long Beach, California.

1.2. Consultation history

The fishing practices under the Proposed Action share similar characteristics to the 2019 Longline EFP, and EFPs issued from 2018 to 2020 for deep-set linked buoy gear (DSLBG). NMFS completed an ESA Section 7 biological opinion on July 11, 2018 (NMFS 2018a), which concluded that the fishing activities under the 2019 Longline EFP were not likely to jeopardize the continued existence of any ESA-listed species, or result in the destruction or adverse modification of critical habitat. On April 29, 2019, NMFS published a final environmental assessment (EA) for the 2019 Longline EFPs and a Finding of No Significant Impact (NMFS 2019a). NMFS issued the EFPs to two vessels in June of 2019. The vessels fished under the EFP from September 5 to December 10, 2019, completing eight fishing trips comprising 20 DSLL sets and 59 SSLL sets off California.

The fishing practices under the Proposed Action also share similar characteristics with the DSLBG configuration, which was recently added as an authorized gear type under HMS FMP (NMFS 2023a). SFD originally consulted with WCR Protected Resources Division (PRD) on DSLBG trials as EFP from 2018 to 2020. The DSLBG EFP has similarities to the proposed XLBG EFP portion of the Proposed Action. The XLBG EFP proposes a similar gear configuration as the DSLBG; however, with more hooks set per link (5 instead of 3) and more links deployed over a larger footprint (10 nm versus 5 nm). There are other details which differ, described in the *Vessels and Gear of the Longline-Type Proposed Action* section (section 1.3.1).

Issuance of the 2019 Longline EFP was followed by litigation, in which the plaintiffs alleged flaws in NMFS' biological opinion and EA. On December 20, 2019, the United States District Court for the Northern District of California ruled in favor of the plaintiffs, and vacated and set aside the 2019 Longline EFPs and the supporting biological opinion, EA, and finding of no significant impact (*Center for Biological Diversity, et al*., *v Ross, et al.*, No.4:19-cv-03135-KAW, 2019 WL 7020195 (N.D.Cal. Dec. 20, 2019)).

Following the litigation on the 2019 Longline EFP, SFD and PRD continued discussion about moving forward with EFP applications that continued to be developed and submitted to the Council for consideration. During the course of discussions held in 2022 and 2023, as SFD was preparing a draft Environmental Impact Statement (DEIS; NMFS 2024a) to address consideration of issuance of EFPs for longline-type gear use within the U.S. West Coast EEZ, the concept of developing a programmatic approach to ESA consultation that would cover the issuance of multiple EFPs with a set of defined parameters materialized. In addition, implementation of an adaptive management component to the Proposed Action also emerged as a concept to help minimize the extent of interactions with leatherback sea turtles over the course of the Proposed Action under development (herein, the term "interaction" refers to an entanglement or hooking, or some combination of these events that leads to incidental capture (or bycatch) of an individual animal with gear deployed under the Proposed Action). At various times throughout 2023 and into 2024, SFD and PRD exchanged written materials and met to discuss these concepts. Following release of the DEIS in February, 2024 (89 FR 9147), SFD and PRD increased the frequency of engagement, as PRD continued to provide technical assistance in preparation of the final Proposed Action and request for consultation. The final Environmental Impact Statement (FEIS) was made availabe on March 14, 2025 (NMFS 2025a).

On May 7, 2024, SFD requested initiation of formal consultation under section 7 of the ESA on the proposed issuance of EFPs to fish with longline-type gear in a portion of the U.S. West Coast EEZ, as described below in the *Proposed Federal Action* (Section 1.3). SFD provided a copy of the January 2024 DEIS (NMFS, 2024a) to PRD. In the letter sent on May 7th, which included a Biological Assessment (BA), SFD included a description of an adaptive management program developed in early consultation with PRD. In the BA, SFD determined that the Proposed Action *may affect and is likely to adversely affect* (LAA) Guadalupe fur seals, leatherback sea turtles, the North Pacific DPS of loggerhead sea turtles, olive ridley sea turtles, and the Eastern Pacific DPS of green sea turtles. SFD also determined that the proposed action *may affect but it is not likely to adversely affect* (NLAA) Central America and the Mexico DPSs of humpback whales, sperm whales, Western North Pacific DPS gray whales, blue whales, fin whales, North Pacific right whales, oceanic whitetip sharks, and giant manta rays that occur in or near the Proposed Action Area. Additionally, SFD determined that the Proposed Action will have *no effects* (NE) on other ESA-listed species that may occur within or near the Proposed Action Area. Furthermore, SFD determined that the Proposed Action may affect, but is NLAA the designated critical habitats for the ESA-listed leatherback sea turtle, the Southern Resident killer whale (SRKW) DPS, and the Central America and the Mexico humpback whale DPSs. Lastly, the Proposed Action Area contains EFH for HMS, groundfish, and coastal pelagic species which are protected under the MSA. SFD determined that the Proposed Action is NLAA EFH. SFD requested that PRD concur with its "not likely to adversely affect" determinations regarding the proposed issuance of this HMS longline-type EFPs and conduct formal consultation for the five ESA-listed species considered.

The ESA section 7 consultation was initiated on May 7, 2024. During consultation, PRD reviewed the interaction data from the proxy datasets used by SFD (i.e., the Hawaii-based pelagic longline fisheries, both SSLL and DSLL, and the DGN fishery, the West Coast longline fishery, and longline and linked buoy gear trials in the West Coast EEZ) thoroughly, along with other information about the species presence and potential vulnerability to bycatch, and determined that giant manta rays and oceanic whitetip sharks may also be adversely affected by the Proposed Action. Therefore, an analysis of the potential adverse effects of the action on those two species is included in the Opinion. Given additional information available, PRD also considered the potential effects of the Proposed Action on the Eastern Pacific DPS scalloped hammerhead shark.

During the consultation, SFD and PRD continued to exchange information about the Proposed Action and details related to the adaptive management program. On July 22, 2024, PRD requested clarification of several important details, including any modifications to the adaptive management program that had been discussed throughout the consultation. SFD responded with the clarifications requested on August 30, 2024, which supports conclusions in this Biological Opinion.

Updates to the regulations governing interagency consultation (50 CFR part 402) were effective on May 6, 2024 (89 Fed. Reg. 24268). We are applying the updated regulations to this consultation. The 2024 regulatory changes, like those from 2019, were intended to improve and clarify the consultation process, and, with one exception from 2024 (offsetting reasonable and prudent measures), were not intended to result in changes to the Services' existing practice in implementing section 7(a)(2) of the Act (89 Fed. Reg. at 24268; 84 Fed. Reg. at 45015). We have considered the prior rules and affirm that the substantive analysis and conclusions articulated in this Biological Opinion and incidental take statement would not have been any different under the 2019 regulations or pre-2019 regulations.

1.3. Proposed Federal Action

Under the ESA, "action" means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies (see 50 CFR 402.02).

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 a FMP or fishery regulations that would otherwise be prohibited" (50 CFR 600.745(b)). Issuance of an EFP, which is generally the subject of the Proposed Action analyzed in this Opinion, would provide such authorization. An EFP is needed to test longline-type gear within the U.S. West Coast EEZ, as well as to test mitigation measures appropriate to minimize adverse environmental impacts. There are currently no other permits, licenses, or entitlements needed to take the Proposed Action.

SFD proposes to issue multiple EFPs, including an adaptive management program discussed in early consultation, to allow interested vessels to fish with longline-type gear (constrained by terms and conditions, see sections 1.3.2, 1.3.3 and 1.3.4) in portions of the U.S. West Coast EEZ (Figure 1) to target swordfish and other marketable HMS. It is expected that EFPs targeting 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. Several no-fishing zones are considered as terms and conditions for EFPs under the Proposed Action (Figure 1; see *Additional Terms and Conditions for Longline-Type EFPs*, section 1.3.3).

The fishing effort for the Proposed Action focuses on the total number of hooks and hook depth as a key functional aspect of different fishing practices proposed for EFP activities. The overall effort (number of hooks) for the Proposed Action is divided by component, and within each component the effort is allocated among longline-type fishing practices: 1) "modified" longline gear; 2) MWSG; and 3) XLBG. The shallow-setting longline-type gear (or Component 1, SSLL) is used to set hooks at a target depth less than 100 meters (m) or ~328 feet (ft), up to a total number of 244,000 hooks set per year. The deep-setting longline-type gear (or Component 2, DSLL) is used to set hooks below 100 m, typically at a target depth between 300 to 400 m or ~984 to 1,312 ft, up to a total number of 662,400 hooks set per year. Applicants have stated that they would be using both shallow-set and deep-set gear configurations.

Typically, NMFS issues individual HMS EFPs for a 2-year period with opportunity to renew. After the initial period, the applicant, the NMFS SFD may renew an EFP or EFPs. Per regulations at 50 CFR 600.745, HMS EFP applicants must present a report on the results of the EFP and the data collected (including catch data) to NMFS. This information can be used by NMFS and to evaluate impacts of fishing activities under EFPs. The Council may provide input as to whether additional data collection is likely to be useful for making future fishery management decisions.

As discussed further below, the ESA consultation process resulted in an approach to adaptively manage fishing under the EFPs to ensure take and mortality of leatherback sea turtles is limited to not exceed the projected levels described in the EIS. The adaptive management approach also promotes the flexibility to modify terms and conditions aimed at minimizing the potential for future interactions in response to lessons learned over the course of EFP fishing. Given that continuation of the proposed action is dependent on future permit renewals and will be informed by data collection and adaptive management, there is some uncertainty as to the ultimate duration of this proposed action. Through information exchanged during consultation, SFD and PRD considered a duration of 10 years to be a reasonable analytical assumption from which to derive estimates of effects and extent of take for purposes of this ESA biological opinion's effects analysis, and for purposes of estimating extent of take for the ITS.

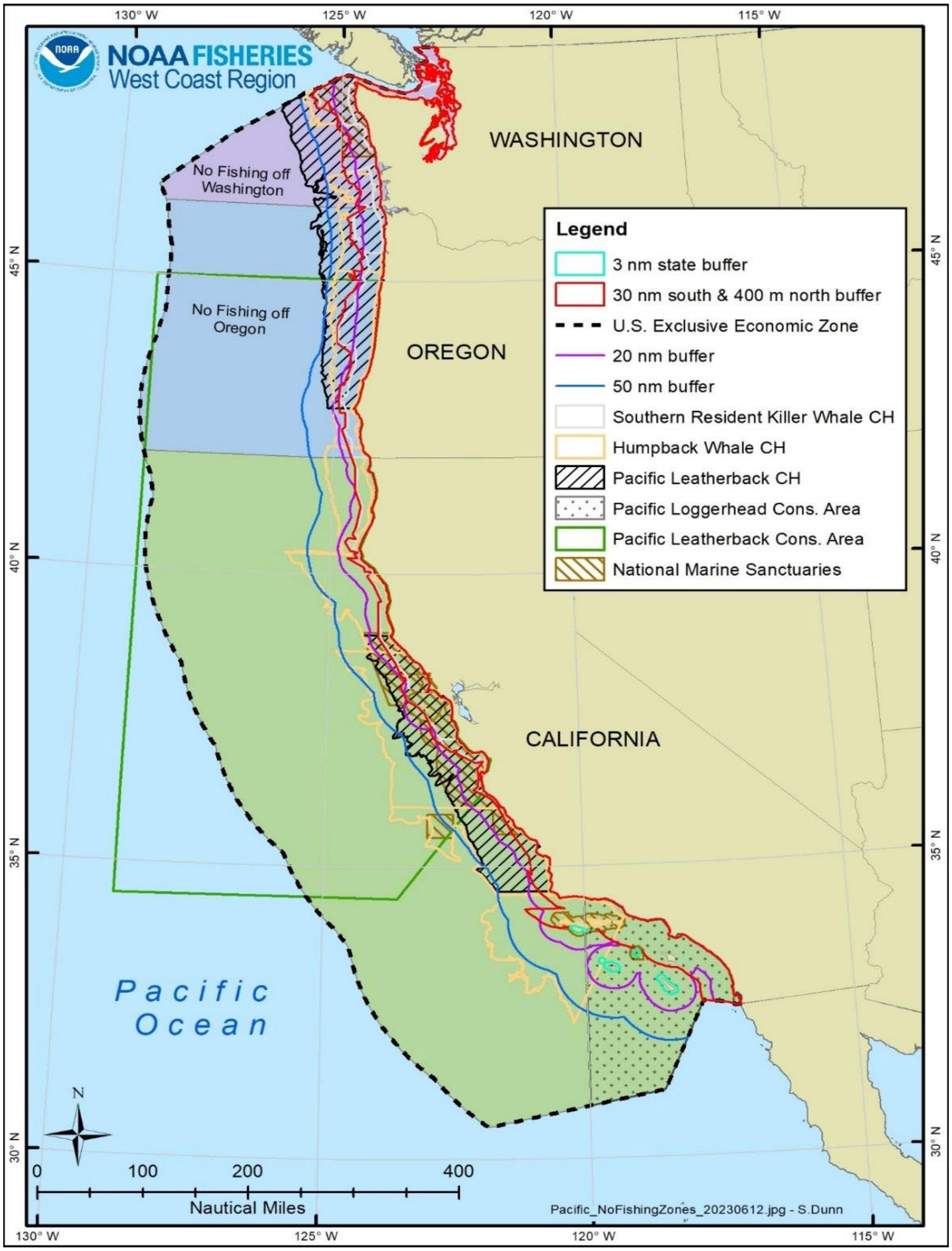

Figure 1. Coast-wide view of the U.S. West Coast EEZ along with proposed no-fishing zone areas for various components of the proposed action, including areas off Washington and Oregon, the 50 nm line, the 30 nm line, the 20 nm line, Leatherback Critical Habitat, Humpback whale Critical Habitat, Southern Resident killer whale DPS Critical Habitat, 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 which includes the Davidson Seamount (brown-hatched quadrilateral polygon)).

1.3.1. Vessels and Gear of Longline-type EFPs

In general, longline or longline-type fishing gear for HMS is an umbrella term for fishing practices that employs 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 (Figure 2). Descending from the main line are branch lines (also known as "gangions"); each ending in a single, baited hook. The main line droops in a curve from one float to the next, and usually bears between 2 to 25 "gangions". Fishing depth is determined by the length of the float lines and branch lines, and the amount of sag in the mainline between floats (Boggs and Ito 1993). Typically, longline gear is set at a shallower depth (< 328 feet, or < 100 m)) to target swordfish, and set at a deeper depth (~984 to 1,312 feet, or ~300 m to 400 m, or deeper thermocline zone) to target tuna.

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 could be used to selectively target swordfish, tunas, or other marketable HMS or to target these species as a complex. Generally, SSLL is set at sunset, and hauled in at sunrise. For DSLL, the gear is typically set at first light in the morning and hauled back close to dusk, depending on the time of year.

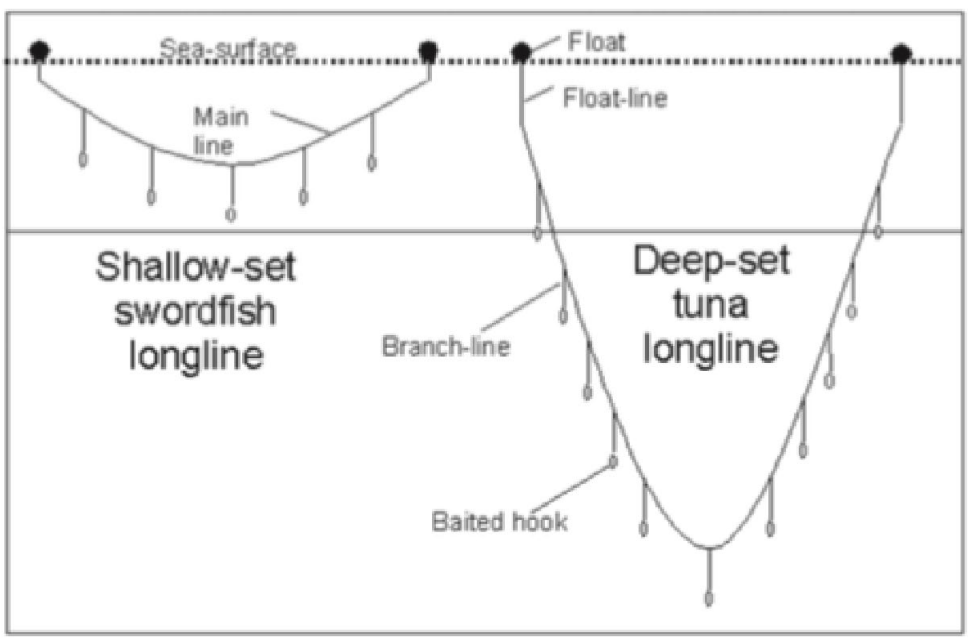

Figure 2. Longline configurations depicting shallow-set longline gear to target swordfish and deep-set longline gear to target tuna species (Maschal 2015).

General fishing practice specifications for effort that may occur under the longline-type EFPs are summarized below. More specificity on terms and conditions of the EFPs are discussed in

Additional Terms and Conditions for Longline-type EFPs, and *Adaptive Management Program under the Proposed Action* sections.

Modified Longline Gear: Modified longline is a fishing practice recommended by the Council. It is similar to fishing gear used in the Hawaii-based longline fisheries, which generally consists of a mainline that exceeds one nm and extends up to 100 kilometers (or ~62 miles) in length, suspended horizontally in the water column and supported at regular intervals by vertical float lines connected to surface floats (Figure 2). Fishing depth is determined by the length of the float lines and branch lines, and the amount of sag in the mainline between floats. The mainline droops in a curve from one float line to the next, and usually bears between 2-to-25 gangions between floats. Descending from the mainline are branch lines; each ending in a single, baited hook. EFP fishing using modified longline gear would be fished in both shallow-set and deep-set gear configurations under the Proposed Action.

The term "modified" relates to the evolution of longline fishing gear since the longline regulations under HMS FMP were implemented in 2004. At that time, the Council was preparing the original HMS FMP for NMFS review, and the proposed longline fishing practices were absent of sea turtle mitigation measures (i.e., circle hooks and mackerel-type bait) currently being used in the Hawaii-based longline fisheries. Ultimately, regulations to implement the HMS FMP prohibited fishing vessels to target swordfish with SSLL gear east of 150°W longitude, and to fish with DSLL gear inside Federal waters off the U.S. West Coast. 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).

Mid-water Snap Gear: MWSG is a new fishing practice recommended by the Council that generally consists of a mainline that exceeds one nm and extends up to 5 nm in length, suspended horizontally in the water column and supported at regular intervals by vertical float lines connected to surface floats (Figure 3). Fishing depth is determined by the length of the float lines and branch lines. Descending from the mainline are branch lines, each ending in a single, baited hook. MWSG would be fished in both shallow-set and deep-set gear configurations.

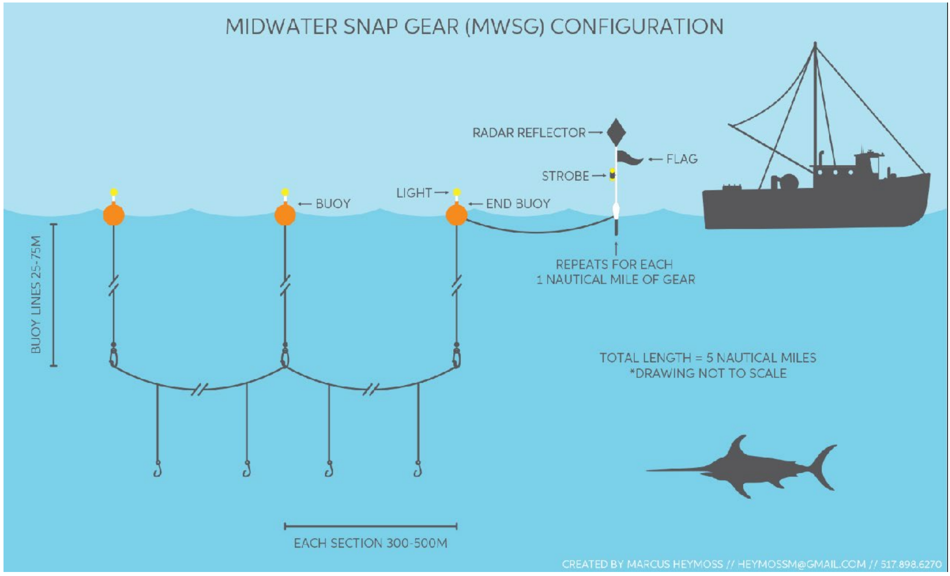

Figure 3. Basic description of mid-water snap gear (Brown 2021[4]).

Deep-set Extended Linked Buoy Gear: Deep-set XLBG is a new fishing practice recommended by the Council which was designed to resemble the authorized DSLBG, but is an extended version which consists of a mainline that exceeds one nm, extending up to 10 nm in length, suspended horizontally in the water column and supported at regular intervals by vertical float lines connected to surface floats (Figure 4). This configuration includes more hooks per section than DSLBG. Fishing depth is determined by the length of the float lines and branch lines. Descending from the mainline are branch lines, each ending in a single, baited hook. XLBG would only be fished in the DSLL gear configuration (at depths greater than 100 m) under the Proposed Action.

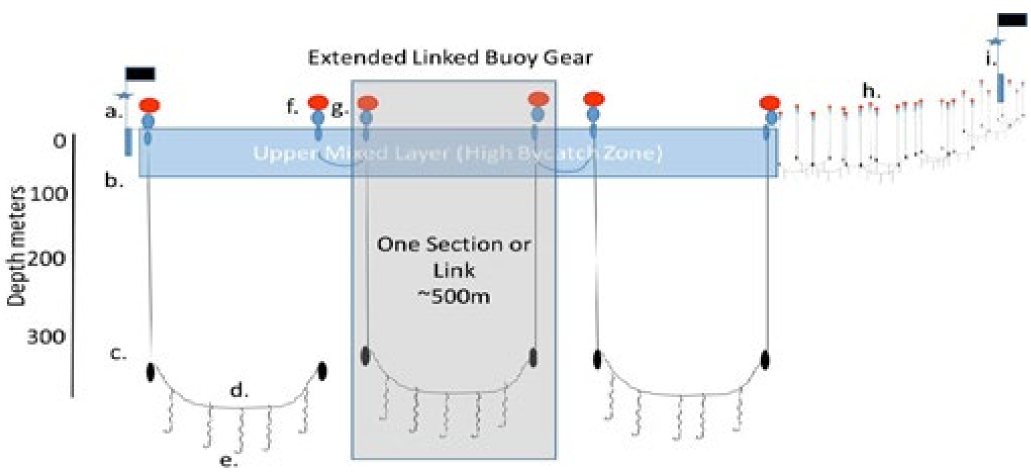

Figure 4. A drawing of Extended Linked Buoy Gear. Three terminal sections have been enlarged to visualize gear specifics (PFMC 2022).

[4] https://www.pcouncil.org/documents/2021/08/d-3-attachment-2-revised-exempted-fishing-permit-application-for-midwater-snap-gear-received-from-mr-austen-brown.pdf/

WCR SFD proposes to set an effort maximum for SSLL and DSLL components of the Proposed Action (Table 1). Hook depths serve as a distinguishing functional aspect of these different components, as described above.

Table 1. Maximum annual number of hooks permitted to be set by component for the Proposed Action.

Component	Maximum Annual Number of Hooks Set
Component 1—shallow-setting (Alternative 1-3[1])	244,000
Component 2—deep-setting: (Alternative 2-2[1])	662,400
Total annual number of hooks for shallow-set and deep-set = 906,400 **(9,064,000 hooks over 10 years of the Proposed Action)**	

[1]See section 2 under Proposed Alternatives in the final EIS for the Proposed Action (NMFS 2025a).

Based on information provided by WCR SFD, the total annual effort (as maximum annual number of hooks) allocated to each component corresponds with preferred alternatives examined in the FEIS prepared for the Proposed Action (NMFS 2025a). The total annual effort also includes a portion of unallocated effort, which considers future management of EFP activities and review of EFP applications that may be submitted in the future. Consistent with protocols described in the HMS FMP, the Council reviews applications for EFPs and provides recommendations on those applications to NMFS on an annual basis (NMFS 2024a). Table 2 describes the allocation of effort among these operations and proposed fishing practices in EFP applications received to date, and that may be permitted under this Proposed Action. The fishing practices in these applications include: “modified” longline, MWSG and XLBG. The unallocated portion of fishing effort in Table 2 reflects the amount of effort left if EFPs are issued for all of the applications currently under review as this Proposed Action is being developed. The unallocated portion of effort could be allocated to future EFPs for small-scale operations under the Proposed Action, subject to review by NMFS, who would seek input from the Council and coordination with other state and federal agencies on EFP applications. Any such future EFPs issued under this Proposed Action would be consistent with the types of EFPs described in the Proposed Action and subject to the adaptive management program described below (see *Adaptive Management Program under the Proposed Action* section). At such time a new application is being considered as part of this Proposed Action, SFD would notify PRD. Any proposed EFPs that would not fit within scope of the Proposed Action, including the elements of the adaptive management program, along with other longline-type EFPs under the Proposed Action, would require a new, separate consultation.

Under the Proposed Action, Table 2 denotes which activities are considered large-scale and small-scale operations relative to the existing U.S. longline operations in the Pacific Ocean. In consideration of an average hooks per set in the Hawaii-based longline fisheries (2004-2019), “large-scale” refers to fishing practices that would set up to approximately two-thirds of the number of hooks per set deployed in the Hawaii-based longline fisheries, while “small-scale” refers to fishing practices that would set up approximately one-third of that number of hooks. For shallow-setting, "large-scale" fishing operations could set up to roughly 700 hooks per set, and "small-scale" operations could set up to approximately 400 hooks per set. For deep-setting, "large-scale" fishing operations could set up to roughly 1,600 hooks per set, and "small-scale" operations could set up to roughly 800 hooks per set.

Table 2. Total effort (number of hooks) by component (i.e., shallow-setting and deep-setting) for longline-type EFPs, and unallocated effort to be used for adaptive management, and associated with the Proposed Action.

	Large-scale Operations	**Small-scale Operations**		
Total Effort for Proposed Action by Component	**Modified Longline EFP Annual Allocated Effort**	**Mid-water Snap Gear EFP Annual Allocated Effort**	**Extended Linked Buoy Gear EFP Annual Allocated Effort**	**Unallocated Annual Effort for Adaptive Management**
Maximum of 244,000 Shallow-set Hooks	122,00 hooks	75,000 hooks	no hooks	*47,000 hooks*
Maximum of 662,400 Deep-set Hooks	331,200 hooks	45,000 hooks	50,000 hooks	*236,200 hooks*

EFP terms and conditions for the various fishing practices under the Proposed Action are discussed in more detail below. These include terms and conditions that are mandatory for all EFPs under the Proposed Action, terms and conditions that are specific to alternative fishing practices by component, and terms and conditions that WCR SFD may consider applying to specific EFPs under a proposed adaptive management program. The adaptive management program is discussed in further detail below as well. Generally, this program includes limits on take and mortality of protected species and responses to interactions, such as adjustments to the number of allocated hooks to each fishing practice (See *Adaptive Management Program under the Proposed Action* section).

1.3.2. Regulatory Exemptions and Mandatory Terms and Conditions for Longline-type Fishing under the Proposed Action

This section describes proposed permit terms and conditions for EFPs[5] under the Proposed Action in relation to existing regulations. As described in the Analytical Approach (Section 2.1) and *Effects of the Action* (Section 2.5), because longline fishing is prohibited within the U.S. West Coast EEZ, proxy data from other U.S. fisheries is used to help assess the effects of the

[5] Permit requirements that are part of the proposed action will sometimes be referred to as "permit terms and conditions," in order to distinguish them from the distinct "terms and conditions" included to implement the Reasonable and Prudent Measures provided in this biological opinion's Incidental Take Statement.

Proposed Action. Therefore, these mandatory permit terms and conditions are reflective of operations in these other U.S. fisheries.

Regulations at 50 CFR subpart C are implemented under the Tuna Conventions Act in accordance with resolutions of the Inter-American Tropical Tuna Commission (IATTC). The United States is obligated to implement decisions of the IATTC. These regulations apply to U.S. fishing vessels fishing for HMS within the IATTC Convention Area, which includes the EEZ off the U.S. West Coast. Therefore, these regulations will apply to the Proposed Action. Similarly, we expect that regulations introduced to implement provisions of Resolutions C-23-07 (*Conservation Measures for the Protection and Sustainable Management of Sharks*) and C-23-11 (*On the Establishment of a Vessel Monitoring System*) adopted by the IATTC (89 FR 54724, August 1, 2024) will apply to the Proposed Action, upon final implementation.

Regulations at 50 CFR part 660, subpart K apply to HMS fisheries off the U.S., and Section 660.712 is specific to fishing with longline gear. EFPs issued under the Proposed Action would be exempted from 50 CFR 660.712 (a)(1) as to allow for longline-type fishing in the U.S. West Coast EEZ (Section 2.3 of the FEIS, NMFS 2025a). The following regulations at 50 CFR 660.712 are inapplicable as they apply to activities occurring outside of the Proposed Action Area: 660.712(a)(2)-(9) and (c)(1)(i). Regulations at 50 CFR 660.712(d)(1)-(5) regard conditions for using vessel monitoring systems (VMS)[6]. However, all longline-type EFPs under the Proposed Action will be exempted from these regulations in favor of explicit EFP terms and conditions for using VMS, or other suitable monitoring devices.

The following key terms and conditions are mandatory requirements for all EFPs under the Proposed Action, irrespective of whether the activities are shallow-setting or deep-setting:

1. ***Require observer coverage***: All vessels would be subject to the requirement to carry an observer when requested by NMFS, as required in existing regulations at 50 CFR 660.719. Because funding levels for observer coverage vary across fiscal years and funding allocation must balance management needs across a range of fisheries, this general requirement is intentionally intended to be flexible as to account for changes in these types of conditions. Nonetheless, NMFS proposes to request all EFP applicants under the Proposed Action, through issuance of EFPs with terms and conditions, to carry an observer, as to ensure scientific data collection by NMFS-trained observers in addition to other EFP reporting requirements. Therefore, this Proposed Action is expected to operate under a 100% observer coverage for monitoring and data collection. If future changes to this mandatory requirement would be needed due to changes in funding allocations or other unforeseen reasons, SFD will engage with PRD for further technical assistance. See the section below, *Additional Terms*

[6] 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, surveillance and enforcement of area and time restrictions and other fishery management measures.

and Conditions for Longline-type fishing under the Proposed Action, for further detail on observer coverage requirements (see number 1 in the list).

2. ***Successfully complete a Protected Resources Workshop*: ** Commensurate with existing regulations at 50 CFR 660.712(e), WCR SFD will require prospective EFP holders and captains to participate in a protected species workshop prior to receipt of their EFPs. If and when alternate captains are considered for EFP vessels, they will be required to participate in a protected species workshop before their name can be added to any EFP.
3. ***Possess onboard a valid Pacific HMS permit:*** All EFP vessels will be required to have a Pacific HMS permit onboard, in addition to their EFP, when participating in EFP activities.
4. ***Require all vessel to have a VMS installed and in use:*** While the EFPs under the Proposed Action would exempt EFP holders from existing VMS regulations at 50 CFR 660.712(d)(1)-(5), the terms and conditions of the EFPs would require all participating vessels to have a VMS unit installed onboard and in use during EFP activities. See the section below, *Additional Terms and Conditions for Longline-type Fishing under the Proposed Action,* for further detail on ping rates (see number 27 in the list).
5. ***Require carrying and use of specific equipment for handling and releasing 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)). EFPs issued under the Proposed Action will not be exempt from this regulation. See the section below, *Additional Terms and Conditions for Longline-type Fishing under the Proposed Action*, for further detail (see numbers 32 and 36 in the list).
7. ***Fishing under the Proposed Action is authorized only for Federal waters of the U.S. West Coast EEZ:*** EFP vessels must fish in federal waters inside the U.S. West Coast EEZ (Figure 1) only. Additional management zones or area closure within the Proposed Action Area apply to EFPs under the Proposed Action. See the section below, *Additional Terms and Conditions for Longline-type Fishing under the Proposed Action*, for further detail (see numbers 2, 3, 4, 8, 9, 31, and 35 in the list).
8. ***Prohibition on shark finning and landing of shark fins:*** As required by the Shark Conservation Act of 2010, EFP vessels 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.

In addition to the above mandatory terms and conditions for all EFPs under the Proposed Action, the following is a list of mandatory EFP terms and conditions for different types of fishing practices by the respective effort component (i.e., whether the fishing practice involves shallow- or deep-setting). EFP vessels may only deploy one of the fishing practices at a time (e.g., shallow-set or deep-set for any set). These EFP terms and conditions specify commonly accepted mitigation measures that are in place for deterring or managing interactions with sea turtles and seabirds in U.S. longline-type fisheries. These mandatory terms and conditions are described further below, and are summarized in Table 3. Because hooks set under the proposed XLBG EFP are to be set below 100 m, this configuration resembles a deep-set operation. Also, the use of a heavy weighting system (see *Additional Terms and Conditions for Longline-Type Fishing Under the Proposed Action* number 44 in the list) is regarded as having a similar effect as the mandatory terms and conditions for modified longline and MWSG EFPs. That is, the purpose and function of the heavy weighting system is to get hooks to depth quickly and maximize the tautness of fishing gear during deployment and minimize the likelihood for entanglements or interactions with unwanted or protected species.

Table 3. Mandatory terms and conditions by Component 1 (shallow-setting) and Component 2 (deep-setting) for the Proposed Action.

<table>
<tr><th>Shallow-setting (Component 1)
244,000 total hooks</th><th>Large-scale
Modified Shallow-set Longline
122,00 hooks</th><th>Small-scale
Mid-water Snap Gear (shallow-setting)
75,000 hooks</th><th>Small-scale
Extended LBG
no hooks</th></tr>
<tr><td>Shallow-setting Mandatory Terms & Conditions</td><td colspan="2"><u>Sea Turtle Terms and Conditions:</u>
● Must use large circle hooks and mackerel-type bait

<u>Seabird Terms and Conditions:</u>
● Vessels that side-set must:
o Use branch lines that have a minimum 45 g weight within 1 m of each hook
o 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
o When seabirds are present, set gear so hooks remain underwater and do not rise to the surface
o A line shooter not required; however, if used, mountas far forward on the port or starboard side of the vessel as possible
● Vessels that stern-set must:
o Night set: begin set at least one hour after sunset and finish setting before sunrise
o Use at least one tori line
o Ensure the mainline is set slack, including when using basket-style gear
o Use minimum vessel lights necessary for navigation and safety</td><td></td></tr>
</table>

Table 3 (Continued). Mandatory terms and conditions by Component 1 (shallow-setting) and Component 2 (deep-setting) for the Proposed Action.

Deep-setting (Component 2) 662,400 total hooks	**Large-scale** **Modified Deep-set Longline** (331,200 hooks)	**Small-scale** **Mid-water Snap Gear (shallow-setting)** (45,000 hooks)	**Small-scale** **Extended LBG** (50,000 hooks)
Deep-setting Mandatory Terms & Conditions	Gear Terms & Conditions: ● Deploy fishing gear such that the deepest point of the mainline between any two floats is set at a depth greater than 100 m (~328 ft) below the sea surface Protected Species Terms and Conditions: ● Must use large circle hooks ● Unless using a heavy weighting system (#44), deploy in a manner consistent with the specifications below: o Each float line must be at least 20 m long o Attach as least 15 branch lines between two consecutive floats (basket gear-at least 10 branch lines) o Light sticks are prohibited from use when deep-setting ● Unless using a heavy weight system (#44), vessels that side-setting must: o Use branch lines that have a minimum 45 g weight within 1 m of each hook o 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 o Mainline set from port or starboard side, as far forward as possible o When seabirds are present, set gear so hooks remain underwater and do not rise to the surface o A line shooter is not required; however, if used, mount it as far forward as possible on the port or starboard side of the vessel as possible ● Unless using a heavy weighting system (#44), vessels that stern-set must: o Use one tori line o When using monofilament gear, use a line shooter o Use branch lines that have a minimum 45g weight within 1 m of each hook o When using basket-style gear ensure the mainline is set slack.		Gear Terms & Conditions: a) Deploy fishing gear such that the deepest point of the mainline between any two floats is set at a depth greater than 100 m (~328 ft) below the sea surface

Mandatory Shallow-setting (Component 1) Terms and Conditions:

The following mandatory EFP terms and conditions would be specific to Component 1 of the Proposed Action, and will be required in addition to the eight terms and conditions for all longline-type EFPs discussed above.

Sea Turtle Terms and Conditions:

- ***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 would be 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 reduce the risk of interactions with sea turtles during fishing activities, and to increase the survival of sea turtles that may be accidentally caught. This hook and bait type have been shown to reduce the likelihood and severity of sea turtle interactions, 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 SSLL 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:

- ***Follow best practices for seabird avoidance and protection measures when side-setting shallow-set gear***: 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 would be followed in a matter consistent with the criteria as detailed in the FEIS (NMFS 2025a).

- ***Follow best practices for seabird avoidance and protection measures when stern-setting shallow-set gear***: 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-based SSLL fishery (50 CFR 665.815 (a)(2)(v) and 50 CFR 665.815 (a)(4)). The measures would be followed in a manner consistent with the criteria as detailed in the FEIS (NMFS 2025a).

Mandatory Deep-setting (Component 2) Terms and Conditions:

The following mandatory EFP terms and conditions would be specific to Component 2 of the Proposed Action, and will be required in addition to the eight terms and conditions for all longline-type effort discussed above.

Gear Terms and Conditions:

- ***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 would be 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:

- ***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 (as described in additional measure number 44 for XLBG), these gear specifications are mandatory and are similar to the definition of "deep-set" or "deep-setting" in regulations for the Hawaii DSLL fishery (50 CFR 665.800 Definitions).
    - Each float line would be at least 20 m (65 ft 7 in.) long. The definition of "float line" means a line used to suspend the main longline beneath a float
    - At least 15 branch lines would be attached 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

- ***Deep-setting vessels fishing under the Proposed Action would be required to use large circle hooks*****:** See the section below, *Additional Terms and Conditions for Longline-Type Fishing Under the Proposed Action*, which describes further constraining circle hook size to 16/0 for all deep-setting EFP operations (see number 19). Regulations in place for the Hawaii-based DSLL fishery require the use of 32 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 large 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).

- ***Unless using a heavy weighting system, EFP vessels that deploy deep-set longline-type gear by side-setting must follow the following practices*****:** These measures are similar to requirements for the Hawaii DSLL fishery (50 CFR 665.815(a)(1)) and would be followed in a manner consistent with the criteria as detailed in the FEIS (NMFS 2025a).

- ***Unless using a heavy weighting system, deep-setting vessels that stern-set would be required to follow the following best practices for seabird avoidance and protection*****:** These best practices would include the use of a tori line, a line shooter, proper branch line weights, and when using basket-style gear ensure the mainline is set slack. Unless using a heavy weighting system (as described in *Additional Terms and Conditions for Longline-Type Fishing Under the Proposed Action* measure number 44 for XLBG), vessels that stern-set would be required to deploy deep-set gear consistent with best practices described in the FEIS (NMFS 2025a).

1.3.3. Additional Terms and Conditions for Longline-type Fishing under the Proposed Action

The following additional EFP terms and conditions, which are further summarized in Table 4, are measures specific to the EFP operations under the Proposed Action occurring within the U.S. West Coast EEZ, beyond those included in Tables 2 and 3.[7] Because there is little to no data available from use of the proposed gear and measures in the action area on which to quantitatively evaluate likely effects of incorporating these terms and conditions as part of the Proposed Action, WCR SFD included qualitative considerations for inclusion of these additional EFP terms and conditions, as well as other potential measures that NMFS may consider making as terms and conditions of EFPs in the future based on data collected, lessons learned from EFP activities, or as responses to triggers described in the *Adaptive Management Program under the Proposed Action* section below.

The intent of these additional, precautionary measures is to limit the take by minimizing the risk of interactions with ESA-listed species, and help ensure that the effects of the activities under the Proposed Action do not exceed what has been anticipated based on proxy datasets, bolster safety-at-sea for EFP operations, and enhance monitoring and enforcement of the EFP activities. As indicated above, some of these EFP terms and conditions further tighten constraints described in mandatory EFP terms and conditions included above (e.g., observer coverage requirement, circle hook size), which are based on existing regulations. For a more detailed description of the full menu of these additional measures, we refer to section 4.8 in the FEIS for the Proposed Action (NMFS 2025a).

1. ***Require human observer coverage*****:** All EFP vessels would be required to carry a human observer (100% coverage of EFP fishing practices) for purposes of monitoring fishing activities and onboard data collection, and until such time when NMFS has determined, through coordination between SFD and PRD, that reduced human observer coverage levels may provide a sufficient level of monitoring coverage, or other

[7] These measures are enumerated and in sequential order, but some numbers in sequence will appear missing. This is because WCR SFD selected the additional terms and conditions listed below (and summarized in Table 4) from a broader menu of additional terms and conditions considered in the FEIS for the Proposed Action (NMFS 2025). Note, the numbers of the additional terms and conditions changed from the DEIS to the FEIS.

monitoring methods can serve the purpose of monitoring needs under the Proposed Action or both.

2. ***EFP fishing prohibited in waters off the State of Washington (north of the WA/OR border at 46° 15′ N latitude)*****:** All EFP vessels would be prohibited to fish for HMS in waters off the State of Washington (north of the WA/OR border; see Figure 1) for all EFP fishing practices.

3. ***EFP fishing prohibited in waters off the State of Oregon (north of the OR/CA border at 42° N latitude and south of the WA/OR border at 46° 15′ N latitude)*****:** All EFP vessels would be prohibited from fishing in federal waters off the State of Oregon (north of the OR/CA border and south of the WA/OR border; see Figure 1) for the first year of the Proposed Action. This area would be open to EFP fishing after the first year.

4. ***Include National Marine Sanctuaries (NMSs) areas (including the Davidson Seamount Management Zone) in the no-fishing zone*****:** EFP fishing would be prohibited in NMSs (Figure 1) only for large-scale modified longline EFPs.

8. ***No fishing within the Pacific Leatherback Conservation Area (PLCA) during the closure period***: EFP fishing would be closed to the deep-setting component of the large-scale modified longline EFP vessels during the PLCA closure period (August 15 to November 15).

9. ***Use of the Temperature Observations to Avoid Loggerheads (TOTAL) tool to inform closure of the Pacific Loggerhead Conservation Area (LCA)*****:** The TOTAL tool (Welch et al. 2019) would be used to trigger a time-area closure of the LCA for large-scale modified longline and MWSG EFPs when the sea surface temperature conditions reach a threshold for concern of increased loggerhead presence off southern California, consistent with criteria specified in 50 CFR 660.713(c)(2).[8]

13. ***Prohibit use of wire leaders*****:** The use of wire leaders would be prohibited to help prevent sharks from biting through the leaders and preventing quicker release without prior hook removal from sharks incidentally caught, to the extent possible.

14. ***Mako and blue shark post-release mortality research*****:** Large-scale modified longline EFP vessels would be required to participate in a post-release tagging study to evaluate post-release survival of blue sharks (*Prionace glauca*) and shortfin mako sharks (*Isurus oxyrinchus*).

15. ***Use of EcoCast, a near real-time dynamic ocean management tool*****:** All EFP captains would be required to evaluate and validate EcoCast predictions, which have been previously developed to inform bycatch avoidance strategies in the Proposed Action

[8] https://coastwatch.pfeg.noaa.gov/loggerheads/

Area.[9] This will include reporting on conditions experienced on the fishing grounds after consulting predictions made by EcoCast prior to fishing. EFP captains are encouraged to work cooperatively with scientists from the Southwest Fisheries Science Center (SWFSC). While this process may evolve during the Proposed Action, initial expectations are that EFP participants will be required to report on use of the tool for each trip.

16. ***Prohibit the use of "lazy lines"*****:** The use of lazy lines, which are branchlines that are unclipped from the mainline as gear is retrieved and hung from the side of the vessel, would be prohibited for all EFP vessels to help prevent unintended interactions.

17. ***Hook depth >30 m***: All hooks set under MWSG EFPs would be required to be below 30 m.

18. ***Require the use of only mackerel-type bait when deep-setting*****:** All EFP vessels for deep-setting under large-scale modified longline EFPs would be required to use mackerel-type bait only (i.e., no squid bait).

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˚*****:** Require use of only 18/0 circle hooks with shallow-setting, and deep-setting using a size range between 16/0 to 18/0 size under large-scale modified longline and MWSG EFPs.

20. ***Use of a hydraulic line shooter during EFP operations*****:** All EFP vessels fishing under small-scale XLBG and MWSG EFPs would be required to use a line shooter, unless MWSG EFP vessels are engaged in basket-style side 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***: All EFP vessels fishing under MWSG EFPs would be required to use a nylon monofilament branch line or leader, and follow these specifications 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 is to assemble the gear such that the hook is the weakest component of the terminal tackle.

[9] EcoCast is a dynamic ocean management tool that uses near real-time fisheries observer data and satellite-derived environmental data to predict where the target species (broadbill swordfish) and bycatch species (e.g., leatherback turtle) are likely to be each day (Hazen et al. 2018). This tool can help minimize bycatch of ESA-listed species by generating daily maps that can be used by EFP captains to inform their fishing effort and optimize the harvest of target species while minimizing bycatch of protected species (https://coastwatch.pfeg.noaa.gov/ecocast/).

26. ***Use the Hawaii-based longline fishery "flyback prevention device" for fishermen safety while using monofilament leaders*:** All EFP vessels would be strongly encouraged to use of a flyback prevention device in the absence of wire leaders (e.g., additional term and condition #13) to increase safety of crew and improve safe-handling and release capabilities.

27. ***VMS ping rates at once per hour, or more frequent for specific EFPs*:** The use of current ping rates (once per hour) would be required for all EFP vessels.

30. ***Gear to be clearly marked and lit, and never set in shipping lanes, areas of high traffic, or areas where whale activity is observed*:** Captains and crews fishing under large-scale modified longline and MWSG EFPs would be required to 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.

31. ***No longline fishing within 50 nm of the mainland shore and islands*:** All large-scale modified longline EFP vessels would be required to observe this no fishing zone (see Figure 1).

32. ***Annual limit on the incidental catch of striped marlin*:** All large-scale modified longline EFPs would be required to operate under an annual incidental catch limit of striped marlin. Once the limit is reached, fishing under all large-scale modified longline EFPs will cease for the remainder of the calendar year. The annual incidental catch limit for shallow-setting vessels is 12 striped marlin, and for deep-setting vessels is 132 striped marlins.

33.[10] ***Limits on number of hooks on any shallow-set to 700 or fewer, and on any deep-set to 1,600 or fewer***: Large-scale modified longline EFP operations would be constrained to fish with roughly two thirds or less of the average hooks per set fished in the Hawaii-based longline fisheries occurring offshore (i.e., outside of the EEZ).

35. ***No fishing shore-side within 30 nm of the mainland shore when south of Point Conception,[11] and no fishing shore-side of the generalized 400 m depth contour when north of Point Conception***: All EFP vessels fishing with MWSG and XLBG EFPs would be required to observe this no-fishing zone (see Figure 1).

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[10] This EFP term and condition was not originally included in section 4.8 of the DEIS (NMFS 2024a). The numeration for this condition does not refer to the same condition #31 in the DEIS, which described the no-fishing within 20 nm of the mainland shore and islands which was further excluded in the current framework for the adaptive management program. The enumeration of the additional terms and conditions reflect those listed in the FEIS (NMFS 2025a).

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

36. ***Annual limit of 10 striped marlins incidentally caught during EFP fishing***: All EFP vessels fishing with MWSG EFPs would be required to operate under an annual incidental catch limit of 10 striped marlins (based on Council recommendation). Once the limit is reached, fishing under all MWSG EFPs will cease for the remainder of the calendar year.

37. ***All non-marketable live sharks will be released alive, and all dead sharks must be retained unless prohibited from commercial take***: All captains and crew fishing with MWSG EFPs would be required to take reasonable steps for releasing live sharks carefully (following best practices, see #37 in the FEIS, NMFS 2025a) without compromising human safety (we note this could include future regulations implementing requirements for shark handling by U.S. longline vessels fishing for tuna or tuna-like species in the Eastern Pacific Ocean (EPO), which were implemented at 300.27(k)(2) to require release of incidentally caught sharks by leaving them in the water and cutting the branchline so that less than 1 meter remains on each animal).

38. ***Each buoy will have a plastic breakaway link connecting buoy and buoy line***: All EFP vessels fishing with MWSG EFPs would be required to include a plastic breakaway link at each buoy connecting the buoy and buoy line.

39. ***Limits on number of hooks on any shallow-set to 400 or fewer, and on any deep-set to 800 or fewer***: All EFP vessels fishing with MWSG EFPs would be required to observe a limit of 150 hooks per set, and all EFP vessels fishing with XLBG EFPs would be required to observer a limit of 100 hooks per set.

40. ***Limit total mainline length to less than 5 nm***: For all EFP vessels fishing with MWSG EFPs, the mainline length would be required to be limited to 5 nm or less.

41. ***Limit total mainline length to less than 10 nm***: For all EFP vessels fishing with XLBG EFPs, the mainline length would be required to be limited to 10 nm or less.

42. ***Limit soak time***: For all EFP vessels fishing with MWSG EFPs, the soak time of the fishing gear would be required to be limited to 4 hours or less to facilitate active tending of the gear.

43. ***Use of gear tending***: For all EFP vessels fishing with MWSG and XLBG EFPs, the distance at which the vessels may be from their fishing gear would be required to be limited to 3 nm. 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.

44. ***Use of a heavy weighting system***: All EFP vessels fishing with XLBG EFPs would be required to use weights greater than 1.8 kg or 4 lbs. Use of a heavy weighting system provides rapid descent rates to get hooks below the thermocline faster, maintain hooks at a constant depth, and keep vertical lines taut.

45. ***Use of a strike indicator***: All EFP vessels fishing with XLBG EFPs would be required to use a float system to detect strikes and allow for service of gear when a hooked species is on the line.

Table 4. Additional terms and conditions by EFP type under the Proposed Action.

Large-scale **U.S. West Coast Modified Longline**	**Small-scale** **Mid-water Snap Gear**	**Small-scale** **Extended LBG**
Shallow- or Deep-setting: #1—Require observer coverage #2—No fishing in WA waters #3—No fishing in OR waters in first year of EFP #4—No fishing in National Marine Sanctuaries #9—TOTAL for Loggerhead Conservation Area #13—Prohibit wire leaders #14—Mako & blue shark research #15—Evaluate and validate EcoCast predictions #16—No lazy lines #19—Hook size (16/0 or greater for DS; 18/0 for SS) #26—Flyback prevention device #27—Current VMS ping rates #30—Clearly marked and lit for ships and whales #31—50 nm no-fishing zone from mainland and islands #32—Limit striped marlin based on catch projections #33—Limit on hooks (700/set SS and 1,600/set DS) **Deep-setting:** #8—No fishing in PLCA (Aug 15-Nov 15) #18—Only mackerel-type bait for DSLL	**Shallow- or Deep-setting:** #1—Require observer coverage #2—No fishing in WA waters #3—No fishing in OR waters in first year of EFP #9—TOTAL for Loggerhead Conservation Area #13—Prohibit wire leaders #15—Evaluate and validate EcoCast predictions #16—No lazy lines #17—Hook depth >30m #19—Hook size (16/0 or greater for DS; 18/0 for SS) #20—Use of a line shooter #21—2.0 mm diameter leader #26—Flyback prevention device #27—Current VMS ping rates #30—Clearly marked and lit for ships and whales #35—30 nm no-fishing zone from mainland south of Pt. Conception and limit fishing north of Pt. Conception to 400m depth contour #36—Limit 10 striped marlin #38—Plastic breakaway on buoy #39—Limit on hooks (150/set) #40—Mainline limited 5 nm #42—Limit on soak time (≤4 hours) #43—Gear tending	**Deep-setting only:** #1— Require observer coverage #2—No fishing in WA waters #3— No fishing in OR waters in first year of EFP #13—Prohibit wire leaders #15—Evaluate and validate EcoCast predictions #20—Use of a line shooter #27—Current VMS ping rates #35—30 nm no-fishing zone from mainland south of Pt. Conception and limit fishing north of Pt. Conception to 400m depth contour #39—Limit on hooks (100/set) #41—10 nm gear footprint #43—Gear tending #44—Use of a heavy (≥4lbs) weighting system #45—Use a strike indicator

1.3.4. Adaptive Management Program under the Proposed Action

To caution against uncertainty in estimation of leatherback[12] interactions for the Proposed Action based on proxy datasets (see Section 2.1 *Analytical Approach* section below), and to minimize the number of leatherback interactions that would occur under the Proposed Action, NMFS proposes to "adaptively manage" EFPs operating under the Proposed Action according to an additional set of programmatic EFP terms and conditions and potential management measures for responding to instances of take and mortality of leatherback sea turtles. Together, this suite of management responses and EFP terms and conditions are referred to as the "adaptive management program" for the Proposed Action. For the purpose of monitoring take, NMFS proposes a monitoring period of five years. The monitoring period does not sunset, but rather continues on a rolling basis throughout the anticipated duration of the Proposed Action. Commensurate with proposed programmatic EFP terms and conditions (described in more detail below), a suite of management measures are identified as potential revisions to the aforementioned terms and conditions for various EFPs under the Proposed Action as responses to instances of interactions, such as to further constrain the likelihood of future leatherback interactions.

In this adaptive management program, and commensurate with what initially proposed, NMFS proposes to (1) set limits on interactions and mortality of leatherback sea turtles within a 5-year monitoring period under the Proposed Action, (2) phase-in permitting of large-scale EFP operations after permitting and collecting data on small-scale EFP operations, and (3) re-evaluate terms and conditions in response to any instances of leatherback interactions and mortality in prescribed ways described below. The intent in proposing this approach is to reduce the likelihood of future leatherback interactions, if and when they occur. The program for managing terms and conditions is described as "adaptive" in that the prescribed responses to interactions and "phased-in" issuance of permits are: (1) reflective of our expectations towards risk, and (2) responsive to continuous (either annual or multi-year based) takes as a way to re-adjust the framework and provide enough discretion to factor learning into the management response.

Programmatic Responses to Instances of Interactions or Observed Mortality

NMFS proposes the following programmatic responses to instances of leatherback sea turtle interactions or mortality within a given year or multi-year timeframe over the monitoring period. These programmatic responses are intended to reduce the likelihood of future leatherback sea turtle interactions occurring under the Proposed Action, in response to any interactions as they occur (if they occur).

As indicated in the *Proposed Federal Action* section, sea turtle mitigation measures will apply to all EFPs under the Proposed Action (50 CFR 660.712(b)). These measures include carrying on-board specific equipment and practices to use in instances of interactions to promote safe-release

[12] 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 (85 FR 57988, September 17, 2020).

and minimize injury of sea turtles. Additionally, EFP vessels will be required to carry NMFS-trained observers unless and until another mode of monitoring is deemed sufficient.

Upon any instance of interactions, NMFS-trained observers will assess the situation and make notes, including recording the deposition of the animal, as:

- Released Alive (freely swimming away with no gear remaining),
- Released Injured (visible injury, gear attached), or
- Released Dead (after attempted resuscitation for up to 24 hours per handling and release requirements), or
- Released Unknown (not likely to be used).

Once notified of an instance of leatherback sea turtle interaction during EFP activities under the Proposed Action, SFD will immediately contact the vessel involved in the take and any other EFP vessels for which their longline-type fishing practice has been associated with interactions as a result of the Proposed Action, and notify these EFP vessels to cease fishing immediately. NMFS believes it is reasonable to expect that the period of time between the occurrence of take and cessation of fishing by an EFP vessel or vessels should not exceed 3 days (i.e., 72 hours). In response to the interaction, NMFS will convene a "tiger team," inclusive of staff from WCR SFD, PRD, and SWFSC, to review records and information collected by the observer and/or directly from fishermen pertaining to the interaction. Once the onboard observer returns from the fishing trip, the WCR Observer Program will debrief the observer. The "tiger team" will use information about the interaction and criteria identified in Ryder et al. (2006) to estimate post-release mortality and make recommendations to SFD for implementation of revised terms and condition/measures to help minimize the number of future leatherback interactions and the extent of their injuries as quickly as possible, in accordance with the programmatic responses described for the leatherback sea turtle interaction and mortality thresholds below:

- ***Upon the first interaction of a leatherback in a given year***, the EFP vessel engaged in the interaction will cease fishing immediately. EFP fishing by that vessel cannot resume until NMFS has considered revisions to the terms and conditions of that vessel's EFP and other EFPs for that longline-type fishing practice. NMFS may reissue the EFP (or EFPs) with revised terms and conditions.

- ***Upon the second interaction of a leatherback in a given year,*** the EFP vessel engaged in the interaction and all other vessels engaged in a longline-type fishing practice under an EFP that has been associated with an interaction occurring within the monitoring period will cease fishing immediately for the remainder of the calendar year. EFP fishing by these vessels cannot resume until authorization is granted by NMFS. NMFS may revise the terms and conditions of the EFP for the vessel engaged in the interaction and any other EFPs issued for that longline-type fishing practice. Such revisions could include reducing effort limits for the remainder of the calendar year or shifting effort to other EFP operations or both. For those EFP vessels that may continue fishing with longline-type fishing practices that have not been associated with any prior interactions, fishing must cease immediately and for the remainder of the calendar year if any form of take occurs, and may not resume fishing until authorization is granted by NMFS. In the interim, NMFS may revise the terms and conditions for any longline-type fishing practices associated with an interaction or decide to delay authorization into the subsequent fishing year, or both.

  - ***If two leatherback turtles interact with large-scale longline operations in a given year,*** NMFS will revise terms and conditions for those EFPs, as well as the effort limits of the EFPs operating under the program such as to shift effort allocated to large-scale longline operations to small-scale operations for the remainder of the calendar year and for the subsequent year (i.e., large-scale longline operations will observe a gap year). Large-scale longline operations can reopen in the third year from the year with two interactions by large-scale operations only if fewer than two interactions occur in the small-scale sector during the gap year.

  - ***If two leatherback turtles interact with small-scale operations in a given year,*** NMFS will revise terms and conditions for those EFPs, as well as the effort limits of the EFPs operating under the program. However, the effort allocated to small-scale operations will not be shifted to large-scale operations for the remainder of the calendar year or the subsequent year (i.e., small-scale operations will not be required to observe a gap year).

- ***If there are five leatherback interactions within three consecutive years of the monitoring period***, all EFP fishing ceases immediately and for the remainder of the calendar year for all vessels with EFPs for longline-type fishing practices that have been associated with an interaction during the monitoring period. Fishing cannot resume in subsequent years until authorization is granted by NMFS. NMFS may revise terms and conditions of EFPs for longline-type fishing practices associated with interactions or delay authorization to resume fishing into the subsequent year, or both. Vessels engaged in fishing under EFPs for longline-type fishing practices that have not been associated with any prior interactions may continue fishing, but must cease fishing immediately and for the remainder of the calendar year if any form of take occurs, and may not resume fishing until authorization is granted by NMFS, whom may revise the terms and conditions of EFPs for that longline-type fishing practice in the interim or delay authorization into the subsequent fishing year or both.

- ***Upon an observed mortality in any given year***, all fishing ceases immediately and for the remainder of the calendar year by vessels engaged in the EFP fishing practice that caused the mortality. If the mortality occurs within the large-scale longline sector of the deep-set component, then effort will shift to the small-scale sector of the deep-set component in subsequent years, and all large-scale longline shallow-set operations will be subject to the PLCA closure period in subsequent years. If the mortality occurs in the large-scale longline sector of the shallow-set component, the effort would shift to the small-scale sector of the shallow-set component in subsequent years, and all shallow sets would be prohibited from occurring in the PLCA. If the mortality occurs within the small-scale sector, then the large-scale sector and all vessels fishing under EFPs for the small-scale fishing practice causing the mortality will be subject to the PLCA closure in subsequent years.

- ***If there is more than one observed mortality or estimated mortality exceeds 1.9 within the monitoring period***, all vessels operating under an EFP for a longline-type fishing practice that has been associated with prior take within the monitoring period must cease fishing immediately. Vessels engaged in longline-type fishing practices under EFPs for which no prior interactions occurred may continue fishing, but must cease fishing immediately if any form of take occurs. In both instances, vessels must cease fishing immediately and until granted authorization to resume fishing from NMFS WCR, which in no event will be before NMFS completes a formal ESA Section 7 consultation on the continued operation of the EFP. Based on review of the tiger team's assessments of instances of take within the monitoring period, NMFS may revise terms and conditions for any vessels operating under the Proposed Action. Such revisions could include time or area closures or a reduction in allowable fishing effort.

- ***In the event of three interactions*** occurring in a given year**,** NMFS may revise terms and conditions for any vessels operating under the Proposed Action based on review of the tiger team's assessments of interactions within the monitoring period. Such revisions could include time and/or area closures or a reduction in allowable fishing effort.

<u>*Suite of Potential Terms and Conditions for "Adaptive Management"*</u>

SFD would evaluate revising the terms and conditions for EFPs described in the Proposed Action upon instances of a leatherback interaction or observed mortality as described above. Attachment 3 of the BA included a list of additional measures SFD has considered applying as terms and conditions of EFPs under the Proposed Action, as well as a qualitative discussion of the intended or potential effects of these measures. Based on conditions involving interactions, or in response to other lessons learned or data collected from EFP activities under the Proposed Action, SFD may revise terms and conditions to add measures that are not being proposed for terms and conditions at this time. Further, SFD may wish to revise terms and conditions to include measures that have not been identified in Attachment 3 of the BA.

Generally, SFD anticipates that collecting the necessary information on a take, convening the tiger team, estimating post-interaction mortality and making recommendations for management, and having management propose and clear any revisions to permit terms and conditions could take at least one month, depending on the extent of revisions to terms and conditions. While the recommendations of the tiger team need not be confined by the measures described in the BA, we expect adaptive management will be guided by the responses described in the adaptive management program and be within the scope of the FEIS (NMFS 2025a). To the degree that recommendations of the tiger team and/or the proposed changes to terms and conditions depart from what has been described in the BA, SFD indicated that more documentation may be needed before revised terms and conditions can be cleared and reissued.

Phased-In Issuance of EFPs

NMFS proposes to delay initial issuance of EFPs for any large-scale longline fishing operations in the first year of the Proposed Action until the small-scale sector (i.e., the MWSG and XLBG combined) has fished for at least 45 fishing days in total from the outset of the adaptive management program.[13]

Large-scale longline operations under the Proposed Action refers to vessels fishing more than one-third of the average hooks per set fished in the Hawaii-based longline fisheries (e.g., more than 400 shallow set hooks and more than 800 deep-set hooks as defined in measure #36). Large-scale longline operations under the Proposed Action will be constrained to fishing fewer than 700 shallow-set and 1,600 deep-set hooks per set (i.e., roughly two-thirds of the average hooks per set fished in the Hawaii-based longline fisheries that operate in offshore waters just beyond federal waters off the U.S. West Coast as defined in measure #31). Though, NMFS could further constrain hooks per set by revisions to terms and conditions of EFPs for these operations under the adaptive management program. This approach may further reduce the risk of impacts to other ESA-listed species.

2. ENDANGERED SPECIES ACT: BIOLOGICAL OPINION AND INCIDENTAL TAKE STATEMENT

The ESA establishes a national program for conserving threatened and endangered species of fish, wildlife, plants, and the habitat upon which they depend. As required by section 7(a)(2) of the ESA, each Federal agency must ensure that its actions are not likely to jeopardize the continued existence of endangered or threatened species or to adversely modify or destroy their designated critical habitat. Per the requirements of the ESA, Federal action agencies consult with NMFS, and section 7(b)(3) requires that, at the conclusion of consultation, NMFS provide an opinion stating how the agency's actions would affect listed species and their critical habitats. If incidental take is reasonably certain to occur, section 7(b)(4) requires NMFS to provide an ITS that specifies the impact of any incidental taking and includes reasonable and prudent measures (RPMs) and terms and conditions to minimize such impacts.

NMFS' WCR SFD determined that the Proposed Action is NLAA: blue whale, fin whale, the Mexico and Central America DPSs of humpback whale, North Pacific right whale, sperm whale, Western North Pacific DPS of gray whale, oceanic whitetip shark, and giant manta ray. We concur with SFD's determination for all species above, with the exclusion of oceanic whitetip shark, and giant manta ray, for which we concluded that the Proposed Action *may affect and is likely to adversely affect* (LAA) both species.

[13] As a comparison, five vessels fished 49 days in the first year following NMFS issuance of DSBG EFPs. At present, up to 10 vessels have requested issuance of EFPs for small-scale operations under the Proposed Action.

Furthermore, SFD determined that the Proposed Action may affect, but is NLAA the designated critical habitats for the ESA-listed leatherback sea turtle, the SRKW DPS, and the Central America and the Mexico humpback whale DPSs. SFD determined that designated critical habitat for leatherback sea turtles, both Central America and Mexico DPS of humpback whales, and SRKW DPS may be affected, but it is not likely to be adversely affected. Our concurrence is documented in the *"Not Likely to Adversely Affect" Determinations* section (section 2.12). NMFS' WCR SFD also determined that the Proposed Action will have NE on other ESA-listed species occurring within or near the Proposed Action Area.

In this Opinion, we analyze the likely adverse effects resulting from the Proposed Action on the following species: Guadalupe fur seal, giant manta ray, oceanic whitetip shark, East Pacific DPS green sea turtle, leatherback sea turtle, North Pacific Ocean DPS loggerhead sea turtle, and olive ridley sea turtle.

Additionally, SFD determined that the Proposed Action will have *no effect* (NE) on the following ESA-listed species occurring in or near the Proposed Action Area: sei whale (*Balaenoptera borealis*), SRKW DPS, Eastern Pacific DPS of scalloped hammerhead shark (*Sphyrna lewini*), Southern DPS of green sturgeon (*Acipenser medirostris*), Southern DPS of Pacific eulachon (*Thaleichthys pacificus*), gulf grouper (*Mycteroperca jordani*), white abalone (*Haliotis sorenseni*), black abalone (*Haliotis cracherodii*), or any ESA-listed Evolutionary Significant Unit (ESU) or DPS of salmonids from the U.S. West Coast, or their critical habitats. No further analysis of potential effects is documented in our opinion for these species, with the exception of the Eastern Pacific DPS scalloped hammerhead shark, which may be exposed to and at risk of effects from the Proposed Action. Our analysis for this species is documented in the *"Not Likely to Adversely Affect" Determinations* section (2.12).

2.1. Analytical Approach

This Opinion includes a jeopardy analysis that relies upon the regulatory definition of "jeopardize the continued existence of" a listed species, which is "to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species" (50 CFR 402.02). Therefore, the jeopardy analysis considers both survival and recovery of the species.

This Opinion also relies on the regulatory definition of "destruction or adverse modification," which "means a direct or indirect alteration that appreciably diminishes the value of critical habitat as a whole for the conservation of a listed species" (50 CFR 402.02). However, no analysis of adverse modification is included in this Opinion, as no designated critical habitat is likely to be adversely affected by the Proposed Action.

The designations of critical habitat for leatherback sea turtles, both the Central America and Mexico DPSs of humpback whales, and SRKW DPS use the term primary constituent element (PCE) or essential features. The 2016 final rule (81 FR 7414; February 11, 2016) that revised the critical habitat regulations (50 CFR 424.12) replaced this term with physical or biological features (PBFs). The shift in terminology does not change the approach used in conducting a "destruction or adverse modification" analysis, which is the same regardless of whether the original designation identified PCEs, PBFs, or essential features. In this Opinion, we use the term PBF to mean PCE or essential feature, as appropriate for the specific critical habitat.

The ESA Section 7 implementing regulations define effects of the action using the term "consequences" (50 CFR 402.02). As explained in the preamble to the final rule revising the definition and adding this term (84 FR 44976, 44977; August 27, 2019), that revision does not change the scope of our analysis, and in this Opinion, we use the terms "effects" and "consequences" interchangeably.

We use the following approach to determine whether a proposed action is likely to jeopardize listed species or destroy or adversely modify critical habitat:

- Evaluate the rangewide status of the species expected to be adversely affected by the proposed action
- Evaluate the environmental baseline of the species in the action area
- Evaluate the effects of the proposed action on species using an exposure-response approach
- Evaluate cumulative effects
- In the integration and synthesis, add the effects of the action and cumulative effects to the environmental baseline, and, in light of the status of the species, analyze whether the proposed action is likely to: (1) directly or indirectly reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species; or (2) directly or indirectly result in an alteration that appreciably diminishes the value of critical habitat as a whole for the conservation of a listed species
- If necessary, suggest a reasonable and prudent alternative to the proposed action

Because pelagic longline fishing is not permitted within the U.S. West Coast EEZ, there are no fishery–dependent records for describing baseline conditions that match the longline-type fishing operations proposed to occur within the Proposed Action Area (i.e., U.S. West Coast EEZ off California and Oregon). Therefore, we use observer data from other U.S. West Coast and Pacific Ocean fisheries as proxies for the purpose of evaluating baseline conditions and analyzing impacts of the Proposed Action. These data from other U.S. fisheries are considered in a hierarchical sense. Specifically, we first considered information from the Hawaii-based SSLL and DSLL fisheries data east of the 140˚W, as similar fishing gear similar is occurring in the vicinity of the Proposed Action Area (just outside the U.S. West Coast EEZ). In effect, this information relies on portions of effort in the the Hawaii-based shallow-set and deep-set longline fisheries that occur closest to the action area, yet outside the U.S. EEZ off California and Oregon. Therefore, our analysis takes into consideration, on a qualitative basis, the potential differences in environmental conditions (e.g., water temperature) between the Proposed Action Area and the subset of the Hawaii-based longline fishery used for the analysis. Stratifying the data helps reduce, to some degree, the otherwise likely bias towards the suite of species and magnitude of interactions in coastal areas and warmer waters surrounding the Hawaiian Islands. Secondarily, we use observer data from the DGN fishery operating primarily off the coast of California, as this fishery provides the closest approximation to the spatial and temporal scope of the Proposed Action, although it uses fishing gear different from that being used under the Proposed Action. However, observer records from this fishery can help inform our assessment about the potential suite of listed species that may interact with longline-type fishing associated with this EFP, despite difference in gear configurations and operations. Additionally, information was also taken from observer data collected by the West Coast DSLL fishery, which uses fishing gear similar to that being used under the Proposed Action, though it operates outside of the U.S. West Coast EEZ, and thus outside of the Proposed Action Area. We also consider data collected from two vessels conducting EFP fishing trials using longline fishing gear in the action area during a 3-month period in 2019, and six vessels fishing linked buoy gear for three years, as well as information collected through sightings from aerial and ship-board surveys, satellite telemetry studies, and, to a lesser extent, strandings.

Additionally, we consider the implementation of EFP terms and conditions for the Proposed Action, along with the adaptive management program. Specifically, because of inherent uncertainty in the estimate of take and mortality of ESA-listed species included in this Opinion, which are based on proxy datasets due to the lack of data on the longline-type fishing practices in the Proposed Action Area, we qualitatively consider how mitigation strategies which are reflected in the EFP terms and conditions, and may be implemented throughout the adaptive management program, as appropriate, impact our quantitative assessment of risk. In addition, we consider the practical implications of the adaptive management program, in terms of limiting the risk of cumulative totals of leatherback interactions across the EFPs under the Proposed Action.

With respect to the seasonal distribution of fishing effort under the Proposed Action, any constraints to when and where effort may occur are spelled out in the EFP terms and conditions, as potentially modified through the adaptive management program over time. Otherwise, we assume that effort could occur under any of the components at any time throughout a year/fishing season. However, for practical reasons such as weather constraints and general expectations for expected availability of key target species such as swordfish and tunas along the U.S. West Coast historically, we do consider effort generally more likely to occur during the summer and fall consistent with the prosecution of other previous and existing West Coast HMS fisheries.

2.2. Rangewide Status of the Species

This Opinion examines the status of each species that is likely to be adversely affected by the Proposed Action. The status is determined by the level of extinction risk that the listed species face, based on parameters considered in documents such as recovery plans, status reviews, and listing decisions. This informs the description of the species' likelihood of both survival and recovery. The species status section also helps to inform the description of the species' current "reproduction, numbers, or distribution" for the jeopardy analysis. Recovery plans for Pacific loggerhead (NMFS and USFWS 1998a), Pacific leatherbacks (NMFS and USFWS 1998b), Pacific olive ridleys (NMFS and USFWS 1998c), and Eastern Pacific green sea turtles DPS (NMFS and USFWS 1998d) were reviewed and, as appropriate, used to assess status of species adversely affected by the Proposed Action. A recovery plan for the Guadalupe fur seal has not been developed. Also, we reviewed information included in the recovery plan for the oceanic whitetip shark[14], and a recovery outline for giant manta rays.[15]

2.2.1. Sea Turtles

One key factor affecting the range-wide status of ESA-listed sea turtles and aquatic habitat at large is climate change. Climate change has received considerable attention in recent years, with growing concerns about global warming and the recognition of natural climatic oscillations on varying time scales, such as long-term shifts like the Pacific Decadal Oscillation (PDO) or short-term shifts, like El Niño or La Niña. Evidence suggests that the productivity in the North Pacific (Mackas et al. 1989; Quinn and Niebauer 1995) and the California Current Ecosystem (CCE) (Harvey et al. 2022; Bell et al. 2023) could be affected by changes in the environment. Important ecological factors such as migration, feeding, and breeding locations may be influenced by factors such as ocean currents and water temperature. Any changes in these factors could render currently used habitat areas unsuitable and new use of previously unutilized or previously not existing habitats may be a necessity for displaced individuals. Changes to climate and oceanographic processes may also lead to decreased productivity in different patterns of prey distribution and availability. Such changes could affect individuals that are dependent on those affected prey.

Based upon available information, it is likely that sea turtles are being affected by climate change. Sea turtle species are likely to be affected by rising temperatures that may affect nesting success and skew sex ratios, as some rookeries are already showing a strong female bias as warmer temperatures in the nest chamber leads to more female hatchlings (Chan and Liew 1995; Kaska et al. 2006; Blechschmidt et al. 2022). Increased temperatures also lead to higher levels of embryonic mortality (Matsuzawa et al. 2002). Rising sea surface temperatures and sea levels may affect available nesting beach areas as well as ocean productivity (Fuentes et al. 2011). An increase in typhoon frequency and severity, a predicted consequence of climate change (Webster et al. 2005), can cause erosion which leads to high nest failure (Van Houtan and Bass 2007). Rising sea levels can cause repeated inundation of nests and abrupt disruption of ocean currents used for natural dispersion during the green turtle life cycle. Feeding may also be affected by climate change as seagrasses, a major food source for green sea turtles, may be affected by changing water temperature and salinity (Short and Neckles 1999; Duarte 2002).

Based on climate change modeling efforts in the eastern tropical Pacific Ocean, for example, Saba et al. (2012) predicted that the Playa Grande (Costa Rica) sea turtle nesting populations would decline 7% per decade over the next 100 years. Changes in beach conditions are expected

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[14] https://www.fisheries.noaa.gov/resource/document/recovery-plan-oceanic-whitetip-shark

[15] https://www.fisheries.noaa.gov/resource/document/giant-manta-ray-recovery-outline

to be the primary driver of the decline, with hatchling success and emergence rates declining by 50-60% over the next 100 years in that area (Tomillo et al. 2012). Sea turtles are known to travel within specific isotherms and these could be affected by climate change and cause changes in their bioenergetics, thermoregulation, prey availability, and foraging success during the oceanic phase of their migration (Robinson et al. 2009; Saba et al. 2012).

While the understanding of how climate change may impact sea turtles is building, there is still uncertainty and limitations surrounding the ability to make precise predictions about or quantify the threat of future effects of climate change on sea turtle populations (Hawkes et al. 2009). As discussed above, elevated sea surface and sand temperatures and sea level rise may affect important life stages and vital rates, such as egg incubation, hatchling success, foraging success, etc., as well as important habitat. Therefore, inferences of a population trend forecast based on climate models should be made with caution, particularly when actual data over time are contrary to the model forecast. In addition, when considering the effects of a relatively short-term action (i.e., ten years) on the species and critical habitat, the effects of changing climate over multiple decades into the future may be irrelevant.

2.2.1.1. Loggerhead sea turtles – North Pacific DPS

Until 2011, loggerheads were listed globally as a threatened species under the ESA. A recovery plan for the then threatened U.S. Pacific loggerhead populations was completed over 20 years ago (NMFS and USFWS 1998a). In 2011, a final rule was published describing ESA-listings for nine DPSs of loggerhead sea turtles worldwide (76 FR 58868). The most recent status review for the North Pacific DPS of loggerheads was completed in 2020, which reaffirmed the endangered status of this species (NMFS and USFWS 2020a).

The North Pacific Ocean DPS is the only species found in the *Action Area* of the Proposed Action listed as endangered under the ESA. Although the recovery plan applicable to the North Pacific loggerhead DPS was completed in 1998 (NMFS and USFWS 1998a), through a U.S. initiative, three countries (United States, Japan, and Mexico) have been developing a tri-national recovery plan, although there have been complications in collaborations with Japan and Mexico. Further resolution and clarification between the three countries is needed to determine if the recovery plan will move forward through a “formal” process (B. Schroeder, NMFS-headquarters, personal communication, 2022).

<u>Description and Geographic Range</u>: Loggerheads are circumglobal, inhabiting continental shelves, bays, estuaries, and lagoons in temperate, subtropical, and tropical waters. Major nesting grounds are generally located in temperate and subtropical regions, with scattered nesting in the tropics. North Pacific loggerhead sea turtles occur north of the equator in the Pacific Ocean. Like other sea turtle species, the North Pacific loggerhead exhibits a complex life cycle: egg, hatchling, juvenile, subadult, and adult. Juvenile and subadult life stages are also frequently distinguished according to whether they occur in neritic or pelagic waters.

North Pacific loggerheads nest exclusively in Japan, in three regions (or management units): mainland Japan, Yakushima, and Okinawa. After the turtles emerge as hatchlings on their natal beaches in Japan, they spend their developmental years foraging in the North Pacific, moving with the predominant ocean gyres for many years before returning to their neritic foraging habitats (Pitman 1990; Bowen et al. 1995; Musick and Limpus 1997). Satellite tracking of juvenile loggerheads indicates the Kuroshio Extension Bifurcation Region in the central Pacific to be an important pelagic foraging area for juvenile loggerheads (Polovina et al. 2006; Kobayashi et al. 2008; Howell et al. 2008). Researchers have identified other important juvenile turtle foraging areas off the coast of Baja California Sur, Mexico (Peckham et al. 2007; Conant et al. 2009). Recent resident times of juvenile North Pacific loggerheads foraging at a known hotspot off Baja California were estimated at over 20 years, with turtles ranging in age from 3 to 24 years old (Tomaszewicz et al. 2015). Loggerheads documented off the U.S. West Coast are primarily found south of Point Conception, California in the SCB. South of Point Eugenia on the Pacific coast of Baja California, pelagic red crabs (*Pleuroncodes planipes*) have been found in great numbers, attracting top predators such as tunas, whales and sea turtles, particularly loggerheads (Pitman 1990; Wingfield et al. 2011; Seminoff et al. 2014). Despite the fact that a considerable number of scientific efforts have been undertaken to study the movements and migrations of juvenile loggerheads in the central Pacific and off Baja and the west coast of the U.S. (Nichols et al. 2000; Polovina et al. 2003; Polovina et al. 2004; Polovina et al. 2006; Kobayashi et al. 2008; Howell et al. 2010; Peckham et al. 2011; Allen et al. 2013; Briscoe et al. 2016), there is still a general lack of understanding for the ecology of juvenile loggerheads in the eastern Pacific.

After spending years foraging in the central and eastern Pacific, mature loggerheads migrate to forage in oceanic or neritic waters closer to Japan in between breeding seasons (Hatase et al. 2002; Hatase et al. 2010), with adult females returning to nest, on average, every 3.3 years (mean "remigration interval") and laying a mean of 4.6 nests per season ("clutch frequency") (see Hatase et al. 2013). Thus, adult loggerheads remain in the western Pacific for the remainder of their life cycle (Iwamoto et al. 1985; Kamezaki et al. 1997; Conant et al. 2009; Hatase et al. 2002).

Loggerheads documented off the U.S. West Coast in the Proposed Action Area are primarily found south of Point Conception, California, in the SCB.

<u>*Population Status and Trends*</u>: 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). Along the Japanese coast, nine major nesting beaches (greater than 100 nests per season) and six "submajor" beaches (10–100 nests per season) exist, including Yakushima Island where over 50% of nesting occurs (Kamezaki et al. 2003; Jones et al. 2018). Census data from 12 of these 15 beaches provide composite information on longer-term trends in the Japanese nesting assemblage. From this data, Kamezaki et al. (2003) concluded that a substantial decline (50–90%) in the size of the annual loggerhead nesting population in Japan had occurred since the 1950s. As discussed in the 2011 final ESA listing determination, current nesting in Japan represents a fraction of historical

nesting levels (Conant et al. 2009; 76 FR 58868). Nesting declined steeply from an initial peak of approximately 6,638 nests in 1990–1991, to a low of 2,064 nests in 1997. Since that time, nesting has been variable, increasing and decreasing over time as is typical of sea turtle nesting trends. Overall, since 2003/2004, an increasing trend of approximately 9% annual growth in the number of nests has been documented for the entire nesting assemblage (i.e., all Japanese nesting beaches combined), through 2015 (Y. Matsuzawa, Sea Turtle Association of Japan, personal communication, 2017).

In terms of abundance, Van Houtan (2011) estimated a total number of 7,138 adult nesting females in the North Pacific loggerheads population for the period 2008-2010. An abundance assessment using data available through 2013, assuming a 2.7 year remigration and three nests per female (Conant et al. 2009), was conducted by Casale and Matsuzawa (2015) as part of an International Union for Conservation of Nature (IUCN) Red List assessment that estimated 8,100 nesting females in the population. Jones et al. (2018) used a model estimate of 3,632 females nesting at Yakushima, assumed to represent 52% of all nesting females in the population, to estimate the total number of North Pacific loggerhead nesting females at 6,984 (NMFS 2019b).

As noted in the *Description and Geographic Range* section, juvenile North Pacific loggerheads have been documented in high numbers off the coast of Baja California Sur, Mexico (Peckham et al. 2007; Conant et al. 2009). Aerial surveys conducted from 2005 through 2007 in the Gulf of Ulloa, a known "hot spot," provided an estimated foraging population of over 43,000 juvenile loggerheads (Seminoff et al. 2014). Results of an aerial survey conducted during the fall of 2015 in the SCB documented more than 70,000 loggerheads throughout the area (Eguchi et al. 2018), likely feeding on pelagic red crabs and pyrosomes which are the turtle's preferred prey. The survey was conducted during an El Niño event, when anomalously warm sea surface temperatures are associated with the presence of loggerheads and which has served as a trigger for the implementation of management measures to close the SCB to drift gillnet fishing during the summer months (68 FR 69962; December 16, 2003). Recent analysis of loggerhead sea turtle presence in the SCB suggests that loggerhead presence offshore of southern California is tied not just to warm temperatures, but to persistently warm temperatures over a period of months such as what occurred during the recent large marine heatwave experienced by the Eastern North Pacific Ocean (Welch et al. 2019).

Most recently, Martin et al. (2020a, 2020b) used a Bayesian state-space population growth model (i.e., a population viability analysis, or PVA) to estimate the range of intrinsic population growth rates, or *r,* in the North Pacific loggerhead populations. They used data from three index beaches in Yakushima: Maehama, Inakahama, and Yotsuehama, from 1985 to 2015. The nest count data was converted to nester count data by dividing the number of nests each year by the mean clutch frequency (4.6 nests per female; Hatase et al. 2013). As with all sea turtles, these trends will not necessarily represent the true growth of the population because annual nester counts, which represent the bulk of data on sea turtles, only represent a portion of the population, specifically adult females. Also, there are no updated nesting data available for the primary nesting beaches in Japan that are more recent than 2015, and the trend in the intervening years is not known (NMFS 2024g). However, as this is the only estimate of population growth rate available for this species, we consider it the best available scientific data to describe trends. We do not have data to ascertain trends in the remaining portion of the North Pacific DPS of loggerheads, and assume these trends apply to the remaining portion of the DPS. (NMFS 2024g). Drawing from the resulting distribution of *r* values as well as the distributions of the nesting female population size at the end of the time series and a process error term, the researchers projected population trends 100 years into the future, conducting 10,000 simulations to capture the variability in projects. In the future projections, Martin et al. (2020a, 2020b) computed the proportion of simulations for which the projected number of annual nesters fell below (and remained below) 50%, 25% and 12.5% of the estimated abundance of nesters within specific time intervals. For the set of runs ending below a threshold, they calculated the mean, median, and 95% credible interval for the number of years until the population fell below the threshold. They also calculated the probability of the projected total reproductive females falling below each threshold at 5, 10, 25, 50, and 100 years in the future.

Results of the PVA model suggest that the adult female portion of the North Pacific loggerhead sea turtle population is increasing at a rate of 2.3%/year (95% confidence interval (CI): −1.1% to 15.6%), and the probability of the population as indicated by the index nesting beaches falling to less than half of its current abundance within 100 years is 33% (Martin et al. 2020a). For those simulations in the PVA that indicated a decline, 50% of current population size was reached in a mean of 25.2 years (95% CI: 5 to 82 years). PVA modeled estimates suggest that the modeled population presently consists of a minimum of 4,541 adult female loggerheads (95% CI: 4,074-5063; total nesters for the three index beaches in Japan). It is estimated that there are approximately 328,744 juvenile (year 1-25) North Pacific loggerhead sea turtles (T. Jones, NMFS, personal communication, 2019). Using the estimate of 4,541 females nesting in Yakushima, representing 52% of nesting females, the total number of North Pacific loggerhead nesting females is 8,733 (4,541*100/52). Using a sex ratio of 65% female (Martin et al. 2020a) suggests that the abundance of the North Pacific loggerhead DPS is approximately 13,435 (8,733*100/65) adults, or a total population size of 342,179 (328,744 juveniles + 13,435 adults).

Recent efforts have examined potential relationships between significant climate/environmental variables and influences on turtle populations. Van Houtan and Halley (2011) identified correlations between loggerhead juvenile recruitment and breeding remigrations and two strong environmental influences: sea surface temperature and the Pacific Decadal Oscillation (PDO) index of ocean circulation. The mechanisms that could influence loggerhead survival at important stages may be relevant to understanding past nesting beach trends, and this is a promising avenue of research. However, there are many more anthropogenic and natural factors that may influence sea turtle populations and future trends, and a consideration of the differences in ocean basins, nesting assemblages, demographics, and habitat, among other variables, needs to be included in any characterization of status and trend of a particular population or DPS such as North Pacific loggerheads. Relating environmental variance and population dynamics is an important component in our attempts to understand the fate of long-lived and highly migratory marine species such as sea turtles. However, we cannot currently reliably predict the magnitude of future climate change and its impacts on North Pacific loggerheads. In addition, as noted by

Arendt et al. (2013), the Van Houtan and Halley (2011) paper proposed an alternative to a long-held paradigm that the survivorship of large juveniles and adult sea turtles is more predictive of population change than juvenile recruitment. Van Houtan and Halley (2011) suggested that cohort effects stemming from survival in the first year of life had a greater effect on population growth. Analyses conducted by Arendt et al. (2013) on climate forcing on annual nesting variability of loggerheads in the Northwest Atlantic Ocean showed that trends in annual nest counts are more influenced by remigrants rather than neophytes, which contradicts in part the Van Houtan and Halley (2011) study. As summarized above, the North Pacific loggerhead nesting population has been generally increasing, considering the most recent trend analyses (using data from three index beaches from 1985 to 2015 (Martin et al. 2020a)) not included in the Van Houtan and Halley (2011) analysis, which may be explained by conservation efforts on the nesting beaches, at the foraging grounds (e.g., Gulf of Ulloa, in Baja California, Mexico), and potentially realized reduction of threats from large-scale fisheries such as longlining.

At this time, uncertainty remains related to the North Pacific loggerhead nesting beach trend forecasts and correlations with climate indices related to the PDO, for example. The mechanisms that could influence loggerhead survival at important stages are logical, and this is a promising avenue of research. Relating environmental variance and population dynamics will be an important step in trying to understand the fate of marine species such as sea turtles. The existing data and current scientific methods and analysis are not able to predict the future effects of climate change on this species or allow us to predict or quantify this threat to the species (Hawkes et al. 2009).

Limiting Factors and Threats: A detailed account of natural and anthropogenic threats of loggerhead sea turtles around the world is provided in recent status reviews (NMFS and USFWS 2007a; Conant et al. 2009; NMFS and USFWS 2020a). Loggerhead nesting beaches are threatened by hurricanes and tropical storms as well as storm surges, sand accretion, and rainfall associated with hurricanes. Hatchlings are killed by predators such as herons, gulls, and sharks. Juvenile and adult loggerheads are also killed by sharks and other large marine predators. Loggerheads are also killed by cold stunning and exposure to biotoxins.

The most significant threats facing loggerheads in the North Pacific include coastal development and bycatch in commercial fisheries. Destruction and alteration of loggerhead nesting habitats are occurring throughout the species' range, especially coastal development (including breakwaters that alter patterns of erosion and accretion on nesting beaches), beach armoring, beachfront lighting, and vehicular/ pedestrian traffic. In Japan, many nesting beaches are lined with concrete armoring to reduce or prevent beach erosion, causing turtles to nest below the high tide line where most eggs are washed away unless they are moved to higher ground (Matsuzawa 2006). As the size of the human population in coastal areas increases, that population brings with them secondary threats such as exotic fire ants, feral pigs, dogs and growth of populations that tolerate human presence (e.g., raccoons, armadillos and opossums) which feed on turtle eggs. Overall, the NMFS and U.S. Fish and Wildlife Service (USFWS) have concluded that coastal development and coastal armoring on nesting beaches in Japan are significant threats to the persistence of this DPS (Conant et al. 2009; 76 FR 58868; NMFS and USFWS 2020a).

For both juvenile and adult individuals in the ocean, bycatch in commercial fisheries, both coastal and pelagic fisheries (including longline, drift gillnet, set-net, trawling, dredge, and pound net) throughout the species' range is a major threat (Conant et al. 2009). Specifically in the Pacific, bycatch continues to be reported in gillnet and longline fisheries operating in "hotspot" areas where loggerheads are known to congregate (Peckham et al. 2007). Interactions and mortality with coastal and artisanal fisheries in Mexico and the Asian region likely represent the most serious threats to North Pacific loggerheads (Peckham et al. 2007; Ishihara 2009; Conant et al. 2009). In Mexico, loggerhead mortality has been significantly reduced, particularly in a previously identified hotspot, where thousands of loggerheads may forage for many years until reaching maturity. In 2013, Mexico was notified that, unless it established a regulatory program comparable in effectiveness to that of the United States, Mexico would receive a "negative certification" under section 403(a) of the Magnuson-Stevens Act. This notification was made as a result of documented evidence of hundreds of loggerheads found stranded or bycaught in coastal artisanal fisheries in the Gulf of Ulloa, off the Pacific coast of Baja California. As a result, in 2016, Mexico published new regulations, which established a reserve located in the loggerhead hotspot area. Within this reserve, the 2016 regulation sets a loggerhead turtle mortality limit for commercial fishing vessels of 90 turtles. If that 90 turtle mortality threshold is met, Mexico would suspend gillnet fishing from May through August to protect loggerhead sea turtles. Restrictions on mesh size and soak time were also included to reduce mortalities. After reviewing the regulations, the United States was able to positively certify Mexico in September 2016 (Department of Commerce 2016). This restriction likely reduces loggerhead bycatch by an order of magnitude and addresses one of the primary threats identified in Conant et al. (2009). Despite the measures Mexico has taken, Mexican Wildlife Law Enforcement reported significant strandings of dead North Pacific loggerhead sea turtles on the shores of the Gulf of Ulloa between 2018 and 2020 (459 in 2018, 331 in 2019, and 351 from January to June 2020). In communication with NMFS, Mexico noted that the Gulf of Ulloa measures are still in place, including the refuge area. Based on the recent strandings data, NMFS was concerned that the measures were not being fully or effectively implemented. Therefore, in 2021, NMFS re-identified Mexico for not having management measures to end or reduce the bycatch of loggerhead turtles in the Gulf of Ulloa fisheries that are not comparable in effectiveness to U.S. regulations (NMFS 2021a). NMFS is currently in discussions with Mexico to understand more fully the cause of the strandings, as well as the effectiveness of management measures, including enforcement, use of observers (including cameras), analysis of observer data, bycatch reduction measures, and effectiveness of the reserve.

Domestic longline fishing around Hawaii consists of two separately managed fisheries; a deep-set fishery that primarily targets bigeye tuna, and a shallow-set fishery that targets swordfish. The term "Hawaii-based" is used to specify those longline vessels primarily operating out of Hawaii in order to distinguish them from other longline vessels operating in the same waters, but based in other states or nations. The Hawaii-based longline fisheries were estimated to have captured and killed several hundred loggerheads before they were closed in 2001. Under requirements established in 2004 to minimize sea turtle bycatch (69 FR 17329), vessel operators in the Hawaii-based SSLL fishery must use large (sized 18/0 or larger) circle hooks with a maximum of 10 degrees offset and mackerel-type bait. Between 2004 and 2023, NMFS observed a total of 304 interactions of North Pacific loggerheads with the SSLL fishery (NMFS 2024g). From 2012-2017, the incidental take statement for the Hawaii-based SSLL fishery was 34 loggerhead turtles per year, which served as the "hard cap" for the fishery that requires closure of the entire fishery during any year if reach. Recently, the hard cap for loggerhead sea turtle bycatch was removed, with the expectations that up to 36 may be caught and 6 may be killed each year, and that individual vessels would be restricted to no more than 5 loggerheads taken during any one trip (NMFS 2019b). Subsequently, due to the exceedance of the incidental take statement for North Pacific loggerhead sea turtles in 2023, NMFS reinitiated ESA Section 7 consultation for the Hawaii SSLL fishery, and anticipated the take of up to 135 North Pacific loggerhead sea turtles over five consecutive years, with maximum 5-year running average of 4.5 mortalities per year (NMFS 2024g).

In the deep-set longline tuna fishery based out of Hawaii from 2004-2022, there were 19 loggerheads observed taken (estimated 98 total, based on observer coverage) (NMFS 2024g). Based on historical capture events, NMFS anticipated that over 10 years, up to 86 North Pacific loggerheads will be captured, and of those, 48 will be killed. NMFS anticipated the take (includes interactions, injuries or mortalities) of up to 43 North Pacific loggerheads over any given 5-year period, with a maximum 5-year running average of 4.8 mortalities per year (NMFS 2023b).

In the current West Coast DSLL fishery operating outside of the U.S. West Coast EEZ, NMFS has anticipated that one North Pacific DPS loggerhead could be taken and killed every 10 years (NMFS 2016a). In 2019, one loggerhead sea turtle was observed to have been captured, and released alive but injured in the West Coast DSLL fishery (NMFS 2024a). No other loggerhead interactions have been reported in the fishery since 2005.

The American Samoa-based longline fishery has an observer program that ranged from around 6-7% from 2007-2009, increased to 25-33% in 2010-2011, and now averages around 20% observer coverage. From 2007-2023, there have been no observations of loggerheads taken in that fishery (Pacific Islands Regional Office observer database: https://www.fisheries.noaa.gov/resource/data/pacific-islands-longline-quarterly-and-annual-reports).

In the Western Central Pacific Ocean U.S. purse seine fishery, NMFS authorized the incidental take of up to 36 North Pacific loggerhead turtles annually, with an anticipation that 6 of those turtles would die (NMFS 2021b). Additionally, NMFS anticipated the take of 30 loggerhead interactions to occur in the U.S. Eastern Tropical Pacific (ETP) purse seine fishery, with one mortality anticipated every seven years (NMFS 1999, 2004). In the ETP non-U.S. purse seine fisheries rarely interact with loggerhead sea turtles. For example, from 1993 through 2021, nearly 26 loggerheads were estimated to have been killed, with no deaths estimated since 2015. With 100% observer coverage in the U.S. purse seine fleet operating in the ETP, there have been zero loggerheads observed killed in this fishery (IATTC, personal communication, 2022). Because effort in this area may take place south of the equator, some of these turtles may be from the South Pacific loggerhead DPS, but without genetic information or tags to verify their origin, NMFS assume they are from the North Pacific DPS.

Estimating the total number of sea turtle interactions in other Pacific fisheries, which interact with the same sea turtle populations as U.S. fisheries, is difficult because of low observer coverage and inconsistent reporting from international fleets. However, several attempts have been made for certain fisheries known to have significant sea turtle bycatch issues such as pelagic longlining. Lewison et al. (2004) estimated 2,600 – 6,000 loggerhead mortalities from pelagic longlining in the Pacific in 2000. Beverly and Chapman (2007) more recently estimated loggerhead and leatherback longline bycatch in the Pacific to be approximately 20% of that estimated by Lewison et al. (2004), which would equate to between 520 and 1,200 loggerhead mortalities during the year assessed. Chan and Pan (2012) estimated that there were approximately 1,866 total sea turtle interactions of all species in 2009 in the central and North Pacific by comparing swordfish production and turtle bycatch rates from fleets fishing in the central and North Pacific area. More recently, Peatman et al. (2018) estimated that a median estimate of 29,405 loggerheads were captured in longline fisheries operating in the North Pacific from 2003-2017. These various estimates cover different time intervals, were produced by a variety of assumptions, and rely on data collected from fisheries with limited observer coverage (generally <1%, particularly for the fleets with the highest expended effort, except for Hawaii-based longline fisheries, which range from ~20-100%), so their differences are not surprising. Nevertheless, they capture the approximate scale of the number of sea turtles that have been captured by fisheries outside of the action area.

In 2015, a workshop was convened to analyze the effectiveness of sea turtle mitigation measures in the tuna regional fisheries management organizations (RFMOs) and 16 countries provided data on observed sea turtle interactions and gear configurations in the Western Central Pacific Ocean. Based on the information gathered there, 549 loggerhead sea turtles were reported, leading to a total estimate of 10,980 loggerheads caught in the region from 1989-2015 in these countries (NMFS unpublished data). Finally, bycatch estimates of sea turtles were summarized from annual reports by the Western and Central Pacific Fisheries Commission (WCPFC) (2021), which included the Hawaii DSLL fishery, which represented around 5-6% of the total hooks set by the West and Central Pacific Ocean (WCPO) longline fisheries. From 2013-2020, an average of 2,387 loggerheads (95% CI: 1,318 – 3,457) were captured per year, with an average of 390 loggerheads (95% CI: 327-452) killed per year (WCPFC 2021).

Between recent developments to reduce sea turtle bycatch in domestic fisheries that have been working their way into some international fisheries and the incomplete datasets and reporting that exist, the exact level of current sea turtle bycatch internationally is not clear. However, given the information that is available, we believe that international bycatch of sea turtles in fisheries throughout the Pacific Ocean, continues to occur at significant rates several orders of magnitude greater than what is being documented or anticipated in U.S. domestic fisheries.

Marine debris, including debris resulting from the 2011 earthquake and tsunami that took place off Japan, also threatens the North Pacific DPS of loggerheads through ingestion and entanglement. Also, plastic pollution due to entanglement to and ingestion of plastic waste (e.g., single-use plastics, ghost nets) represents a threat to loggerhead and other sea turtles (Wilcox et al., 2018; Solomando et al., 2022). Additionally, microplastics has been reported in juveniles and adults sea turtles, which can have harmful effects on individuals (Ostiategui-Francia et al., 2016).

Conservation: Considerable effort has been made since the 1980s to document and reduce loggerhead bycatch in Pacific Ocean fisheries, as this is the highest conservation priority for the species. NMFS has formalized conservation actions to protect foraging loggerheads in the North Pacific Ocean which were implemented to reduce loggerhead bycatch in United States fisheries. Observer programs have been implemented in federally managed fisheries to collect bycatch data, and several strategies have been pursued to reduce both bycatch rates and post-hooking mortality. These strategies include developing gear solutions to prevent or reduce capture (e.g., circle hooks) or to allow the turtle to escape without harm (e.g., turtle exclusion devices), implementing seasonal time-area closures to prevent fishing when turtles are congregated, modifying existing gear, and developing and promoting "Sea Turtle Handling Guidelines" (NMFS and USFWS 2007a). For example, switching to large circle hooks and mackerel bait in 2004 reduced the interaction rate by approximately 90% in the Hawaii SSLL fishery (Gilman et al. 2007a), and more recent analyses showed a reduction of 95% in this fishery (Swimmer et al. 2017). NMFS has also developed a mapping product known as TurtleWatch that provides a near real time product that recommends areas where the deployment of pelagic longline shallow sets should be avoided to help reduce interactions between Hawaii-based pelagic longline fishing vessels and loggerhead sea turtles (Howell et al. 2008, 2015).

Since loggerhead interactions and mortalities with coastal fisheries in Mexico and Japan are of concern and are considered a major threat to North Pacific loggerhead recovery, NMFS and United States non-governmental organizations have worked with international entities to: (1) assess bycatch mortality through systematic stranding surveys in Baja California Sur, Mexico; (2) reduce interactions and mortalities in bottom-set fisheries in Mexico; (3) conduct gear mitigation trials to reduce bycatch in Japanese pound nets; and (4) convey information to fishers and other stakeholders through participatory activities, events and outreach. In 2003, Grupo Tortuguero's ProCaguama (Operation Loggerhead) was initiated to partner directly with fishermen to assess and mitigate their bycatch while maintaining fisheries sustainability in Baja California, Mexico. ProCaguama's fisher-scientist team discovered the highest turtle bycatch rates documented worldwide and has made considerable progress in mitigating anthropogenic mortality in Mexican waters (Peckham et al. 2007, 2008). As a result of the 2006 and 2007 tri-national fishermen's exchanges run by ProCaguama, Sea Turtle Association of Japan (STAJ), and the Western Pacific Fisheries Management Council (WPFMC), in 2007 a prominent Baja California Sur fleet retired its bottom-set longlines (Peckham et al. 2008; Peckham and Maldonado-Diaz 2012). Prior to this closure, the longline fleet interacted with an estimated 1,160-2,174 loggerheads annually, with nearly all (89%) of the takes resulting in mortalities (Peckham et. al. 2008). Because this fleet no longer interacts with loggerheads, conservation efforts have resulted in the continued protection of approximately 1,160-2,174 juvenile loggerheads annually (final loggerhead listing rule: 76 FR 58868; September 22, 2011).

Additionally, stranding data collected since 2003 at Playa San Lazaro indicates a 60% reduction in standings' during 2010 compared to previous 2003-2009 averages (Peckham 2010). To date, 90% of the gillnet fleet has retired their gear (a total of 140 gillnets), 18 crews have converted to hook and line fishing (a more sustainable practice in the 'hotspot' area), and local government enforcement has increased to ensure compliance with local laws (Peckham pers. comm.). In Japan, due to concerns of high adult loggerhead mortality in mid-water pound nets, researchers with the STAJ, ProCaguama, and NMFS have begun collaborations, together with local fishermen throughout several Japanese prefectures, to investigate and test pound net mitigation options to reduce the impact and mortality of sea turtle bycatch. This work was ongoing as of 2011, and has received high media attention both within Japan and internationally that has helped to raise public awareness and maintain momentum (Ishihara et al. 2014).

Led by the Mexican Wildlife Service, a federal loggerhead bycatch reduction task force, comprised of federal and state agencies and non-governmental organizations, was organized in 2008 to ensure loggerheads receive the protection they are afforded by Mexican law. In 2009, while testing a variety of potential solutions, ProCaguama's fisher-scientist team demonstrated the commercial viability of substituting bycatch-free hook fishing for gillnet fishing. ProCaguama, in coordination with the task force, is working to develop a market-based bycatch solution consisting of hook substitution, training to augment ex-vessel fish value, development of fisheries infrastructure, linkage of local fleets with regional and international markets, and concurrent strengthening of local fisheries management (Conant et al. 2009).

Conservation efforts have also focused on protecting nesting beaches, nests, and hatchlings. Much of Japan's coastline is "armored" using concrete structures to prevent and minimize impacts to coastal communities from natural disasters. These structures have resulted in a number of nesting beaches losing sand suitable for sea turtle nesting, and nests often need relocating to protect them from erosion and inundation. In recent years, a portion of the concrete structures at a beach in Toyohashi City, Aichi Prefecture, was experimentally removed to create better nesting habitat (76 FR 58868; September 22, 2011). The STAJ, along with various other organizations in Japan, are carrying out discussions with local and federal Government agencies to develop further solutions to the beach erosion issue and to maintain viable nesting sites. Recently, the Ministry of Environment has supported the local NGO conducting turtle surveys and conservation on Yakushima in establishing guidelines for tourism to minimize impacts by humans on nesting beaches (Y. Matsuzawa, STAJ, personal communication; Conant et al. 2009). Yet, beach erosion and armament still remain one of the most significant threats to nesting beaches in Japan (Conant et al. 2009). Since 2003, the Council has been contracting with STAJ to protect loggerhead nests and increase hatchling survivorship at several nesting beaches in southern Japan, including at the two primary beaches on Yakushima Island. Beach management activities include conducting nightly patrols during the summer nesting season to relocate nests from erosion prone areas, protecting nests from predators and people with mesh and fences, and cooling nests with water and shading to prevent overheating during incubation. STAJ has developed techniques for nest relocation that now result in an average of 60% hatchling success rates (compared to nearly zero survival of the same nests laid in erosion prone areas). Nest relocation in 2004-08 resulted in an estimated 160,000 hatchlings being released that otherwise may have been lost (76 FR 58868; September 22, 2011).

The conservation and recovery of loggerhead turtles is facilitated by a number of regulatory mechanisms at international, regional, national, and local levels, such as the Food and Agriculture Organization's (FAO) Technical Consultation on Sea Turtle-Fishery Interactions, the Inter-American Convention for the Protection and Conservation of Sea Turtles (IAC), Convention on International Trade in Endangered Species of Wildlife Fauna and Flora (CITES), and others. In 2008 the WCPFC adopted CMM 2008-03 to mitigate the impacts on turtles from longline swordfish fisheries in the western central Pacific Ocean. The measure includes the adoption of FAO guidelines to reduce sea turtle mortality through safe handling practices and to reduce bycatch by implementing one of three methods by January 2010. The three methods to choose from are: 1) use only large circle hooks, or 2) use whole finfish bait, or 3) use any other mitigation plan or activity that has been approved by the Commission. As a result of these designations and agreements, many of the intentional impacts on sea turtles have been reduced: harvest of eggs and adults have been slowed at several nesting areas through nesting beach conservation efforts and an increasing number of community-based initiatives are in place to slow the take of turtles in foraging areas. Moreover, as shown by the above examples from Hawaii, Japan, and Baja Mexico, international efforts are growing to reduce sea turtle interactions and mortality in artisanal and industrial fishing practices (Gilman et al. 2007b; Peckham et al. 2007; NMFS and USFWS 2007a; Ishihara et. al. 2014).

2.2.1.2. Leatherback sea turtles

A recovery plan for the U.S. Pacific populations of leatherbacks was completed over 20 years ago (NMFS and USFWS 1998b), and leatherbacks remain listed globally as an endangered species under the ESA (35 FR 8491). On January 26, 2012, NMFS revised critical habitat for leatherbacks to include additional areas within the Pacific Ocean (77 FR 4170) (before this rule, critical habitat was designated in the late 1970s on and adjacent to Sandy Point Beach, on the western end of St. Croix in the U.S. Virgin Islands (43 FR 43688 and 44 FR 17710)). The revised designation includes approximately 17,000 square miles stretching along the California coast from Point Arena to Point Arguello east of the 3,000 meter depth contour and approximately 25,000 miles stretching from Cape Flattery, Washington, to Cape Blanco, Oregon east of the 2,000 meter depth contour. The principal biological feature identified as essential to leatherback conservation was prey; primarily scyphomedusae. The Proposed Action occurs within Pacific leatherback critical habitat (see Figure 1), and we analyze potential effects to designated leatherback critical habitat in section 2.12.5 of this Opinion

Description and Geographic Range: The leatherback turtle has the most extensive global distribution of any reptile and is distributed throughout the oceans of the world, from the equator to subpolar regions in both hemispheres. Leatherback sea turtles have been observed at sea between about 71° N to 47° S (Eckert et al. 2012). Leatherback turtles spend the majority of their lives at sea, where they develop, forage, migrate, and mate, nesting on beaches on every continent except Europe and Antarctica, including several islands of the Caribbean and the Indo-

Pacific (Eckert et al. 2012; NMFS and USFWS 2020b). The leatherback sea turtle is unique among sea turtles for its large size, lack of scales, ridged carapace, and wide north-south distribution (due to thermoregulatory systems and behavior). Leatherbacks are the largest living turtle, adults weighing an average of 1,000 pounds (453 kg), and over 5 feet (1.52 m) in carapace length (Davenport et al. 2011). Leatherback sea turtles undertake the longest migrations of any sea turtle, migrating long, transoceanic distances between their tropical nesting beaches and the highly productive temperate waters where they forage, primarily on jellyfish and tunicates.

Globally, seven populations are currently recognized under the ESA: (1) Northwest Atlantic; (2) Southeast Atlantic; (3) Southwest Atlantic; (4) Northeast Indian; (5) Southwest Indian; (6) West Pacific; and (7) East Pacific (NMFS and USFWS 2020b). For purposes of this Opinion, we focus on the two populations (i.e., West Pacific and East Pacific) occurring within the Pacific Ocean basin. The marine distribution for Pacific leatherback sea turtles extends north into the Sea of Japan, northeast and east across the North Pacific to the west coast of North America (predominantly off California), west to the South China Sea and Indonesian Seas, and south into the high latitude waters of the western South Pacific Ocean and Tasman Sea (Benson et al. 2011) (Figure 5).

We define the West Pacific population as leatherback turtles originating from the West Pacific Ocean (WPO), with the following boundaries: south of 71° N, north of 47° S latitudes, and east of 120° E, and west of 117.124° W longitudes (NMFS and USFWS 2020b). Indonesia, Papua New Guinea, and Solomon Islands have been identified as the core nesting areas for this population (Benson et al. 2007a; 2007b; 2011; 2018). Long-term monitoring data for this population is geographically limited to the Bird's Head Peninsula in West Papua at Jamursba Medi and Wermon nesting beaches, which represent an estimated 50 to 75 percent of all nesting in the WPO (NMFS and USFWS 2020b). Additional but lower levels of nesting have been documented elsewhere in Indonesia, including a new monitoring program established in 2017 on Buru Island (WWF 2019), plus locations in Papua New Guinea, Solomon Islands, Vanuatu and the Philippines (NMFS and USFWS 2020b).

We define the East Pacific population as leatherback turtles originating from the East Pacific Ocean (EPO), north of 47° S and south of 32.531° N latitudes, and east of 117.124° W, west of the Americas. The East Pacific leatherback population is characterized by somewhat continuous and low density nesting across long stretches of beaches along the coast of Mexico and Central America (NMFS and USFWS 2020b). The best available genetic data indicate a high degree of connectivity among nesting aggregations that comprise a single population without population subdivision (NMFS and USFWS 2020b). This population generally occupies a marine distribution distinct from the West Pacific population, although there are some pelagic areas where East and West Pacific populations overlap. Genetic analyses of juvenile and adult leatherback sea turtles caught in fisheries off Peru and Chile indicate that a proportion (approximately 16% of sampled turtles) are from West Pacific rookeries (Donoso and Dutton 2010; NMFS and USFWS 2013).

Leatherback turtles lead a completely pelagic existence, foraging widely in temperate and tropical waters except during the nesting season, when gravid females return to tropical beaches to lay eggs. Leatherbacks are highly migratory, exploiting convergence zones and upwelling areas for foraging in the open ocean, along continental margins, and in archipelagic waters (Morreale et al. 1994; Eckert 1998, 1999; Benson et al. 2007a, 2011). During migrations or long distance movements, leatherbacks maximize swimming efficiency by traveling within 15 feet of the surface (Eckert 2002). Although leatherbacks can dive deeper than any other reptile, with dives as deep as 3,937 feet (1,200 m), they spend most of their time at depths of less than 262 feet (80 m) (Shillinger et al. 2011). Leatherback sea turtles feed from near the surface to depths exceeding 1,000 m, including nocturnal feeding on tunicate colonies within the deep scattering layer (Spotila 2004). Migrating leatherback sea turtles spend a majority of their time submerged and display a pattern of continual diving. They appear to spend almost the entire portion of each dive traveling to and from maximum depth, suggesting continual foraging along the entire depth profile (Eckert et al. 1998).

Results from various satellite telemetry studies have documented transoceanic migrations between nesting beaches and foraging areas in the Atlantic and Pacific Ocean basins (Ferraroli et al. 2004; Hays et al. 2004; James et al. 2005; Eckert 2006; Eckert et al. 2006; Benson et al. 2007b; 2011). In the Pacific, leatherbacks nesting in Central America and Mexico migrate thousands of miles into tropical and temperate waters of the South Pacific (Eckert and Sarti 1997; Shillinger et al. 2008). After nesting, females from the Western Pacific nesting beaches make long-distance migrations into a variety of foraging areas including the central and eastern North Pacific, westward to the Sulawasi and Sulu and South China Seas, or northward to the Sea of Japan (Benson et al. 2007a; Benson et al. 2011).

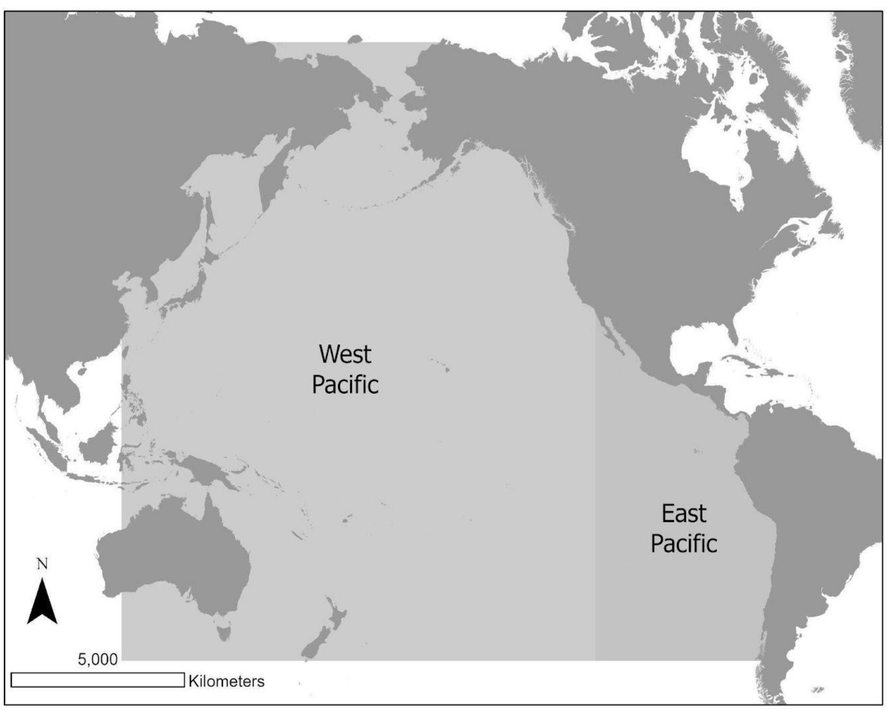

Figure 5. Map identifying the ranges of the East and West Pacific populations of leatherbacks.

Leatherback nesting aggregations are found both in the West and East Pacific. Aerial surveys conducted between 2004 and 2007 identified Indonesia, Papua New Guinea, and Solomon Islands as the core nesting areas for the population (Benson et al. 2011). The majority of nesting occurs along the north coast of the Bird's Head Peninsula, Papua Barat, Indonesia at Jamursba-Medi and Wermon beaches (Dutton et al. 2007). A recent discovery of a previously undocumented nesting area on Buru Island, Indonesia and relatively new sites in the Solomon Islands, suggests that additional undocumented nesting habitats may exist on other remote or infrequently surveyed islands of the WPO (NMFS and USFWS 2020b). Low levels of nesting are also reported in Vanuatu (Petro et al. 2007; Wan Smolbag 2010).

The population exhibits genetic population structure. While mtDNA analyses of 106 samples from Indonesia, Papua New Guinea, and Solomon Islands did not detect genetic differentiation among nesting aggregations (Dutton et al. 2007), microsatellite DNA analyses indicate fine-scale genetic structure (Dutton 2019; NMFS SWFSC unpublished data). Hence, we treat these nesting aggregations as subpopulations. Two life history strategies are documented in the WPO population: winter boreal nesters (December to March) and summer boreal nesters (June to September). Migration and foraging strategies vary based on these life history strategies, likely due to prevailing offshore currents and seasonal monsoon-related effects experienced as hatchlings (Benson et al. 2011; Gaspar et al. 2012). Summer nesting females forage in Northern Hemisphere habitats in Asia and the North Pacific Ocean, while winter nesting females migrate to tropical waters in the South Pacific Ocean (Benson et al. 2011; Harrison et al. 2018; Figure 6). The lack of crossover among seasonal nesting populations suggests that leatherbacks develop fidelity for specific foraging regions likely based on juvenile dispersal patterns (Benson et al. 2011; Gaspar et al. 2012; Gaspar and Lalire 2017). Stable isotopes, linked to particular foraging regions, confirm nesting season fidelity to specific foraging regions (Seminoff et al. 2012). Adult West Pacific leatherback sea turtles interacting with the pelagic longline fishery proposed in this EFP are most likely summer nesters using the North Pacific transition zone (or Kuroshio extension), equatorial eastern Pacific, or the California Current Extension (Figure 6).

The most recent status review (NMFS and USFWS 2020b) defines the East Pacific subpopulation as leatherback turtles originating from the EPO, north of 47° S, south of 32.531° N, east of 117.124° W, and west of the Americas. The subpopulation generally occupies a distribution distinct from the WPO population and is considered to be located outside of the action area for the Proposed Action. However, based on interactions with the Hawaii-based DSLL fishery, there are some areas where East and West Pacific populations can overlap, such as south of Hawaii. Based on the genetic analyses of leatherbacks found off the U.S. West Coast, we consider the probability of the East Pacific leatherback sea turtles occurring in the action area, to be extremely low. No leatherbacks taken and sampled in the California DGN fishery or captured off the U.S. West Coast for research have ever been genetically assigned to the East Pacific nesting beach subpopulation (P. Dutton, personal communication, SWFSC, unpublished data).

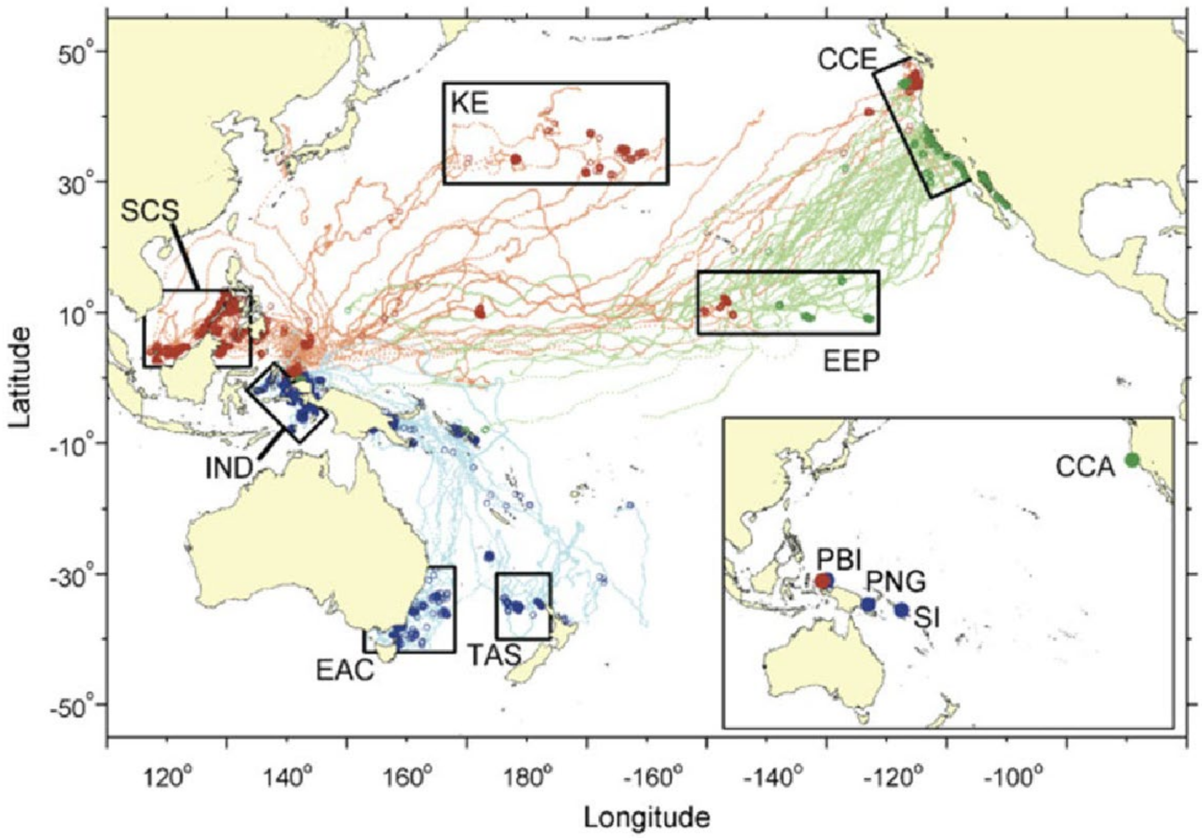

Figure 6. Satellite tracks from 126 West Pacific leatherback sea turtles. Color of track indicates deployment season: red = summer nesters, blue = winter nesters, green = deployments at central California foraging grounds. Inset shows deployment locations; PBI = Papua Barat, Indonesia, PNG = Papua New Guinea, SI = Solomon Islands, CCA = central California. Black boxes represent ecoregions for which habitat associations were quantitatively examined: SCS = South China, Sulu and Sulawesi Seas, IND = Indonesian Seas, EAC = East Australia Current Extension, TAS = Tasman Front, KE = Kuroshio Extension, EEP = equatorial eastern Pacific, and CCE = California Current Ecosystem (from Benson et al. 2011).

Leatherbacks nesting in the EPO (primarily in Mexico and Costa Rica, and to a lesser extent, Nicaragua) migrate thousands of miles into tropical and temperate waters of the South Pacific (Eckert and Sarti 1997; Shillinger et al. 2008). Tagging studies have shown that eastern Pacific post-nesting females migrate southward to the south Pacific after nesting in Costa Rica (Shillinger et al. 2008, 2011; Figure 7). The adult turtles commonly forage offshore in the South Pacific Gyre in upwelling areas of cooler, deeper water and high productivity (Shillinger et al. 2011). During the nesting season, they stay within the shallow, highly productive, continental shelf waters (Shillinger et al. 2010). There are also data on at-sea distribution that were collected via observers and fishers onboard fishing vessels in the EPO. The primary data available developed by the Inter-American Tropical Tuna Commission (IATTC) shows a wide distribution of leatherback sea turtles throughout the EPO, ranging from the Gulf of California, Mexico to Peru (IATTC 2012). However, genetic analyses of juvenile and adult leatherback sea turtles caught in fisheries off Peru and Chile indicate that a proportion (approximately 16% of sampled turtles) are from West Pacific rookeries (Donoso and Dutton 2010; NMFS and USFWS 2013).

The IUCN Red List conducted its most recent assessment of the WPO subpopulation in 2013 and listed it as "Critically Endangered" due in part to its continual decline in nesting, the continued threat due to fishing, and the low number of estimated nesting females.

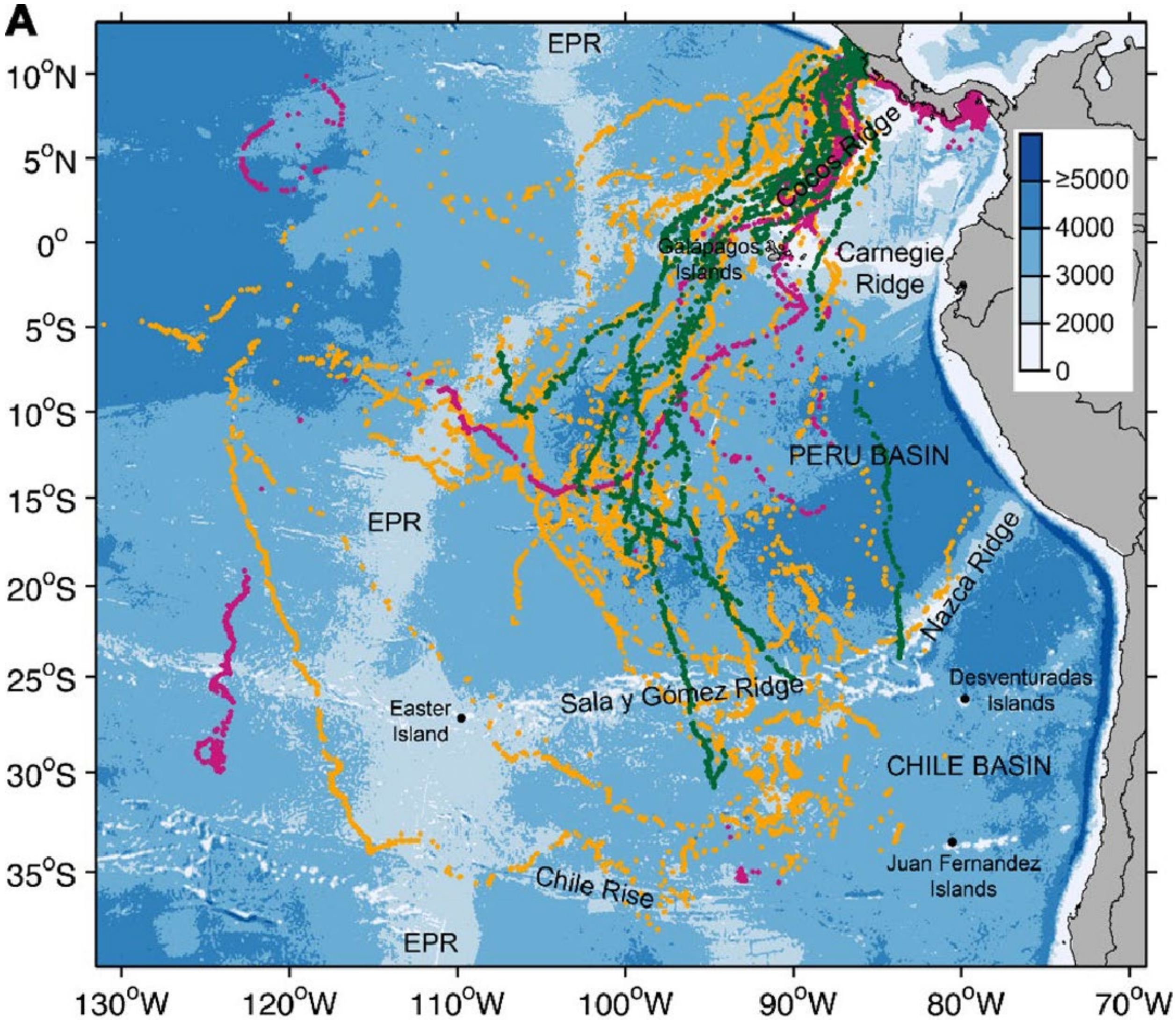

Figure 7. Satellite tracks for 46 post-nesting female leatherback sea turtles from the East Pacific population and nesting at Playa Grande, Costa Rica. Colors indicate the year of deployment: 2004 (*n* = 27, orange), 2005 (*n* = 8, purple), and 2007 (*n* = 11, green; From Shillinger et al. 2008).

<u>*Population Status and Trends*</u>: Sea turtles are difficult to study across all life stages due to their extensive distribution, certain cryptic life stages, complex life history, and remote habitats. As a result, status and trends of sea turtle populations are usually based on data collected on nesting beaches (e.g., number of adult females, number of nests, nest success, etc.). The spatial structure of male leatherback sea turtles and their fidelity to specific coastal areas is unknown; however, we describe the status of leatherback populations based on the nesting beaches that females

return to when they mature. We make inferences about the growth or decline of leatherback populations based on numbers of nests and trends in numbers of nests.

Leatherbacks occur throughout the world, and populations and trends vary in different regions and nesting beaches. In 1980, the leatherback population was approximately 115,000 (adult females) globally (Pritchard 1982). By 1995, one estimate claimed this global population of adult females had declined to 34,500 (Spotila et al. 1996). In 2020, NMFS and USFWS published a global status review for leatherback sea turtles. Abundance and trend estimates of nesting females for five of the DPSs not located in the Pacific Ocean indicated that all were at risk of extinction. The Northwest Atlantic DPS has a total index of nesting female abundance of 20,659 females, with a moderate level of confidence. This DPS exhibits a decreasing nest trend at nesting beaches with the greatest known nesting female abundance. For the Southwest Atlantic DPS, NMFS and USFWS estimated only 27 females, with most nesting occurring in Brazil, exhibiting an increasing, although variable nest trend. The Southeast Atlantic DPS was estimated to have 9,198 nesting females, with most nesting occurring in Gabon where a declining nest trend has been observed at this largest nesting aggregation. The Southwest Indian Ocean DPS was estimated to have 149 nesting females, with an overall nesting trend that is slightly decreasing. Lastly, the Northeast Indian DPS total index of nesting female abundance was estimated to be 109 females with a declining trend, particularly with the extirpation of its largest nesting aggregation in Malaysia (NMFS and USWFS 2020b).

In the Pacific, leatherback populations are declining at all major Pacific basin nesting beaches, particularly in the last three decades (Spotila et al. 1996; Spotila et al. 2000; NMFS and USFWS 2007b; NMFS and USFWS 2020b).

East Pacific Leatherback

Using the best available data for the East Pacific population, NMFS and USFWS (2020b) estimate that there are approximately 755 adult females at the index beach sites for the East Pacific population, with 76% of nesting occurring on beaches in Mexico (572 females), 22% (165 females) in Costa Rica, and 2% (18 females) in Nicaragua. This estimate is based on index beaches that comprise approximately 75% of the total nesting for the population (NMFS and USFWS 2020b); therefore, we estimate a total of 1,007 adult females. Assuming a sex ratio of 79% female (Santidrian-Tomillo et al. 2014) suggests there was a total of 1,274 adults in 2020 inclusive of both males and females. We do not have data to assess the total population size; however, based on data in Table 2 of Jones et al. (2012), we expect that adults comprise a mean of 2.1% (CI: 1.3% to 3.7%) of the total population size, which would suggest a total population size of 60,611 (CI: 34,050 to 95,462) individuals in 2020.

The East Pacific leatherback population has undergone dramatic declines over the last three generations (Wallace et al. 2013a; NMFS and USFWS 2020b), and to date there is no sign of recovery. Where there were enough data to estimate trends (at least 9 years of data), NMFS and USFWS (2020b) estimated mean trends with 95% CI as specified in Table 5.

Table 5. Trends in nesting females for nesting beaches in the East Pacific leatherback population with at least 9 years of data (from NMFS and USFWS 2020b).

Beach	Years	Low/High Nest Numbers	Mean Annual Trend	95% Confidence Interval
		Mexico		
Tierra Colorada	1996-2017	12/503	0.6%	-17.1 to 18.9%
Barra de la Cruz/ Grande	1996-2016	5/365	+9.5%	-6.5 to 25.8%
Cahuitan	1997-2016	4/75	-4.3%	-22.1 to 17.6%
		Costa Rica		
Las Baulas	1988-2015	22/1,504	-15.5%	-23.1 to -7.8%

Historically, the majority of nesting in Costa Rica has occurred at Las Baulas, Nesting at this beach has been depleted, with no signs of recovery as of to date, with a 15.5% annual rate of decline in nesting females that documented from 1988/1989 through 2015/2016, and with nesting from 2010 to 2015 ranging from 22 to 38 nesting females per year (NMFS and USFWS 2020b). In Mexico, a positive trend has been recorded at some nesting beaches (i.e., Barra de la Cruz/Playa Grande +9.5% annually), but a negative trend has been recorded in other areas (i.e., Cahuitan -4.3% annually over the same period). For some beaches, trends from 2011 through 2016 (the end of the time series) suggest an increase; however, there are not enough data to determine if this reflects interannual variation or a true change in trends. Overall, the current and potential future trend for the population is uncertain, and additional years of data are needed to ascertain if recovery is occurring in Mexico. Based on high nest numbers and mean trends across four index beaches (i.e., Tierra Colorada, Barra Cruz/Grande, Cahuitan, and Las Baulas), NMFS (2023b) estimate a weighted average trend of -8.1% for the East Pacific leatherback population. Given that the majority of nesting for the population is currently occurring in Mexico, we consider the declining trend of -4.3% per year at Cahuitan to be the most concerning scenario because it is the lowest population growth rate (i.e., highest rate of decline) in Mexico. The highest measured rate of decline for the East Pacific population is -15.5% per year at what was historically the primary nesting beach, Las Baulas Costa Rica; however, given the current low levels of nesting at this beach, it is not clear that this rate of decline is the most representative of the population.

Western Pacific leatherbacks

The Western Pacific leatherback population that nests in Indonesia, Papua New Guinea, Solomon Islands, and Vanuatu harbors is the last remaining nesting aggregation of significant size in the Pacific. The leatherback status review (NMFS and USFWS 2020b) conservatively estimated adult female abundance at 1,277 individuals in 2017. This value is based only on nesting at Jamursba-Medi and Wermon beaches in Papua Barat, Indonesia, as these are the only beaches with long-term monitoring. Despite a slight uptrend in the most recent data, NMFS and USFWS (2020b) estimated the long-term trend in annual nest counts for Jamursba Medi (data collected from 2001 to 2017) at -5.7% annually. These two beaches likely represent between 50% and 75% of all nesting for this population (NMFS and USFWS 2020b). To assist with analysis in the Hawaii SSLL fishery biological opinion (NMFS 2019b), NMFS conducted a PVA on West Pacific leatherback sea turtles (Martin et al. 2020a, 2020b). They used the same data as the status review (NMFS and USFWS 2020b) from the Jamursba-Medi and Wermon index beaches, and used Bayesian models to impute missing data and to estimate the range of intrinsic population growth rates (r). Drawing from the resulting distribution of r values as well as the distributions of the nesting female population size at the end of the time series and a process error term, Martin et al. (2020a, 2020b) projected population trends 100 years into the future, conducting 10,000 simulations to capture the variability in projections. In the future projections, Martin et al. (2020a, 2020b) computed the proportion of simulations for which the projected number of annual nesters fell below (and remained below) 50%, 25%, and 12.5% of the estimated abundance of nesters. For the set of runs ending below a threshold, they calculated the mean, median, and 95% credible interval for the number of years until the population fell below the threshold. They also calculated the probability of the projected total reproductive females falling below each threshold at 5, 10, 25, 50, and 100 years in the future.

Results of the PVA model suggest that the adult female portion of the West Pacific leatherback sea turtle population is declining at a long-term rate of 6% per year (95% CI: -23.8% to 12.2%), and the population as indicated by the index beaches is at risk of falling to less than half of its current abundance in as few as five years (range 5-26 years, mean 12.7 years; Martin et al. 2020a). PVA modeled estimates suggest the population in 2017 from these two beaches consisted of about 790 adult female leatherback sea turtles (95% CI: 666-942) using the median values for nest counts. As trends at these beaches between 2017 and 2022 appear to be stable (Figure 8), we consider the 2017 abundance estimate to be the best estimate of current (2025) adult females for the index beaches.

The index of total nesting females in Jamursba Medi and Wermon (1,277 females) provided in the status review of the species (NMFS and USFWS 2020b) was based on a simple calculation that does not provide confidence or credible intervals. While NMFS and USFWS (2020b) determined that this index was a suitable representation of total nesting female abundance for their purposes (i.e., evaluating extinction risk), they acknowledged that the degree to which the index represents the actual abundance of nesting females is unknown. We consider the values from Martin et al. (2020a) using the median values for nest counts to be the best available estimates for abundance for two reasons. First, Martin et al. (2020a) imputed missing data for months during which data were not collected, providing a more accurate estimate of total nesting. Second, their model evaluated variation due to natural causes (i.e., changes in nesting over time due to environmental or demographic factors) and observational error (i.e., imperfect data collection; Martin et al. 2020a).

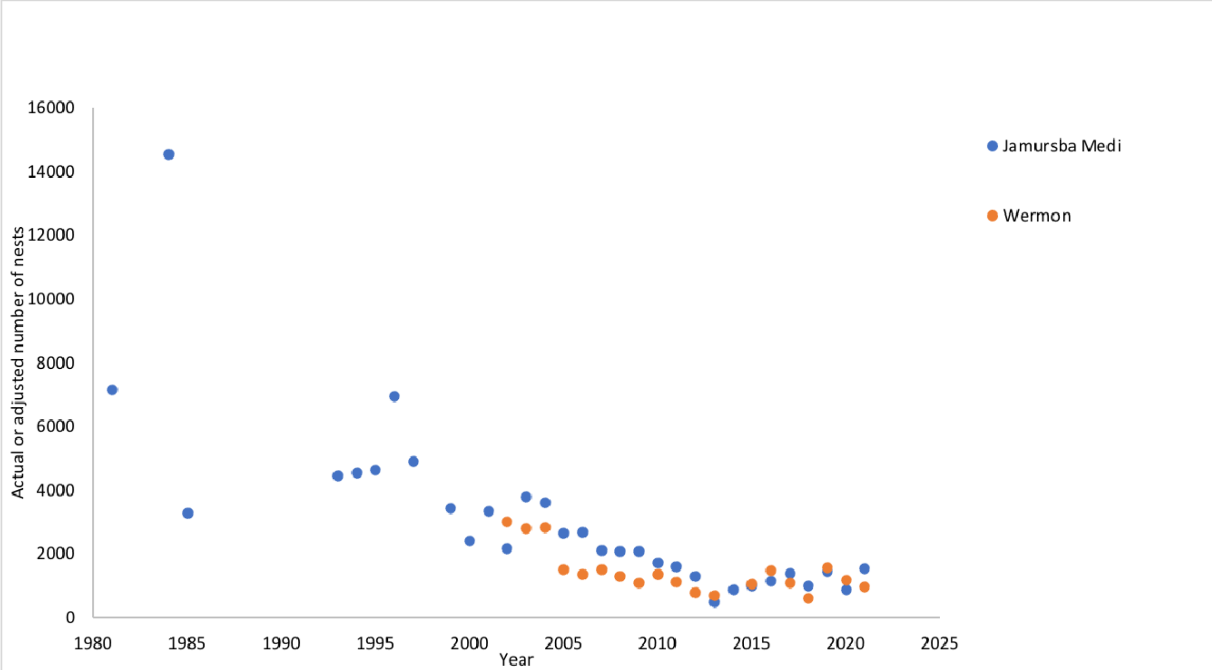

Figure 8. Actual and adjusted number of leatherback nests between 1981 and 2021 at Jamursba Medi and Wermon. Each year represents nests laid from April of one year to March of the following year (Lontoh et al. in prep).

To estimate the total number of nesting females from all nesting beaches in the WPO, we considered nesting at unmonitored or irregularly monitored beaches. Approximately 50% to 75% of West Pacific leatherback nesting occurs at Jamursba Medi and Wermon beaches (Dutton et al. 2007; NMFS and USFWS 2020b). Applying the conservative estimate of 75% to the Martin et al. (2020a) estimate of 790 nesting females in the index beaches leads to an estimate of 1,054 nesting females for the West Pacific population, with an overall 95% CI of 888 to 1,256 nesting females. It should be noted that this estimate (i.e., 1,054) of nesting females for the West Pacific population based on more recent available information is an update of the NMFS and USFWS (2020b) estimate (i.e., 1,277).

Preliminary data from the Jamursba Medi and Wermon index beaches indicate that nest numbers were relatively stable from 2017 to 2021 (Lontoh et al. in prep), but the data are not yet available in sufficient detail to update the model of Martin et al. (2020a). Hence, we acknowledge that there is a great deal of uncertainty associated with the current status of West Pacific leatherback sea turtles, as represented by the two index beaches.

Additional but lower levels of nesting have been documented elsewhere in Indonesia, including a new monitoring program established in 2017 on Buru Island (WWF 2022), plus locations in Papua New Guinea, Solomon Islands, Vanuatu and the Philippines. Monitoring at most of these additional sites has not been going on long enough to establish trends or abundance; therefore, data from these nesting beaches cannot be used to reliably calculate those metrics at this time. An exception to this is the World Wildlife Fund (WWF) program at Buru Island in Indonesia, where data have been consistently collected since 2017 (WWF 2022). While there is only 6 years of data available, this period does span almost two remigration intervals. These data indicate an increasing trend of 10.1% per year (CI: -26.1% to 46.3%) based on an exponential growth curve. To encompass full boreal winter and summer nesting, the nesting data are censused from October to September – thus data from 2018 represents data from October 2017 to September 2018. We note that the collection of data started in January of 2017 and the nest number for 2017 is missing data from October to December 2016, and therefore does not represent a full year of data. Using the same method to calculate total adult females as Martin et al. (2020a; remigration interval multiplied by the average of the last 4 years of nesters; see Equation 13 in Martin et al. 2020a), there are approximately 103 adult females nesting at Buru Island, which would constitute an addition to the modeled estimate of 790 annual nesting females at Jamursba Medi and Wermon in 2017 (Martin et al. 2020a). Assuming a 73% female sex ratio (Benson et al. 2011) and based on NMFS' PVA results for median nest counts, the total number of adult leatherback sea turtles in the WPO population would be 1,443 ([790/0.73]/0.75; 95% CI: 1,216-1,720) assuming the index beaches represent 75% of the population.

Based on the estimates presented in Jones et al. (2012) for all Pacific populations, NMFS inferred an estimated West Pacific leatherback total population size (i.e., juveniles and adults) of 250,000 (95 CI: 97,000-535,000) in 2004. Based on the relative change in the estimates derived from Jones et al. (2012) and the more recent Martin et al. (2020a), NMFS estimates the juvenile and adult population size of the West Pacific leatherback population is around 100,000 sea turtles (95 percent CI: 47,000-195,000). As nesting numbers have been stable since 2017, we assume these abundance estimates are representative of 2025 abundance estimates as well.

The Western Pacific population has been exhibiting low hatchling success and decreasing nesting population trends due to past and current threats (NMFS and USFWS 2020b). The low estimated nesting female abundance of the West Pacific population places it at elevated risk for environmental variation, genetic complications, demographic stochasticity, negative ecological feedback and catastrophes. These processes, working alone or in concert, place small populations at a greater extinction risk than large populations, which are better able to absorb impacts to habitat or losses in individuals. Low site fidelity, which is characteristic of the species, results in the dispersal of nests among various beaches. This may help to reduce population level impacts from threats which may disproportionately affect one area over another, but may also place nests in locations that are likely unmonitored and not protected from human poaching or predation, thereby increasing threats to the population. Due to its small size, this population has restricted capacity to buffer such losses (NMFS and USFWS 2020b).

Tapilatu et al. (2013) found a 78% decline in nesting from 1984 to 2011 at Jamursba Medi, and a 62.8% decline in nesting in Wermon from 2002 to 2011. Overall, they estimated a 5.9% per year decline in nesting abundance for both nesting beaches over this time period. The median trend in annual nest counts estimated for Jamursba Medi nesting beaches from data collected from 2001-2017 was -5.7% annually (95% CI: -16.2% to 5.3%; NMFS and USFWS 2020b). The median trend in annual nest counts estimated for Wermon nesting beaches from data collected from 2006-2017 (excluding 2013-2015 due to low or insufficient effort) was -2.3% annually (95% CI: -19.8 to 14.9%; NMFS and USFWS 2020b). As previously described, Martin et al. (2020a) estimated the combined trends for Jamursba Medi and Wermon to be a mean of - 6.0% annually (95% CI: -24.1 to 12.2%). We note that the nesting data in Figure 8 from 2018 to 2021 are preliminary, and only provided to NMFS from the authors (Lontoh et al. in prep) as the figure shown in Figure 8. Until we receive the detailed raw monthly data from the nesting beaches, the growth trend analysis of Martin et al. (2020a, 2020b) cannot be updated. Therefore, since we do not have any updated modeled estimates of future growth rates based on this new information, we rely on the estimates of Martin et al. (2020a, 2020b) for current population growth rates. In addition, given the substantial declines in the population from 1984 to 2012, the data from 2012 to 2021 are likely not of long enough duration to definitely state that the population is now at least stable, but this may be reevaluated when raw data are available for analysis. NMFS (2023c) notes that New Zealand shallow-set longline fishery has shown a marked increase in leatherback interactions, from a low of one in 2008 to a high of 50 in 2022, which indicates a significant positive trend of 19.9% per year (CI: 8.4% to 31.3%). While fishery captures can be influenced by numerous environmental factors that can disconnect them from population trends, NMFS postulates that the strength of the trend suggests the potential for more leatherback turtles in the water in recent years.

Although human interactions are a major source of mortality for this declining population, there are indications that natural fluctuations in environmental and oceanic conditions could be significant influences on survival rates across various life stages or on reproductive rates (Van Houtan 2011; Tomillo et al. 2012).

Satellite tracking of post-nesting females and foraging males and females, as well as genetic analyses of leatherback turtles caught in U.S. Pacific fisheries or stranded on the west coast of the U.S., along with stable isotope analysis, all indicate that all of the leatherbacks found off the U.S. West Coast are from the Western Pacific nesting populations, specifically boreal summer nesters. Approximately 38-57 percent of summer-nesting females from Papua Barat migrate to distant foraging grounds off the U.S. West Coast, including the neritic waters off central California. Researchers recently assessed the abundance and trend of leatherbacks foraging off central California using 28 years of aerial survey data from coast-wide and adaptive fine-scale surveys (Benson et al. 2020). Results indicate that leatherback abundance of the U.S. West Coast has declined at an annual rate of -5.6% (95% credible interval of -9.8% to -1.5%) to less than 200 individuals.

Martin et al. (2020a) estimated the mean and median time until the West Pacific population declines to 50%, 25%, and 12.5% of its 2017 estimated abundance, and Siders et al. (2023) updated these results to 2021, assuming the population declined at a rate of 6% per year from the 2017 estimates. Results of this updated modeling effort indicate that the adult female portion of West Pacific leatherbacks nesting at Jamursba Medi and Wermon beaches are predicted to decline to 50% of their 2017 abundance in a mean of about 9 years beginning in 2021 (or by about 2030; CI from 1 to 22 years) and to 25% of their 2017 abundance in a mean of about 20 years (or by about 2041; 95% CI from 8 to 37 years). Again, these estimates assume a mean decline of 6% per year since 2017, which may not be accurate given some of the recent nesting data.

<u>*Limiting Factors and Threats*</u>:

The primary ongoing threats to leatherback sea turtles worldwide are fisheries bycatch, legal and illegal directed harvest, alteration of nesting habitat, predation, and marine debris or other sources of entanglement (NMFS and USFWS 2020b). Other threats to this species include changing environmental conditions due to climate change (e.g., sand temperatures that result in egg or hatchling mortality or changes in hatchling sex ratios, erosion of nesting beaches due to rising sea levels and increased storm frequency and magnitude), vessel strikes, pollution, and ingestion of marine debris (Tiwari et al. 2013; NMFS and USFWS 2020b). Below, we summarize the main anthropogenic threats facing both the West and East Pacific populations. We start with a general discussion about the impacts of climate change on Pacific leatherbacks, followed by a description of past and ongoing threats to this species within the East and West Pacific basins.

Climate change represents a threat to both the East and West Pacific leatherback populations. The impacts of climate change include: increases in temperatures (air, sand, and sea surface); sea level rise; increased coastal erosion; more frequent and intense storm events; and changes in oceanographic regimes and currents. A warming climate and rising sea levels can impact leatherback turtles through changes in beach morphology and sand temperature (Benson et al. 2015). Leatherback sea turtles are probably already beginning to be affected by impacts associated with climate change given low hatch success due to lethal beach temperatures and beach erosion (Tapilatu and Tiwari 2007; Bellagio Steering Committee 2008; NMFS and USFWS 2013). Climatic variations, including changes in rainfall patterns, sea levels, and temperature, have diminished leatherback nesting success in the Pacific Ocean. Leatherbacks prefer nesting beaches with specific characteristics, but sea level rise and increased erosion due to changes in precipitation patterns pose significant threats to these nesting sites, particularly on island nations such as Indonesia, Papua New Guinea, and the Solomon Islands (Hitipeuw et al. 2007; Pilcher and Chaloupka 2013). Over the long-term, climate change-related impacts will likely influence biological trajectories in the future on a century scale (Parmesan and Yohe 2003). Similar to other sea turtles, temperature-dependent sex determination in leatherbacks makes them vulnerable to climatic variations, with climate change anticipated to alter the duration, frequency, and intensity of events such as El Niño and La Niña. Leatherback hatchling sex is determined by nest incubation temperature, with higher temperatures producing a greater proportion of females and reduced reproductive success (Mrosovsky 1994; Chan and Liew 1995; Kaska et al. 2006; Saba et al. 2012; Santidrian-Tomillo et al. 2014; Blechschmidt et al. 2022). Sand temperatures fluctuate between 28.6 and 34.9 °C at Jamursba-Medi, and between 27.0 and 32.7 °C at Wermon (Tapilatu and Tiwari 2007). At Wermon, the sand is black, yet beach temperatures are lower perhaps because peak nesting coincides with the monsoon season (Tapilatu and Tiwari 2007). High average sand temperatures are indicative of a female-biased West Pacific leatherback population at Jamursba-Medi nesting beaches (Tapilatu and Tiwari

2007; Tapilatu et al. 2013). A significant female bias was also reported by Binckley et al. (1998) for East Pacific leatherback hatchlings at the Playa Grande nesting beach in Costa Rica (Plotkin 1995). Reduced vegetation cover along nesting beaches may also result in increased sand temperatures (Santidrian-Tomillo et al. 2012), contributing to the above effects. Changes in beach conditions are expected to be the primary driver of decline, with hatchling success and emergence rates declining by 50-60% over the next 100 years (Tomillo et al. 2012). El Niño events may become more frequent due to climate change and may further increase temperatures on nesting beaches, resulting in higher levels of embryonic mortality (Matsuzawa et al. 2002). Furthermore, heightened storm frequency and intensity can render nesting sites unsuitable and destroy existing nests, exacerbating the impacts of climate change (Patricio et al. 2021).

In addition to impacts on Pacific leatherback nesting success and sex ratios, the impacts of a warming ocean may also affect the environmental variables of their pelagic migratory and foraging habitat, which may further exacerbate population declines (NMFS and USFWS 2020b). Also, rising sea surface temperatures may affect available nesting beach areas through increased erosion and coastal flooding, as well as ocean productivity. West Pacific leatherback turtles have evolved to sustain changes in beach habitats given their proclivity to select highly dynamic and typically narrow beach habitats, and therefore at the population level can likely sustain some level of nest loss (NMFS and USFWS 2020b). However, the increasing frequency of storms and high water events, perhaps as a result of climate change, can result in increased and perhaps unnatural loss of nests. In recent years, management and conservation practices have included relocating erosion-prone nests in Indonesia, Papua New Guinea, and the Solomon Islands to bolster hatchling production (NMFS and USFWS 2020b).

Leatherbacks are known to travel within specific isotherms, which could be affected by climate change that may cause effects on their thermoregulation, bioenergetics, and foraging success during the pelagic phase of their migration, as well as potentially affect prey availability. Based on climate change modeling efforts in the eastern tropical Pacific Ocean. Saba et al. (2012) predicted that the Playa Grande nesting population in Costa Rica would decline 7% per decade over the next 100 years. Changes in beach conditions contributed to the decline, with an estimated lower hatchling success and emergence rates over that time period. Climate change prediction models, coupled with leatherback movements (through satellite telemetry) showed slightly favorable habitat conditions for leatherbacks over the same time period (100 years). Climate change may also contribute to shifts in the distribution and abundance of jellyfish, which is a primary prey resource for leatherbacks. Jellyfish experience diverse effects on abundance and distribution due to climate-induced changes, potentially disrupting leatherback foraging ecology. Some studies suggest rising temperatures increase jellyfish abundance, consequently enhancing metabolic accessibility to leatherbacks (Brotz et al. 2012). Results from Gomes et al. (2024) indicate elevated sea surface temperatures in the CCE prompt decreases in more energetically dense jellyfish populations and increases in energetically poor pyrosomes. Given their specialized diet of jellyfish, however, researchers found it difficult to determine how potential changes in prey distribution would affect leatherback population due to climate change (Hazen et al. 2012), particularly since increased jellyfish populations are often associated with warming caused by climate change (Purcell et al. 2007). Although leatherbacks are known to consume both jellyfish and pyrosomes, the switch to a less energetically dense resource could have impacts on the reproduction and survivability of the population. Temperature can also reorganize the distribution of important prey items, typically poleward and into deeper waters, which can further disrupt the foraging ecology of leatherback sea turtles given their high degree of overlap with jellyfish hotspots (Nordstrom et al. 2020). Changes in oceanographic conditions, such as currents and upwelling patterns, can disrupt nutrient cycling and primary productivity, reducing trophic efficiency from the bottom up (Polovina et al. 2008; Ullah et al. 2018). These alterations in prey items can lead to mismatches between leatherback distribution and prey availability, resulting in reduced foraging success and potential nutritional stress.

Currently, we cannot reliably predict the magnitude of future climate change and the impacts on leatherback sea turtles. The existing data and current scientific methods and analysis are not able to predict the future effects of climate change on this species or allow us to predict or quantify this threat to the species (Hawkes et al. 2009). Uncertainty remains related to leatherback nesting beach trend forecasts and correlations with climate indices. Within the context of the temporal scale of the Proposed Action (five years when considering the adaptive management program, and 10 years for the anticipated duration of the Proposed Action), climate change-related impacts to Pacific leatherbacks are not considered a significant factor that would exacerbate any effects of the Proposed Action over the 10-year period of activity.

The drivers of Pacific leatherbacks decline - both anthropogenic (e.g., bycatch, egg harvest, exploitation of females) as well as environmental (e.g., lethal sand temperatures, predation, erosion) - have been described in detail (Eckert 1993; Bellagio Steering Committee 2008; Tapilatu and Tiwari 2007; Tapilatu et al. 2013). Egg harvest and exploitation of females have been minimized at the two most significant nesting beaches of Papua Barat, Indonesia, and the impact of environmental factors is being addressed through a science-based management and conservation program. Fisheries bycatch is still considered the major obstacle to this population's recovery (Benson et al. 2011; Tapilatu et al. 2013; Wallace et al. 2013b).

Natural factors, including the 2004 tsunami in the Indian Ocean (see detailed report by Hamann et al. 2006) and the tsunami that affected Japan in 2011, may have impacted leatherback nesting beach habitat through encroachment and erosion (2004 tsunami), or may have resulted in increased debris into leatherback marine habitat (e.g., impacting migratory routes and foraging hotspots). Shifting mudflats in the Guianas have also made nesting habitat unsuitable (Crossland 2003; Goverse and Hilterman 2003).

Predation on sea turtle hatchlings by birds and fish (see Vose and Shank 2003) has been commonly reported. Reported predation of leatherback hatchlings includes tarpons (Nellis and Henke 2000), gray snappers (Vose and Shank 2003), ghost crabs, great blue and yellow-crowned herons, and crest caracaras (Santidrian-Tomillo et al. 2010). Adult leatherbacks are preyed upon by large predators, such as jaguars, tigers, killer whales, sharks, and crocodiles (reviewed by Eckert et al. 2012).

A major threat to the West Pacific population is the legal and illegal harvest of leatherback turtles and their eggs. The removal of nesting females from the population reduces both abundance and productivity; egg harvest reduces productivity and recruitment. Though leatherback turtles are protected by regulatory mechanisms in all WPO nations where this population nests, laws are largely ignored and not enforced (NMFS and USFWS 2020b). This is due to the extreme remoteness of beaches, customary and traditional community-based ownership of natural resources (which includes sea turtles), and overall lack of institutional capacity and funding for enforcement (Kinch 2006; Gjertsen and Pakiding 2011; Von Essen et al. 2014).

Directed killing of nesting females, and male and female juvenile and adult leatherbacks in their foraging areas, has been documented throughout the WPO where this population nests (Suarez and Starbird 1995; Petro et al. 2007; Bellagio Sea Turtle Conservation Initiative 2008; Kinch et al. 2009; Tiwari et al. 2013; Jino et al. 2018). While a number of relatively recent NMFS and USFWS funded programs are working to quantify and reduce directed take, egg and turtle harvest is a well-documented past and current threat that is prolific throughout the West Pacific leatherback range (Bellagio Sea Turtle Conservation Initiative 2008; NMFS and USFWS 2013; Tiwari et al. 2013; Tapilatu et al. 2017). In Indonesia, the direct harvest of turtles and eggs likely persists, although this threat has been minimized at Jamursba-Medi, Wermon, and Buru Island beaches due to the presence of monitoring programs and associated educational outreach activities (NMFS and USFWS 2020b). Before the monitoring programs, approximately 4 to 5 boats per week (from May to August) collected 10,000 to 15,000 eggs per boat at Jamursba Medi between 1980 and 1993 (Tapilatu et al. 2013). While the commercial egg harvest has been effectively eliminated since beach monitoring was established at Jamusrba Medi in 1993 (Hitipeuw et al. 2007), recent survey efforts suggest that most, if not all, sea turtle eggs (including leatherback turtles) are poached at other Bird's Head Peninsula beaches and sold in local markets (Tapilatu et al. 2017). Between 2016 and 2017, eight females were poached at Buru Island, Indonesia, (WWF 2018), and it is likely that three to five nesting females have been killed annually over the past two decades (J. Wang, NMFS, pers. comm., 2018). In 2017, 114 of 203 leatherback nests were harvested at Buru Island (WWF 2018). In 2018, due to education provided by the newly established WWF program on Buru Island, local community-based efforts in four villages now prohibit adult female and egg harvest. Indonesian laws prohibit the harvest of sea turtles and eggs; however, there is very little enforcement of these laws in areas where monitoring programs do not exist (NMFS and USFWS 2020b).

In the WPO, leatherbacks are also subjected to traditional harvest, which was well documented in the 1980s and continues today. In the Maluku islands of Indonesia, several villages of the Kei islands have engaged in an indigenous hunt (directed fishery) of juvenile and adult leatherback turtles foraging in coastal habitats for decades. While recent programmatic efforts are working to monitor and reduce this impact, the hunt was historically estimated to take over 100 leatherback turtles annually (Suarez and Starbird 1996; WWF 2019; NMFS and USFWS 2020b). Recent surveys indicate that harvest continues with estimates of 431 mortalities over the past 8 years (53.9/yr), and 104 leatherbacks harvested in 2017 (WWF 2018 as cited in NMFS and USFWS

2020b). Since 2017, the harvest has declined significantly from the high of over 100 leatherbacks in 2017, to less than 25 in 2019-2021, including only 9 turtles in 2021 (92 percent reduction; J. Wang, NMFS-PIFSC, personal communication, 2022). In Papua New Guinea, egg harvest and killing of nesting females is still a major threat despite the fact that leatherback turtles have been protected since the 1976 Fauna (Protection and Control) Act. The killing of nesting females and direct harvest of eggs in Vanuatu and the Solomon Islands is also well documented (Bellagio Sea Turtle Conservation Initiative 2008; NMFS and USFWS 2013) (NMFS and USFWS 2020b).

The primary cause of the historical decline of the East Pacific leatherback population was the legal and illegal (post-conservation measures) harvest of nesting females and eggs. The extensive and prolonged effects of comprehensive egg harvest levels of nearly 90% for about two decades have depleted the leatherback turtle population in Costa Rica and Mexico (Sarti Martínez et al. 2007; Tomillo et al. 2008; Wallace and Saba 2009). To reduce the harvest of turtles and eggs, several regulatory mechanisms and protections have been established in the three nations hosting nesting beaches. In Mexico, the harvest of turtles and eggs is now prohibited as a result of national legislation. In Costa Rica, establishment of Parque Nacional Marino Las Baulas in 1991 ensured increased protection at three nesting beaches (Playa Grande, Playa Ventanas, and Playa Langosta), greatly reducing egg poaching in the area. Though conservation efforts have reduced the levels of both, egg poaching remains high and affects a large proportion of the East Pacific breeding population.

Leatherbacks are vulnerable to bycatch in a variety of fisheries, including longline, drift gillnet, set gillnet, bottom trawling, dredge, and pot/trap fisheries that are operated on the high seas or in coastal areas throughout the Pacific Ocean. Bycatch of leatherback turtles has been documented for a variety of gillnet and longline fisheries in the Pacific Ocean, but little is known about the total magnitude or full geographic extent of mortality (NMFS and USFWS 2020b). Detailed bycatch data are available for U.S.-managed pelagic fisheries operating in the central and eastern Pacific Ocean due to regulatory mandates and high levels of observer coverage. Off the U.S. West Coast, a large time/area closure was implemented in 2001 to protect Pacific leatherbacks by restricting the DGN fishery, which significantly (at least 80%) reduced bycatch of leatherbacks in that fishery. On the high seas, bycatch in longline fisheries is considered a major threat to leatherbacks (Lewison et al. 2004).

The summer nesting component of the population exhibits strong site fidelity to the central California foraging area (Benson et al. 2011), which puts migrating leatherbacks at risk of interacting with U.S. and international pelagic longline fleets operating throughout the Central and North Pacific oceans. Fishery observer data collected between 1989 and 2015 from 34 purse seine and longline fleets across the Pacific documented a total of 2,323 sea turtle interactions, of which 331 were leatherback turtles (Clarke 2017). Two bycatch hotspot areas were identified: one in central North Pacific (which likely reflects the 100% observer coverage in the Hawaii SSLL fishery) and a second hotspot in eastern Australia (Hays et al. 2023). These data are unlikely to be representative of all bycatch hotspots as the data are driven by the presence of fishery observer programs, which are not extensive and are concentrated in certain nations' fishing fleets.

There are interactions between leatherbacks and domestic longline fishing for tuna and swordfish based out of Hawaii. Prior to 2001, an estimated 110 leatherback turtles were captured annually in all Hawaii longline fisheries combined, resulting in approximately nine annual mortalities (McCracken 2000). Under requirements established in 2004 to minimize sea turtle bycatch (69 FR 17329), vessel operators in the Hawaii-based SSLL swordfish fishery must use large (sized 18/0 or larger) circle hooks with a maximum of 10 degrees offset and mackerel-type bait. In addition, NMFS requires 100% observer coverage in this fishery, so every interaction is observed. The 2004 management measures introduced to the Hawaii longline fisheries have demonstrably reduced leatherback sea turtle interaction rates by 83% (Gilman et al. 2007a; Swimmer et al. 2017). Between 2004 and 2017, there have been 99 total leatherback turtle interactions in the SSLL fishery (or approximately eight leatherback turtles annually), based on 100% observer coverage (WPFMC 2018). From 2012-2017, the incidental take statement for the Hawaii-based SSLL fishery was 26 leatherback sea turtles per year, which served as the "hard cap" for the fishery that requires closure of the entire fishery during any year if reached. Recently, the hard cap for leatherback sea turtle bycatch was reset to 16 per year, with the expectations that up to 16 may be caught and 3 may be killed each year, and that vessels would be restricted to no more than 2 leatherbacks taken during any one trip (NMFS 2019b). Between 2004 and 2022, there were a total of 121 leatherback sea turtles captured in the Hawaii-based SSLL fishery, with zero leatherback sea turtles observed killed as a result, but an estimated 21% of those killed given post-interaction mortality estimates (NMFS 2019b; updated in NMFS 2023b). From 2004-2018, NMFS estimated that the Hawaii-based SSLL fishery annually interacted with around 21 leatherbacks/year, with an estimated 3 dead per year (given also post-interaction mortality) (NMFS 2019b).

Between 2002 and 2016, an estimated 166 leatherback interactions have occurred in the Hawaii-based DSLL fishery (or approximately 11 annually) (McCracken 2019). From the 2014 biological opinion for the Hawaii DSLL fishery (NMFS 2014), the estimated future interactions for leatherbacks is 24 annual interactions resulting in 9 mortalities. From 2004-2022, the Hawaii DSLL fishery (~20% observer coverage) was observed to interact with 46 leatherbacks, with an estimated 246 taken (around 13/year). On average, a mean of 17 (95th percentile: 43) were anticipated to be captured. When at-vessel and post-release mortality rates are combined, the effective mortality rate in this fishery is 35%, resulting in a mortality rate of 6 turtles to die each year. The current anticipated take level (incidental take statement) over a 5-year period (running sum) is 92 leatherbacks (interactions, injuries and/or mortalities) (NMFS 2023b). Based on updated fishery interaction, take distribution, and population benchmark data, Siders et al. (2023) used a probability of maturity approach to estimate an expected mortality from the Hawaii DSLL fishery of 0.37 annual nesters per year.

In the current West Coast DSLL fishery operating outside of the U.S. West Coast EEZ, NMFS has anticipated that four leatherbacks could be taken every 10 years, with two of those resulting in mortality (NMFS 2016a). Up to this point, no leatherback interactions have been reported in the West Coast DSLL fishery since 2005.

Observer coverage of the American Samoa longline fishery has varied over time from 5 to 40 percent and has had an estimated 55 leatherback interactions between 2010 and 2017 (McCracken 2019). From the 2023 American Samoa longline fishery biological opinion (NMFS 2023d), the mean number of leatherback sea turtles from the West Pacific population that are likely to be captured by this fishery in any given year is 10 (95th Percentile: 30), given observer data from 2010 to 2019. With an estimated total mortality rate (at-vessel and post release) of 65%, approximately 7 leatherbacks (95th percentile: 20) would be killed per year. Over the next 10 years, NMFS anticipates that the fishery will interact with 17 adult leatherback turtles resulting in the mortality of 4 adults, 3 of which would be females (NMFS 2023d).

Estimating the total number of sea turtle interactions in other Pacific fisheries that interact with the same sea turtle populations as U.S. fisheries is difficult because of low observer coverage and inconsistent reporting from international fleets. Lewison et al. (2004) estimated 1,000 – 3,200 leatherback mortalities from pelagic longlining in the Pacific in 2000. Beverly and Chapman (2007) more recently estimated leatherback longline bycatch in the Pacific to be approximately 20% of that estimated by Lewison et al. (2004), which would equate to 200 – 640 leatherbacks during that time period. Chan and Pan (2012) estimated that there were approximately 1,866 total sea turtle interactions of all species in 2009 in the Central and North Pacific by comparing swordfish production and turtle bycatch rates from fleets fishing in the Central and North Pacific area. In 2015, a workshop convened to analyze the effectiveness of sea turtle mitigation measures in the tuna RFMOs and 16 countries (including the United States, which reported 27% of the interactions) provided data on observed sea turtle interactions and gear configurations in the Western Central Pacific Ocean. Based on the information gathered there, 331 leatherback sea turtles were reported, leading to a total estimate of 6,620 leatherbacks caught in the region from 1989-2015 in these countries (mortality rates were not reported (Common Oceans (ABNJ) Tuna Project 2017). Most recently, Peatman et al. (2018) estimated that 24,006 leatherbacks were captured in longline fisheries operating in the North Pacific from 2003-2017. Finally, bycatch estimates of sea turtles were summarized from annual reports by the WCPFC (2021). Sea turtle data included U.S. fishery data, with the Hawaii-based DSLL fishery representing 5 to 6% of the total hooks set by Western Central Pacific Ocean longline fisheries. From 2013 to 2020, an average of 722 leatherbacks (CI: 468 – 976) were caught annually, with an estimated 76 leatherbacks (CI: 16 – 136) killed per year. With low observer coverage in these international fleets (~3%), confidence in these estimates are low. Nonetheless, we have more confidence in understanding the effects of our domestic longline fisheries, given 100% observer coverage in the Hawaii-based SSLL fishery and approximately 20% observer coverage in the Hawaii-based DSLL fishery, and variable coverage in the American Samoa longline fishery.

The U.S. tuna purse seine fishery operating in the Western and Central Pacific Ocean interacted with approximately 16 leatherback turtles between 2008 and 2015 based on observer coverage ranging from 20 to 100 percent (NMFS and USFWS 2020b). The anticipated future interactions of leatherbacks for this fishery is estimated to be 11 sub-lethal interactions per year, and mortalities are not anticipated from this fishery.

Historically, significant leatherback bycatch was documented in the North Pacific high seas driftnet fishery, which expanded rapidly during the late 1970s, and was banned in 1992 by a United Nations resolution (summarized in Benson et al. 2015). High seas driftnet fishery bycatch was likely a significant contributor to the population declines observed at nesting beaches during the 1980s and 1990s (Benson et al. 2015). Bycatch in small-scale coastal fisheries has also been a significant contributor to leatherback population declines in many regions (Kaplan 2005; Alfaro-Shigueto et al. 2011), yet there is a significant lack of information from coastal and small-scale fisheries, especially from the Indian Ocean and Southeast Asian region (Lewison et al. 2014).

In summary, West Pacific leatherbacks are exposed to high fishing effort throughout their foraging range, and likely in coastal waters near nesting beaches or en route to and from nesting beaches and foraging habitats, though very little fisheries data are available for coastal areas near nesting beaches (NMFS and USFWS 2020b). Bycatch rates in international pelagic and coastal fisheries are thought to be high, and these fisheries have limited management regulations despite hotspots of high interactions, for example in Southeast Asia (Lewison et al. 2004; Alfaro-Shigueto et al. 2011; Wallace et al. 2013a; Clarke et al. 2014; Lewison et al. 2014; Clarke 2017). Annual interaction and mortality estimates are only available for U.S.-managed pelagic fisheries, which operate under fisheries regulations that are designed to minimize interactions with and mortalities of endangered and threatened sea turtles (NMFS and USFWS 2013; Swimmer et al. 2017; NMFS and USFWS 2020b).

Bycatch in commercial and recreational fisheries, both on the high seas and nearshore, is considered a primary threat to the East Pacific leatherback population (NMFS and USFWS 2020b). Juvenile and adult leatherbacks are exposed to high fishing effort throughout their foraging range and in coastal waters near nesting beaches. Mortality is also high in some fisheries, with reported mortality rates of up to 58% due in part to the use of gillnets and consumption of bycaught turtles in Peru (NMFS and USFWS 2020b). While efforts by individual nations and regional fishery management organizations have, to some extent, mitigated and reduced bycatch, this stressor remains a major threat to the East Pacific leatherback population (NMFS and USFWS 2020b).

Given that recent developments to reduce sea turtle bycatch in fisheries have been working their way into some international fisheries, and the incomplete datasets and reporting that exists, the exact level of current sea turtle bycatch internationally is not clear. However, given the information that is available, we believe that international bycatch of sea turtles in fisheries throughout the Pacific Ocean continues to occur at significant rates several orders of magnitude greater than what NMFS documents or anticipates in domestic U.S. Pacific Ocean fisheries.

In an attempt to develop a tool for managers to use locally (e.g., in an EEZ) to reduce threats in a particular area of interest, Curtis et al. (2015) developed biological "limit reference points" for Western Pacific leatherback turtles in the U.S. west coast EEZ, similar to a potential biological removal (PBR) approach calculated for marine mammal stocks.[16] Depending on the model used and the various objectives sought (e.g. achievement of maximum net productivity, or no more than a 10% delay in the time for the population to rebuild) and incorporation of conservative assumptions accounting for broad uncertainty in abundance and productivity estimates, the limit reference point estimate for human-caused removals in the U.S. West Coast EEZ ranged from 0.8 to 7.7 leatherbacks over 5 years. Although these results are useful for consideration, NMFS is not currently using this approach to managing threats to sea turtles foraging within the U.S. EEZ, pending further discussion of how this approach or other approaches relate to the standards of the ESA. We anticipate that the management tool presented by Curtis et al. (2015) and other approaches to managing threats to sea turtles will continue to be subject to future discussion by scientific and policy experts.

Marine debris represents a potential stressor for the East and West Pacific leatherback populations, although the impacts remain unquantified. Leatherback turtles can ingest marine debris, causing internal damage and/or blockages. Larger debris can entangle animals, leading to reduced mobility, starvation, and death. Given the amount of floating debris in the Pacific Ocean within the range of the West Pacific population, marine debris has the potential to be a significant threat, however the impact is unquantified (NMFS and USFWS 2020b). Lebreton et al. (2018) estimated plastic debris accumulation to be at least 79,000 tons in the Great Pacific Garbage Patch, a 1.6 million km^2 area between California and Hawaii. Leatherback turtles feed exclusively on jellyfish and other gelatinous organisms and as a result may be prone to ingesting plastic items resembling their food source (Schuyler et al. 2014; Schuyler 2014). Few studies have addressed the susceptibility of West Pacific leatherbacks to plastic marine debris ingestion, or the magnitude of the risk this potential stressor represents. Entanglement in ghost fishing gear is also a concern (Gilman et al. 2016), and derelict nets account for approximately 46% by piece, and 86% by weight, of debris floating in the Great Pacific Garbage Patch (Lebreton et al. 2018).

The South Pacific Garbage Patch, discovered in 2011 and confirmed in mid-2017, contains an area of elevated levels of marine debris and plastic particle pollution, most of which is concentrated within the ocean's pelagic zone and in areas where East Pacific leatherbacks forage for many years of their life (NMFS and USFWS 2020b). The area containing this aggregation is located within the South Pacific Gyre, which spans from waters east of Australia to the South American continent and as far north as the equator. Entanglement in and ingestion of marine

[16] A Potential Biological Removal (PBR) level means 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. The PBR level is the product of the following factors: 1) the minimum population estimate of the stock; 2) one-half of the maximum theoretical or estimated net productivity rate of the stock at a small population size; and 3) a recovery factor of between 0.1 and 1.0 (50 CFR 229.2).

debris and plastics is a threat that likely kills or injures individuals from this population each year; however, data are not available because most affected turtles are not observed.

Leatherback turtles forage in surface waters and this makes them and their prey susceptible to exposure to contaminants from terrestrial sources. Runoff can carry chemicals, contaminants, and other toxins into marine environments and interact with leatherback prey. When consumed, the turtles bioaccumulate these contaminants and females may transfer them to their offspring (Guirlet et al. 2008, Guzman et al. 2020). In the Caribbean Panama, leatherback eggs were found to have high concentrations of arsenic, selenium, strontium, and chromium (Guzman et al. 2020). We do not have any record of environmental contaminants being the primary source of mortality for leatherbacks but it is possible exposure can affect turtle fitness.

The destruction or modification of habitat is a threat at many nesting beaches used by the East Pacific leatherback population. In Costa Rica, coastal development along the northern and southern ends of the nesting beach at Playa Grande in Las Baulas National Park and in the town of Tamarindo has resulted in the loss of nesting beach habitat in addition to the removal of much of the natural beach vegetation. In addition to the loss and degradation of nesting beach habitat, stressors associated with development include pollution from artificial light, solid and chemical wastes, beach erosion, unsustainable water consumption, and deforestation. In Mexico, the extent of development near nesting beaches is generally low, given the remoteness of the beaches in Baja California and on the mainland (NMFS and USFWS 2020b). With the exception of beach erosion, likely the result of climate impacts described previously (e.g., storms, extreme high tides, and sea level rise), there is little information on additional anthropogenic-induced habitat loss at Western Pacific nesting areas due to the remoteness of beaches (NMFS and USFWS 2020b).

<u>Conservation</u>: Considerable effort has been made since the 1980s to document and address leatherback sea turtle bycatch in fisheries around the world. In the United States, observer programs have been implemented in most U.S. federally managed fisheries to collect bycatch data, and several strategies have been pursued to reduce both bycatch rates and post-interaction mortality. These include developing gear solutions to prevent or reduce capture (e.g., circle hooks in combination with fin-fish bait for longline fisheries) or to allow turtles to escape without harm (e.g., turtle exclusion devices in trawl fisheries), implementing seasonal time-area closures to prevent fishing when turtles are congregated, modifying existing gear (e.g., reducing mesh size of gillnets), and developing and promoting sea turtle handling guidelines. For example, switching to large circle hooks and mackerel-type bait in 2004 with complimentary fishery-based outreach and education resulted in an 84% reduction in the leatherback sea turtle interaction rate in the Hawaii SSLL fishery (Swimmer at al. 2017). In addition, in 2020, NMFS issued a final rule for the SSLL fishery that reduced the annual interaction limit from 26 to 16 for leatherbacks, and included trip (not more than 2 leatherbacks per vessel trip) and vessel (vessels that reach the trip limit twice in a calendar year are prohibited from the fishery for the remainder of the year) limits (85 FR 57988).

NMFS developed a 5-year action plan (2016-2020), identifying the top five recovery actions to support this “Species in the Spotlight” (species listed under the ESA for which immediate, targeted efforts are vital for stabilizing their populations and preventing their extinction) over the next five years: (1) reduce fishery interactions; (2) improve nesting beach protection and increase reproductive output; (3) international cooperation; (4) monitoring and research; and (5) public engagement (NMFS 2016b). This initiative was recently renewed in 2021 for 2021-2025 (NMFS 2021c).

Community-based conservation projects in Wermon and Jamursba-Medi in Papua, Barat, Papua New Guinea, Solomon Islands, and Vanuatu in the West Pacific population and in Mexico, Costa Rica and Nicaragua in the East Pacific Population have been developed that monitor nesting and protect nests from harvest and predation, increasing the production of hatchlings from these nesting areas.

Specifically, with the continuing conservation efforts at Jamursba Medi and Wemon, hatchling production from 2017 to 2019 between April and September alone (i.e., exclusive of the Wermon boreal winter season) increased to 32,000-50,000 hatchlings per year, in contrast with a mean hatchling production of 21,966 from 2005 to 2013 (Tapilatu 2014; Pakiding et al. 2020). This is due in part to increased effort to protect nests from predation, tidal inundation, erosion and high sand temperatures. Nest success rates increased from about 35% prior to 2017 to over 50% since 2017, including the stable numbers of nesting females ranging from 87 to 279 annually at Jamursba Medi and 109 to 285 annually at Wermon. At Buru Island, a multi-year action plan, developed with the involvement of local government agencies, local village elders, and community members continues to be implemented. When the plan was first implemented in 2017, over 60% of nests were being poached or predated, with nesting females also taken. By 2022, less than 1% of nests were being poached, with no nesting females taken, with benefits continuing into the present (ESA Biennial Report to Congress, 2023).

In partnership with NOAA’s Pacific Islands Fishery Science Center (PIFSC) and Pacific Island Regional Office (PIRO), WWF-Indonesia actively works to monitor and reduce the poaching of leatherback turtles in the Kei islands, Indonesia. As mentioned above, over 100 leatherback turtles were harvested annually during certain years, with numbers varying over the years. Over the past 4 seasons (2017-2022), the project has documented a reduction of leatherback takes by 86% (ESA Biennial Report to Congress, 2023).

The conservation and recovery of leatherback sea turtles is facilitated by a number of regulatory mechanisms at international, regional, national and local levels, such as the FAO Technical Consultation on Sea Turtle-Fishery Interactions, the IAC, CITES, and others. In 2008, the WCPFC adopted CMM 2008-03 to mitigate the impacts on turtles from longline swordfish fisheries in the Western Central Pacific Ocean. In 2018, the WCPFC adopted CMM 2018-04 to mitigate the impacts of the purse seine fisheries on sea turtles. As a result of these designations and agreements, many intentional impacts on sea turtles have been reduced: harvest of eggs and adults have been reduced at several nesting areas through nesting beach conservation efforts (although significant more effort is needed to reduce harvest pressure), and a number of community-based initiatives have helped reduce the harvest of turtles in foraging areas.

2.2.1.3. Olive ridley sea turtles

Two populations of olive ridleys were listed under the ESA in 1978 (43 FR 32800; July 28, 1978): the breeding colony populations on the Pacific coast of Mexico was listed as endangered, and all other olive ridleys found other than on the Pacific coast of Mexico were listed as a threatened species. Since olive ridleys found off the U.S. West Coast are likely to originate from Pacific Mexican nesting beaches, we assume that any olive ridleys affected by the Proposed Action are endangered. A recovery plan for the U.S. Pacific populations of olive ridleys was completed nearly 20 years ago (NMFS and USFWS 1998c). A 5-year status review of olive ridley sea turtles was completed in 2014 (NMFS and USFWS 2014).

Description and Geographic Range: Olive ridley sea turtles occur throughout the world, primarily in tropical and sub-tropical waters. Nesting aggregations in the Pacific Ocean are found in the Marianas Islands, Australia, Indonesia, Malaysia, and Japan (western Pacific), and Mexico, Costa Rica, Guatemala, and South America (eastern Pacific). Like leatherback turtles, most olive ridley sea turtles lead a primarily pelagic existence (Plotkin et al. 1993), migrating throughout the Pacific, from their nesting grounds in Mexico and Central America to the deep waters of the Pacific that are used as foraging areas (Plotkin et al. 1994). While olive ridleys generally have a tropical to subtropical range, with a distribution from Baja California, Mexico to Chile (Silva-Batiz et al. 1996), individuals do occasionally venture north, some as far as the Gulf of Alaska (Hodge and Wing 2000). Olive ridleys live within two distinct oceanic regions including the subtropical gyre and oceanic currents in the Pacific. The gyre contains warm surface waters and a deep thermocline preferred by olive ridleys. The currents bordering the subtropical gyre, the Kuroshio Extension Current, North Equatorial Current and the Equatorial Counter Current, all provide for advantages in movement with zonal currents and location of prey species (Polovina et al. 2004). In the EPO, the post-reproductive migrations of olive ridleys are unique and complex. Their migratory pathways vary annually, there are no apparent migratory corridors, and there is no spatial and temporal overlap in migratory pathways among groups or cohorts of turtles (NMFS and USFWS 2014). Unlike other sea turtles that show site fidelity from a breeding ground to a single feeding area, where they reside until the next breeding season, olive ridleys are nomadic migrants that swim thousands of miles over vast oceanic areas. This nomadic behavior may be unique to olive ridleys in the EPO, as studies in other ocean basins indicate these species occupy neritic waters, not making the extensive migrations observed in the EPO.

Individual olive ridleys experience three different reproductive strategies or behaviors: mass or *arribada* nesting, dispersed or solitary nesting, and a mixed strategy of both.

Population Status and Trends: Globally, olive ridleys are the most abundant sea turtle, but population structure and genetics are poorly understood for this species. It is estimated that there are over 1 million female olive ridley sea turtles nesting annually at one of the major beaches (*arribada*) in Mexico (La Escobilla) (NMFS and USFWS 2014). Unlike other sea turtle species, most female olive ridleys nest annually. According to the Marine Turtle Specialist Group of the IUCN, there has been a 50% decline in olive ridleys worldwide since the 1960s, although there have recently been substantial increases at some nesting sites (NMFS and USFWS 2007c). A major nesting population exists in the EPO on the west coast of Mexico and Central America. Both of these populations use the north Pacific as foraging grounds (Polovina et al. 2004).

As described above, because the Proposed Action is most likely to occur closer to eastern Pacific nesting and foraging sites, we assume that this population would be more likely (i.e., than the western Pacific population) to be affected by the Proposed Action, and that any affected turtles may have originated from the endangered Mexican breeding population. The eastern Pacific population is thought to be increasing, while there is inadequate information to suggest trends for other populations. Eastern Pacific olive ridleys 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.

Based on the current number of olive ridleys nesting in Mexico, three *arribada* beaches appear to be stable (Mismaloya, Tlacoyunque, and Moro Ayuta), two are increasing (Ixtapilla, La Escobilla) and one is decreasing (Chacahua), but none of these populations have recovered to their pre-1960s abundance. At the major *arribada* nesting beach, La Escobilla, olive ridleys rebounded from approximately 50,000 nests in 1988 to over 700,000 nests in 1994, and more than a million nests by 2000. From 2001-2005, Abreu-Grobois and Plotkin (2008) estimated a mean annual estimate of over one million females nesting annually at Escobilla. Minor *arribada* nesting beaches in Mexico range from around 2,000 nests (Chacahua) to 10,000-100,000 nests (Moro Ayuta) (NMFS and USFWS 2014).

Regarding non-arribada beaches, population trends for most indicate they are stable or increasing. Stable beaches include El Verde, Maruata-Colola, Puerto Arista, and Moro Ayuta. Increasing trends are reported for Platanitos and Cuyutlán (Abreu-Grobois and Plotkin 2008). These increases observed on the nesting beaches are supported by at-sea estimates of density and abundance. Eguchi et al. (2007) analyzed sightings of olive ridleys at sea, leading to an estimate of 1,150,000 – 1,620,000 turtles in the eastern tropical Pacific in 1998-2006. In contrast, there are no known *arribadas* of any size in the WPO, and apparently only a few hundred nests scattered across Indonesia, Thailand, and Australia (Limpus and Miller 2008).

<u>*Limiting Factors and Threats*</u>: Threats to olive ridleys are described in the most recent five-year status review (NMFS and USFWS 2014). Direct harvest and fishery bycatch are considered the two biggest threats. There has been historical and current direct harvest of olive ridleys. In the 1950s through the 1970s, it is estimated that millions of olive ridleys were killed for meat and leather, and millions of eggs were collected at nesting beaches in Mexico, Costa Rica, and other locations in Central and South America. Harvest has been reduced in the 1980’s and 1990’s, although eggs are still harvested in parts of Costa Rica, and there is an illegal harvest of eggs in parts of Central America and India (NMFS and USFWS 2014).

Olive ridleys have been observed caught in a variety of fishing gear including longline, drift gillnet, set gillnet, bottom trawl, dredge and trap net. Fisheries operating in coastal waters near *arribadas* can kill tens of thousands of adults. This is evident on the east coast of India where thousands of carcasses wash ashore after drowning in coastal trawl and drift gillnets fishing near the huge arribada (NMFS and USFWS 2007c). In the current West Coast DSLL fishery operating outside of the U.S. West Coast EEZ, NMFS has anticipated that up to six olive ridleys could be taken and killed every 10 years (NMFS 2016a). Up to this point, only one olive ridley interaction has been reported since 2005 (NMFS 2024a).

Based upon available information, it is likely that olive ridley sea turtles are being affected by climate change through sea-level rise and rising sea surface temperatures, as well as related changes in ice cover, salinity, oxygen levels and circulation. Impacts from climate change could include shifts in ranges and changes in algal, plankton, and fish abundance, which could affect olive ridley prey distribution and abundance. However, olive ridleys are wide ranging and could shift from an unproductive habitat to more biologically productive waters. Sea level rise and other environmental and oceanographic changes such as the frequency and timing of storms may accelerate the loss of suitable nesting habitats, which could increase beach loss via erosion or inundation of nests (NMFS and USFWS 2014). Marine debris, including debris resulting from the 2011 earthquake and tsunami that took place off Japan, also threatens olive ridleys through ingestion and entanglement.

Conservation: The conservation and protection of olive ridleys is enhanced by a number of regional and local community conservation programs. Efforts to decrease or eliminate poaching of nesting females and eggs and protect their habitat have been implemented in many areas of Mexico. In 1986, Mexico established 17 reserve areas to protect sea turtles. In 1990, Mexico banned the harvest and trade of sea turtles. Mexico requires the use of turtle excluder devices in their shrimp fishery to reduce sea turtle bycatch. Local community efforts are numerous. For example, the nongovernmental organization, Grupo Tortuguero, established 30 community sites for monitoring beaches and in-water surveys along the Baja Peninsula and Gulf of California (Esliman et al. 2012). In the state of Nayarit, Mexico, there are seven centers for Sea Turtle Protection and Conservation, and two Sea Turtle Protection Camps covering nearly 80 km of nesting beaches (Maldonado-Gasca and Hart 2012).

The U.S. implemented several fisheries regulations that remain in effect to reduce sea turtle bycatch including olive ridleys. For example, all commercial fishermen in the U.S. who incidentally take a sea turtle during fishing operations must handle the animals with due care to prevent injury to live sea turtles, resuscitate (if necessary), and return safely to the water. No sea turtles may be consumed, sold, landed, kept below deck, etc. Olive ridley interaction and mortality rates in the Hawaii-based longline fishery have been reduced by requiring specific gear configurations and operational requirements that include use of circle hooks and non-squid bait; fishery closures based on maximum annual turtle interaction limits; area restrictions; proper handling of hooked and entangled turtles; use of disentangling and dehooking equipment such as dip nets, line cutters, and de-hookers; and reporting sea turtle interactions. Vessel owners and operators are also required to participate in protected species workshops to raise awareness of sea turtle ecology and ensure compliance with sea turtle protective regulations.

As a result of these international, national, and local efforts, many of the anthropogenic threats have been lessened. The ban on direct harvest resulted in stable or increasing nesting endangered breeding colony populations on the Pacific coast of Mexico, although the Chacahua *arribada* beach continues to decline. Conservation measures to reduce incidental bycatch have benefited the endangered populations; however, fisheries remain a concern.

2.2.1.4. Green sea turtles – Eastern Pacific DPS

In 2016, NMFS finalized new listings for 11 green sea turtle DPSs, including listing the East Pacific DPS as threatened (81 FR 20057). The East Pacific DPS includes turtles that nest on the coast of Mexico which were historically listed under the ESA as endangered. All of the green turtles DPSs were listed as threatened, with the exception of the Central South Pacific DPS, Central West Pacific DPS, and the Mediterranean DPS which were listed as endangered (Seminoff et al. 2015). Recently the IUCN assessed the East Pacific “regional management unit” of green sea turtles as “vulnerable,” which was downlisted from a previous “endangered” status (IUCN 2021).

On July 19, 2023, NMFS and the USFWS proposed designating critical habitat for the East Pacific green sea turtle DPS along with several other (five) DPSs within U.S. jurisdiction (88 FR 46572). In general, federal projects and projects that are federally funded or authorized must ensure that they do not destroy or adversely modify designated critical habitat.

Description and Geographic Range: Green turtles are found throughout the world, occurring primarily in tropical, and to a lesser extent, subtropical and temperate waters and especially near the 64° F (18° C) isotherm (Seminoff and Wallace 2012). The species occurs in five major regions: the Pacific Ocean, Atlantic Ocean, Indian Ocean, Caribbean Sea, and Mediterranean Sea. Molecular genetic techniques have helped researchers gain insight into the distribution and ecology of migrating and nesting green turtles. Throughout the Pacific Ocean, nesting assemblages group into two distinct regional areas: 1) western Pacific and South Pacific islands; and 2) eastern Pacific and central Pacific, including the rookery at French Frigate Shoals, Hawaii. In the EPO, green sea turtles forage coastally from the U.S. West Coast (42°N) in the north, offshore in waters up to 1,000 miles from the coast, and south to central Chile (40°S). The boundaries of this DPS extend from the aforementioned locations in the U.S. and Chile, out to 143°W and 96°W, respectively (Seminoff et al. 2015).

Green sea turtles in the EPO are migratory as adults, conducting reproductive migrations every three years on average between their natal nesting sites and foraging areas. Individuals show fidelity to foraging areas, often returning to the same areas after successive nesting seasons. In neritic foraging areas, green turtles in the EPO are omnivorous, consuming marine algae, seagrass, mangrove parts and invertebrates. Green turtles in the wild are estimated to attain maturity at 15-50 years (Avens and Snover 2013), with East Pacific green turtles averaging 30 years to maturity.

Green turtles found in the Gulf of California originate primarily from the Michoacán nesting stock. Green turtles foraging in southern California and along the Pacific coast of Baja California originate primarily from rookeries of the Islas Revillagigedos (Dutton 2003) and within the state of Michoacán (Dutton et al. 2019).

<u>*Population Status and Trends*</u>: A complete review of the most current information on green sea turtles is available in the 2015 Status Review (Seminoff et al. 2015). Based on genetic data, the Eastern Pacific green sea turtle DPS consists of at least five populations: two in Mexico, one in Costa Rica, one in the eastern Pacific, and one in the Galapagos Islands. Those populations are represented by at least 39 nesting sites, with most of these sites concentrated in Mexico, Ecuador, and Costa Rica (Seminoff et al. 2015).

Although trend information is lacking for the majority of nesting beaches, based on a 25-year trend for the nesting aggregation at Colola, Mexico, the abundance of East Pacific green turtles appears to have increased since the population's low point in the mid-1980s. (which is the most important green turtle nesting area in the EPO; it accounts for 75% of total nesting in Michoacan and has the longest time series of monitoring data since 1981). Nesting trends at Colola have continued to increase since 2000, with Eastern Pacific green sea turtle populations also increasing at other nesting beaches in the Galápagos and Costa Rica (Wallace et al. 2010; NMFS and USFWS 2007d). Based on nesting beach data, the current adult female nester population for Colola, Michoacan is 11,588 females, which makes this the largest nesting aggregation of East Pacific green turtles, comprising nearly 60% of the estimated total adult female population. The total for the entire East Pacific green turtle is estimated at 20,062 nesting females (Seminoff et al. 2015). This observed increase may have resulted from the onset of nesting beach protection in 1979, as is suggested by the similarity in timing between the onset of beach conservation and the age-to-maturity for green turtles in Pacific Mexico. Similarly, data from the Galapagos Archipelago suggest that the abundance of nesting females in that population may be increasing. Given the likely increasing trend in this population, NMFS recently estimated a total mean population size of 3,580,207 animals in the East Pacific DPS (NMFS 2023b).

Most green turtles found off the U.S. West Coast and in the action area likely originate from the Revillagigedos Archipelago, a secondary nesting site, and the coast of Michoacán, Mexico (Dutton et al. 2019). The most recent survey (2008) from Revillagigedos estimated that as many as 500 nests were laid over a 4-week period, which the most recent status review (Seminoff et al. 2015) used to estimate nester abundance at 500 females.

<u>*Limiting Factors and Threats*</u>: A thorough discussion of threats to green turtles worldwide can be found in the most recent status review (Seminoff et al. 2015). Major threats include: coastal development (including heavy armament and subsequent erosion) and loss of nesting and foraging habitat; incidental capture by fisheries; and the harvest of eggs, sub-adults and adults. Climate change is also emerging as a critical issue. Destruction, alteration, and/or degradation of

nesting and near shore foraging habitat is occurring throughout the range of green turtles. These problems are particularly acute in areas with substantial or growing coastal development, beach armoring, beachfront lighting, and recreational use of beaches. In addition to damage to the nesting beaches, pollution and impacts to foraging habitat are a concern. Pollution run-off can degrade seagrass beds that are a primary forage of green turtles. The majority of turtles in coastal areas spend their time at depths less than 5 m below the surface (Schofield et al. 2007; Hazel et al. 2009) and hence collisions with boats are known to cause significant numbers of mortality every year (NMFS and USFWS 2007d; Seminoff et al. 2015). Marine debris and plastic pollution is also a source of concern for green sea turtles especially given their presence in nearshore coastal and estuarine habitats. Sea turtles captured in Seal Beach and San Diego Bay were found to have higher trace metal concentrations (e.g., selenium and cadmium) than green turtles that inhabit other non-urbanized areas in southern California (Barraza et al. 2019).

The bycatch of green sea turtles, especially in coastal fisheries, is a serious problem because in the Pacific many of the small-scale artisanal gillnet, setnet, and longline coastal fisheries are not well regulated. These are the fisheries that are active in areas with the highest densities of green turtles (NMFS and USFWS 2007d). In the northern portions of the East Pacific DPS, bycatch in fisheries has been less well-documented. However, along the Baja California Peninsula, Mexico, green turtles were reported stranded (suspected bycatch) in the hundreds in Bahia Magdalena (Koch et al. 2006). In Baja California Sur, Mexico, from 2006-2009, small-scale gillnet fisheries caused massive green sea turtle mortality at Laguna San Ignacio, where an estimated 1,000 turtles were killed each year in a fishery targeting guitar fish (Mancini et al. 2012). Bycatch of green turtles has also been reported in Peru and Chile, and while the problem persists, innovative bycatch reduction techniques and monitoring approaches have likely reduced bycatch of all sea turtle species. The meat and eggs of green turtles has long been favored throughout much of the world that has interacted with this species. As late as the mid-1970s, upwards of 80,000 eggs were harvested every night during nesting season in Michoacán (Clifton et al. 1982). Even though Mexico has implemented bans on the harvest of all turtle species in its waters and on the beaches, poaching of eggs, females on the beach, and animals in coastal water continues to happen. In some places throughout Mexico and the whole of the EPO, consumption of green sea turtles remains a part of the cultural fabric and tradition (NMFS and USFWS 2007d; Seminoff and Glass 2021).

In Peru, where the fishing industry is the second largest economic activity in the country, there is evidence of sea turtle bycatch in a range of industrial fisheries. Large impacts may also result from similar interactions with small-scale fisheries, largely due to their diffuse effort and large number of vessels in operation. From 2000 to 2007, shore-based and onboard observer programs from three ports in Peru were used to assess the impacts of marine turtles of small-scale longline bottom set nets and driftnet fisheries. During this time, a total of 807 turtles were captured, of which nearly 92% were released alive. Researchers estimated that 2,400 green turtles were captured annually, and estimated that, given the low observer coverage, the number of turtles (all species) captured per year is likely to be in the tens of thousands (Alfaro-Shigueto et al. 2011).

In the Western Central Pacific, from 1989-2015, the reported number of green turtles reported was 325 turtles, resulting in an “estimated” 6,500 turtles taken (expanded to account for 5% observer coverage used by the WCPFC), although no mortality details were available (Common Oceans (ABNJ) Tuna Project 2017). Of these green turtles, there was no further information supplied that may have apportioned the capture to the six DPSs that may be present in the area of effort. In the Hawaii-based DSLL fishery, between 2004 and 2022, 25 green turtles were observed caught, adjusted to an estimated 128 green turtles taken. Over 10 years, NMFS estimated a cumulative mean of 154 captures of East Pacific green turtles, of which 148 would be expected to die as a result of their interactions (NMFS 2023b). In the current West Coast DSLL fishery operating outside of the U.S. West Coast EEZ, NMFS has anticipated that one East Pacific DPS green sea turtle could be taken and killed every 10 years (NMFS 2016a). Up to this point, no green sea turtle interactions have been reported in this fishery since 2005.

Like other sea turtle species, increasing temperatures have the potential to skew sex ratios of hatchling and many rookeries are already showing a strong female bias as warmer temperatures in the nest chamber leads to more female hatchlings (Kaska et al. 2006; Chan and Liew 1995). Increased temperatures also lead to higher levels of embryonic mortality (Matsuzawa et al. 2002). An increase in typhoon frequency and severity, a predicted consequence of climate change (Webster et al. 2005), can cause erosion which leads to high nest failure (Van Houtan and Bass 2007). Rising sea levels can cause repeated inundation of nests and abrupt disruption of ocean currents used for natural dispersion during the green turtle life cycle. Green sea turtle feeding may also be affected by climate change. Seagrasses are a major food source for green sea turtles and may be affected by changing water temperature and salinity (Short and Neckles 1999; Duarte 2002).

Conservation: There have been important conservation initiatives and advances that have benefited East Pacific DPS green turtles. There are indications that wildlife enforcement branches of local and national governments are stepping up their efforts to enforce existing laws, although successes in stemming sea turtle exploitation through legal channels are infrequent. In addition, there are a multitude of non-profit organizations and conservation networks whose efforts are raising awareness about sea turtle conservation. When assessing conservation efforts, we assumed that all conservation efforts would remain in place at their current levels or improve.

Among the notable regional and/or multinational conservation groups and initiatives are the Central American Regional Network for the Conservation of Sea Turtles, Grupo Tortuguero de las Californias (GTC), Permanent Commission of the South Pacific (CPPS), and the InterAmerican Convention for the Protection and Conservation of Sea Turtles (IAC). The Central American Regional Network resulted in the creation of a national sea turtle network in each country of the Central American region, as well as the development of firsthand tools, such as a regional diagnosis, a 10-year strategic plan, a manual of best practices, and regional training and information workshops for people in the region (e.g., Chacón and Arauz 2001). The GTC is a regional network in Mexico that brings together scientists, conservation practitioners, fishers, and local peoples to address sea turtle conservation issues. Perhaps the greatest achievement of this group was the large decrease in green turtle hunting and local consumption throughout northwestern Mexico. The IAC is the world's only binding international treaty on sea turtle conservation. Signatory nations in the Eastern Pacific include Chile, Peru, Ecuador, Panama, Costa Rica, Honduras, Guatemala, Mexico, and the United States. This treaty endeavors to reduce fisheries bycatch and habitat destruction through a series of binding conservation agreements across these nations. All three of these initiatives work under the principle that benefits and achievements from working in alliance are much higher than those from working alone.

In southern California, NMFS has increased its outreach and education efforts to improve public awareness of the presence of green turtles and to reduce threats to foraging populations, particularly in San Diego Bay, the San Gabriel River and adjacent watershed, as well as estuaries such as Agua Hedionda and Mission Bay. Local threats to green turtles primarily include recreational fishing and vessel strikes, and NMFS has worked with partners to develop educational materials and signs to specifically address those threats.

NMFS and USFWS developed a recovery plan for U.S. Pacific populations of the East Pacific Green Sea Turtle that describes reasonable actions which are believed to be required to recover and/or protect the species (NMFS and USFWS 1998d). One of the six major actions described in the Recovery Plan is to identify and protect primary foraging areas in U.S. jurisdiction. In addition, the Recovery Plan specifically recommends the prevention of degradation or destruction of marine habitats caused by dredging or disposal activities.

2.2.2. Marine Mammals

2.2.2.1. Guadalupe fur seals

In the U.S., Guadalupe fur seals were listed as threatened under the ESA on December 16, 1985 (50 CFR 51252) and consequently, are listed as depleted and a strategic stock under the MMPA. Recently, likely in part due to their increasing trend and lack of threats, the species was "up-listed" from "threatened" to "least concern" under the criteria of the IUCN Redlist of threatened species (Aurioles-Gamboa 2015). The population is considered a single stock because all are recent descendents from one breeding colony at Guadalupe Island, Mexico. The state of California lists the Guadalupe fur seal as a fully protected mammal in the Fish and Game Code of California (Chapter 8, Section 4700, d), and it is also listed as a threatened species in the Fish and Game Commission California Code of Regulations (Title 14, Section 670.5, b, 6, H). The Guadalupe fur seal is also protected under CITES, and fully protected under Mexican law. Guadalupe Island was declared a pinniped sanctuary by the Mexican government in 1975. Currently there is no recovery plan for Guadalupe fur seals and critical habitat has not been designated for this species in the U.S. The most recent information on Guadalupe fur seal description, range, and status can be found in Aurioles-Gamboa (2015) and Carretta et al. (2023a) and is summarized below.

Description and Geographic Range: The Guadalupe fur seal is the only member of the genus *Arctocephalus* in the Northern Hemisphere. Prior to commercial sealing during the 19th century, this species ranged from Monterey Bay, California, to the Revillagigedo Islands, Mexico. Archeological evidence suggests that the Guadalupe fur seal was found in the Channel Islands before commercial exploitation reduced the population to near extinction (Walker and Craig 1979), with records indicating that during the Holocene period, Guadalupe fur seal remains accounted for 40-80% of all pinniped bones at the Channel Islands (Rick et al. 2009). By 1897, the Guadalupe fur seal was believed to be extinct. None were seen until a fisherman found slightly more than two dozen at Guadalupe Island in 1926. The capture of two adult males at Guadalupe Island in 1928 established the species' return; however, they were not seen again until 1954. Between 1969 and 1989, 48 sightings of Guadalupe fur seals were made on the southern Channel Islands, including one territorial male that was seen from 1981 to 1990, and a second bull established a territory from 1989 to 1991 (Reeves et al. 2002). Prior to 1985, there were only two sightings of Guadalupe fur seals from central and northern California (Monterey in 1977 and Princeton Harbor in 1984). Guadalupe fur seals were once found throughout Baja California, Mexico and along the California coast. Currently, the species breeds mainly on Guadalupe Island, Mexico, off the coast of Baja California. A smaller breeding colony, discovered in 1997, appears to have been established at Isla Benito del Este in the San Benito Archipelago, Baja California, Mexico (Belcher and Lee 2002), and a pup was born at San Miguel Island, California (Melin and DeLong 1999). Since 2008, individual adult females, subadult males, and between one and three pups, have been observed annually on San Miguel Island (NMFS-AKFSC unpublished data).

Guadalupe fur seals are medium sized, sexually dimorphic otariids (Belcher and Lee 2002; Reeves et al. 2002). Distinguishing characteristics of the Guadalupe fur seal include the digits on their hind flippers (all of similar length), large, long foreflippers, and unique vocalizations (Reeves et al. 2002). Guadalupe fur seals are dark brown to black, with the adult males having tan or yellow hairs at the back of their mane. Guadalupe fur seals are polygamous breeders; males may mate with up to a dozen females during a single breeding season. Adult males are considerably longer and larger-bodied (352-375 lbs) than adult females (88-110 lbs), and they have a thicker chest and neck with a thick uniform mane that extends from the forehead to the shoulders. Females give birth from early June through July, with a peak in late June. They mate about a week after giving birth, and then begin a series of foraging trips lasting two to six days. They come ashore for four to six days between foraging trips to nurse their pups; with nursing lasting about eight months (Figureroa-Carranza 1994). Pups are weaned at about nine months old. Guadalupe fur seals prefer shorelines with abundant large rocks and lava blocks and are often found at the base of steep cliffs and in caves and recesses, which provide protection and cooler temperatures, particularly during the summer breeding season (Aurioles-Gamboa 2015).

Researchers studying the feeding habitats of the Guadalupe fur seal found that they feed on deep-water cephalopods and small schooling fish. Digestive tracts of stranded animals in central and northern California contained primarily squid (*Loligo opalescens* and *Onychoteuthis borealojaponica*), with a few otoliths of lampfish (*Lampanyctus*) and Pacific sanddab (*Citharichthys sordidus*) (Hanni et al. 1997). Recent studies of their feeding habits also indicate that off their main colony on Guadalupe Island, they primarily target cephalopods, with fish comprising a minor component of their diet. Lactating females may travel a thousand miles or more over a two-week period from the breeding colony to forage. They appear to feed mainly at night, at depths of about 20 m (65 feet), with dives lasting approximately 2 1⁄2 minutes (Reeves et al. 2002), with one documented deep dive of 82 meters (Gallo-Reynoso et al. 2008). Based on a stable isotope analysis of male Guadalupe fur seal carcasses, there appears to be some niche segregation between coastal and oceanic males, possibly based on individual age and size (Aurioles-Gamboa and Szteren 2020). Foraging trips can last between four to twenty-four days (average of fourteen days). Tracking data show that adult females spend 75% of their time at sea, and 25% at rest (Gallo-Reynoso et al. 1995).

Researchers know little about the whereabouts of Guadalupe fur seals during the non-breeding season, from September through May, but they are presumably solitary when at sea. Guadalupe fur seals may primarily extend their range approximately 20 km from the breeding areas to account for the main haulout and foraging areas. While distribution at sea is relatively unknown (Reeves et al. 2002) until recently, Guadalupe fur seals may migrate at least 600 km from the rookery sites, based on observations of individuals by Seagars (1984). Recently, in 2016, satellite tags were attached to 5 pups on Guadalupe Island. Three pups that departed the island traveled north, from 200-1,300 kilometers before the tags stopped transmitting. One of those pups was eventually found dead and emaciated in Coos Bay, Oregon (Norris et al. 2017). Given the emergence of a warm water anomaly off Baja California in the spring of 2014 and the strong 2015/2016 El Niño event that developed in the tropical Pacific, Guadalupe fur seals may have experienced a shortage of their favored prey species, squid, and it is unclear if this event may have temporarily extended their range north, as it often does for more tropical marine species.

Population Status and Trends: It is difficult to obtain an accurate abundance estimate of Guadalupe fur seals due in part to their tendency to stay in caves and remain at sea for extended lengths of time, making them unavailable for counting. Commercial sealing during the 19th century reduced the once-abundant Guadalupe fur seal to near extinction in 1894. At the time of listing in 1985, the population was estimated at 1,600 individuals, compared to approximately 20,000 to 100,000 animals before hunting occurred in the 18^{th} and 19^{th} centuries (Fleischer 1987). Counts of Guadalupe fur seals have been made sporadically since 1954. A few of these counts were made during the breeding season, but the majority were made at other times of the year. In 1994, the population at Guadalupe Island was estimated at 7,408 individuals (Gallo-Reynoso 1994). There have been other, more recent population abundance estimates for Guadalupe Island, with a considerable amount of variation between them: 20,000 in 2010 (García-Capitanachi et al. 2017), and between approximately 34,000 and 44,000 in 2013 (García-Aguilar et al. 2018). Guadalupe fur seals are also found on San Benito Island, likely immigrants from Guadalupe Island, as there are relatively few pups born on San Benito Island (Aurioles-Gamboa et al. 2010). There were an estimated 2,504 seals on San Benito Island in 2010 (García-Capitanachi et al. 2017). Based on information presented by García-Aguilar et al. (2018), and using a population size:pup count ratio of 3.5, the most current minimum population estimate is 31,019 (Carretta et al. 2023a, 2024).

All Guadalupe fur seals represent a single population, with two known breeding colonies in Mexico, and a purported breeding colony in the United States. Documented seal counts in the literature generally provide only the total of all Guadalupe fur seals counted (i.e., the counts are not separated by age/sex class). The counts made during the breeding season, when the maximum number of animals is present at the rookery, have been used to examine population growth. Gallo-Reynoso (1994) calculated the population of Guadalupe fur seals in Mexico from thirty years of population counts, and concluded the population was increasing; with an average annual growth rate of 13.3% on Guadalupe Island. The 2000 NMFS stock assessment report for Guadalupe fur seals also indicated the breeding colonies in Mexico were increasing; and more recent evidence indicates that this trend is continuing (Aurioles-Gamboa et al. 2010; Esperon-Rodriguez and Gallo-Reynoso 2012). From 1984 to 2013 at Guadalupe Island, the Guadalupe fur seal population increased at an average annual growth rate of 5.9 percent (range 4.1 to 7.7 percent; García-Aguilar et al. 2018). Other estimates of the Guadalupe fur seal population of the San Benito Archipelago (from 1997-2007) indicate that it is increasing as well at an annual rate of 21.6% (Esperon-Rodriguez and Gallo-Reynoso 2012), and that this population is at a phase of exponential increase (Aurioles-Gamboa et al. 2010). However, these estimates are considered too high, and likely result from immigration at Guadalupe Island (Carretta et al. 2024). Based on direct counts of animals from 1955 and 1993, the estimated annual population growth rate is 13.7%, with a PBR for this stock that is calculated at 1,062 Guadalupe fur seals per year (Carretta et al. 2024).

In the U.S., a few Guadalupe fur seals are known to inhabit California sea lion rookeries in the Channel Islands (San Nicholas Island and San Miguel Island) (Stewart et al. 1987; NMFS-AKFSC, unpublished data). Strandings of Guadalupe fur seals have occurred along the entire U.S. West Coast, suggesting that the seal may be expanding its range (Hanni et al. 1997; NMFS-West Coast Region-stranding program unpublished data). The severe reduction of the Guadalupe fur seals has evidently had a less substantial effect on its gene pool, when compared to other similarly depleted pinniped species, as relatively high levels of genetic variability have been reported (Reeves et al. 2002).

The Guadalupe fur seal clearly experienced a precipitous decline due to commercial exploitation, and may have undergone a population bottleneck. Bernardi et al. (1998) compared the genetic divergence in the nuclear fingerprint of samples taken from 29 Guadalupe fur seals, and found an average similarity of 0.59 of the DNA profiles. This average is typical of outbreeding populations. When comparing the amount of unique character fragments found in Guadalupe fur seals to that of other pinnipeds that have experienced bottlenecks (e.g., Hawaiian monk seals), that amount is much higher (0.14 vs. 0.05) in Guadalupe fur seals than Hawaiian monk seals. By using mitochondrial DNA sequence analysis in comparing the genetic diversity of Guadalupe fur seals to northern elephant seals (which did experience a severe bottleneck), Guadalupe fur seals had more haplotypes and a higher number of variable sites. The authors hypothesized that the numbers of Guadalupe fur seals left after harvest may have been underestimated, and the population may not have actually experienced a bottleneck, or the bottleneck may have been of short duration and not severe enough to suppress genetic diversity. Although the relatively high levels of genetic variability are encouraging, it is important to note that commercial harvest still influenced the population. Later studies comparing mitochondrial DNA found in the bones of pre-exploitation Guadalupe fur seals against the extant population showed a loss of genotypes, with twenty-five genotypes in pre-harvest fur seals, and seven present today (Weber et al. 2004).

Guadalupe fur seals are known to travel great distances, with sightings occurring thousands of kilometers away from the main breeding colonies (Aurioles-Gamboa et al. 1999). Guadalupe fur seals are infrequently observed in U.S. waters. They can be found on California's Channel Islands, with as many fifteen individuals being sighted since 1997 on San Miguel Island, including three females and reared pups.

Limiting Factors and Threats: Although the Guadalupe fur seal population is growing, the species is still at risk due to its relatively low population (i.e., compared to other pinniped species found in the California Current), and the fact that nearly all pup production occurs on one island. Feeding grounds of Guadalupe fur seals occur around the rookeries and the lower part of the California Current, which is influenced by human population centers with contaminant runoff, and extensive oil tanker traffic, and offshore oil extraction activity in southern California, increasing the risk of an oil spill.

Sealing on the California coast was first recorded in 1805, and Native Americans left the remains of Guadalupe fur seals in their middens (Bonner 1994). Commercial sealers in the 19th century decimated the Guadalupe fur seal population, taking as many as 8,300 fur seals from San Benito Island (Townsend 1924). Numbers of fur seals harvested are difficult to ascertain because of the difficulty the hunters had in distinguishing species while hunting (Seagars 1984). The species was evidently exterminated from southern California waters by 1825. Commercial sealing continued, although with declining returns, in Mexican waters through 1894. Incomplete sealing records suggest that perhaps as many as 52,000 fur seals were killed on Mexican islands between 1806 and 1890, mostly before 1848; from 1877 to 1984, only some 6,600 fur seals were harvested (Reeves et al. 2002). Due to its full protection in Mexico and in the U.S., it is presumed that Guadalupe fur seals are not presently hunted, although it is not known if Guadalupe fur seals are illegally killed.

Outside of the action area (i.e., south of the California/Mexico border and outside of the U.S. west coast EEZ), until recently, there are no apparent conflicts with commercial fisheries. Although commercial hunting occurred in the past, and has since ceased, the effects of these types of exploitations persist today. Other human activities, such as entanglements from commercial fishing gear, are ongoing and continue to affect these species. Gillnet and set-net fisheries likely take some animals, particularly in areas near Guadalupe Island and San Benito Islands (Aurioles-Gamboa 2015). In 2015, one Guadalupe fur seal was found hooked in the Hawaii-based SSLL fishery, while three unknown pinniped species (otariids) were also found hooked and could be Guadalupe fur seals (NMFS 2017).

During El Niño events, Guadalupe fur seals may experience high pup mortality due to storms and hurricanes (Gallo-Reynoso 1994), as well as low prey availability, which is likely a cause for elevated strandings of malnourished and emaciated pups and subadults off California, beginning in 2015.

Guadalupe fur seals share much of their haul-out and breeding habitat with California sea lions (*Zalophus californianus*), which have historically suffered from viral disease outbreaks and could serve as a vector for disease transmission. During periods of low prey availability, both species may compete for resources. Exotic fauna and diseases could be introduced from humans interacting with pinnipeds on the island. Lastly, killer whales and sharks, particularly great white sharks (*Carcharodon carcharias*), have been seen with regularity around Guadalupe Island, particularly during the summer months, and are therefore likely predators of Guadalupe fur seals (Auroles-Gamboa 2015).

2.2.3. Marine Fish

2.2.3.1. Giant manta ray

The giant manta ray was listed as a threatened species under the ESA on January 22, 2018 (83 FR 2916). NMFS conducted a status review for both the giant manta ray and the reef manta ray (*Manta alfredi*) in 2017 (Miller and Klimovich 2017) in response to a 2015 petition from Defenders of Wildlife to list both species (and the Caribbean manta ray (*M. c.f. birostris*), for which NMFS determined was not a taxonomically valid species or subspecies for listing).

<u>*Description and Geographic Range*</u>: The giant manta ray occurs across the globe in tropical and warm temperate bodies of water from 36°S to 40°N (Mourier 2012; Figure 9). The documented range for this species within the northern hemisphere includes: Mutsu Bay, Aomori, Japan; the Sinai Peninsula and Arabian Sea, Egypt; the Azores Islands, Portugal; and as far north as southern California (west coast) and New Jersey (east coast), United States (Kashiwagi et al. 2010; Moore 2012; CITES 2013). In the southern hemisphere, the giant manta ray has been documented as far south as Peru, Uruguay, South Africa, French Polynesia, New Zealand, and most recently, photographed in eastern Australia off Montague Island and Tasmania at 40°S (Mourier 2012; CITES 2013; Couturier et al. 2015). In addition, the giant manta ray has been observed in a predictable seasonal pattern in estuarine waters of Florida, Uruguay, and Brazil, suggesting that they may use estuaries as nursery areas during summer months (Adams and Amesbury 1998; Milessi and Oddone 2003; Medeiros et al. 2015).

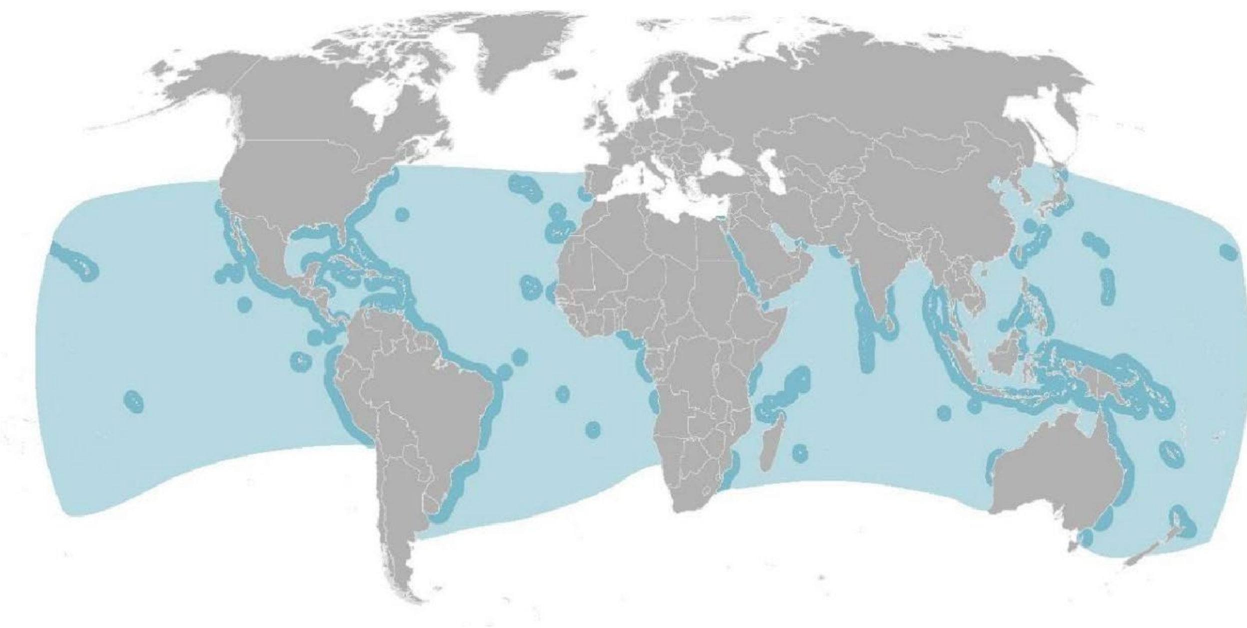

Figure 9. Distribution map for the giant manta ray. Extent of occurrence is depicted by light blue and the area of occupancy is noted in darker blue (Figure 3 from Lawson et al. 2017).

The environmental variables that drive giant manta ray habitat use in the ocean are largely unknown, although temperature is a clear correlate (Jaine et al. 2014). Giant manta rays are found offshore in oceanic waters near productive coastlines, continental shelves, offshore pinnacles, seamounts and oceanic islands. In a satellite tracking study off the Yucatán Peninsula, Mexico, Graham et al. (2012) found that 95% of giant manta ray locations occurred in waters warmer than 21.6° C, and that most locations were correlated with high surface chlorophyll concentrations and in waters shallower than 50 meters, representing thermally dynamic and productive waters.

Because manta rays are migratory and considered ecologically flexible (e.g., low habitat specificity), they may be less vulnerable to the effects of climate change compared to other elasmobranchs. However, manta rays frequently rely on coral reef habitat for important life history functions such as feeding and cleaning, and depend on planktonic food resources for nourishment and growth, both of which are highly sensitive to environmental changes. Therefore, climate change is likely to have an impact on distribution and behavior of giant manta rays (Miller and Klimovich 2017).

Stewart et al. (2016a) also reported that giant manta rays off the Revillagigedo Archipelago, Mexico tend to occur near the upper limit of the pelagic thermocline where zooplankton aggregate but also shift their activity from surface waters to 100-150 meters, likely targeting surface-associated zooplankton to vertical migrators. Burgess (2017) suggested that giant manta ray specifically feed on mesopelagic plankton, which would place them at depths as deep as 1,000 meters (also see Marshall et al. 2018). Giant manta rays are also observed at cleaning sites at offshore reefs where they are cleaned of parasites by smaller organisms.

The population structure of giant manta rays is largely unknown. At a minimum, the evidence suggests that giant manta rays in the Atlantic and giant manta rays in the Indo-Pacific represent separate populations because this species does not appear to migrate to the Pacific through the Drake Passage (or vice versa) and they do not appear to migrate around the Cape of Good Hope to the Indian Ocean (Lawson et al. 2017; Marshall et al. 2018). Several authors have reported that giant manta ray likely occur in small regional subpopulations (Lewis et al. 2015; Stewart et al. 2016b Marshall et al. 2018; Beale et al. 2019) and may have distinct home ranges (Stewart et al. 2016b). The degree to which subpopulations are connected by migration is unclear, but is assumed to be low (Stewart et al. 2016b; Marshall et al. 2018), and regional or local populations are not likely to be connected through immigration and emigration (Marshall et al. 2018), making them effectively demographically independent. To date there have been limited genetics studies on giant manta ray; however, Stewart et al. (2016b) found genetic discreteness between giant manta ray populations in Mexico suggesting isolated subpopulations with distinct home ranges within 500 km of each other. While NMFS concluded that the species is likely to become endangered within the foreseeable future throughout a significant portion of its range (the Indo Pacific and eastern Pacific), NMFS did not find the species met the criteria to list as a DPS (final rule; January 22, 2018; 83 FR 2916).

A vulnerability analysis conducted by Dulvy et al. (2014) indicates that mobulid populations can only tolerate very low levels of fishing mortality and have a limited capacity to recover once their numbers have been depleted (Couturier et al. 2012; Lewis et al. 2015). Furthermore, Lewis et al. (2015) suggests local populations in multiple areas in Indonesia have been extirpated due to fishing pressure, noting that *M. birostri*s was the most common species previously caught in these areas. Additionally, White et al. (2015) documented an 89% decline in the observed *M. birostris* population in Cocos Island National Park (Costa Rica) over a 20-year period. This decline is believed to be from overfishing outside of the park. Note that these declines are from directed fishing and not bycatch.

<u>*Population Status and Trends*</u>: As mentioned above, NMFS listed giant manta rays globally as threatened in 2018. The IUCN lists them as vulnerable (the category that immediately precedes endangered in the IUCN classification system), with a decreasing population trend. Although the number of regional subpopulations is unknown, the sizes of those identified as regional subpopulations tends to be small, ranging from 600 to 25,250 (CITES 2013; Marshall et al. 2018; Beale et al. 2019). CITES (2013) highlights two giant manta ray subpopulations that have been studied with population estimates provided, and counts for more than ten aggregations, where individuals have been recorded (Table 4 in Miller and Klimovich (2017)). The number of individually identified giant manta rays for each studied aggregation ranges from less than 50 in regions with low survey effort or infrequent sightings, to more than 1,000 in some regions with targeted, long-term studies. However, ongoing research including mark-recapture analyses suggests that typical subpopulation abundances are more likely in the low thousands (e.g., Beale et al. 2019) and in rare cases may exceed 22,000 in areas with extremely high productivity, such as in coastal Ecuador (Harty et al. 2022).

Thus, while some subpopulations may have been reduced to very small population sizes due to fisheries (direct harvest or bycatch), in general, stable giant manta ray subpopulations are likely to be larger, potentially greater than 1,000 individuals, which is consistent with the literature that suggests subpopulations are isolated with limited movement. More importantly, the size of some of these subpopulations has declined significantly in regions subject to fishing (Marshall et al. 2018). Fisheries catch and bycatch have caused giant manta rays to decline by at least 30% globally, and by up to 80% in significant portions of its range (i.e., Indonesia, Philippines, Sri Lanka, Thailand, Madagascar; Marshall et al. 2018). Lewis et al. (2015) collected data on daily landings of Manta and Mobula species from 2002 to 2014 for eight locations in Indonesia, and found landings of *Manta* species declined by 71% to 95% in three locations with the most complete data. Reports from fishermen suggest that these data are representative of declines in abundance rather than shifts in effort. Tremblay-Boyer and Brouwer (2016) present catch per unit effort (CPUE) data for giant manta ray observed incidentally captured in the WCPO longline and purse seine fisheries, and concluded giant manta rays are observed less frequently in recent years compared to 2000-2005, suggesting a decline in abundance (Tremblay-Boyer and Brouwer 2016).

In most areas of the world there are mainly counts of recorded individuals, but a few subpopulation estimates have been made within subregions. Within the EPO, where giant manta rays found off the U.S. West Coast may originate from, the following locations indicate both individuals recorded as well as subpopulation estimates, if known: Isla de la Plata (Ecuador): 2,804 individuals recorded (which provided an estimate of 22,316 (a “super-population”) (Harty et al. 2022); Revillagigedos (Mexico): 916 individuals recorded, no estimate on the subpopulation abundance estimates; Costa Rica (not clear if Atlantic or Pacific Ocean): 52 individuals recorded, no estimate on subpopulation abundance estimates (NMFS 2022a).

<u>*Limiting Factors and Threats*</u>: The 2017 status review report provides extensive details of the known threats facing giant manta rays (Miller and Klimovich 2017). The most significant threat to the giant manta ray is overutilization for commercial purposes. They are taken as bycatch in a number of global fisheries throughout their range, and are most susceptible to industrial purse-seine (particularly the Indian Ocean and the EPO) and artisanal gillnets. They are also targeted for their parts (primarily meat) given the expansion of the international mobulid gill raker market (thought to have healing properties in Asian medicine), and increasing demand for manta ray products, particularly in many portions of the Indo-Pacific. As mentioned above, declines of sightings have been reported in several areas. Efforts to address overutilization of the species through regulations appear to be inadequate.

In the EPO, giant manta rays are frequently reported as bycatch in the large-scale purse seine fisheries; however, most manta and devil ray captures are pooled together as identification to species level is difficult. Hall and Roman (2013) reported catch and bycatch (defined as individuals retained for utilization and individuals discarded dead, respectively) prior to 2005 as below 20 tons (data from 1998-2004). By 2005, estimated catch and bycatch was around 30 tons, and increased to around 150 tons in 2006.

In the U.S. West Coast DGN fishery, NMFS authorized the incidental take of up to 1 giant manta ray annually, with an anticipation that this individual would die (NMFS 2023c). Also, NMFS anticipated that a mean total number of 20 giant manta rays would be caught annually in the Hawaii-based DSLL fishery, with a mean number of 9 giant manta rays killed annually (NMFS 2022b).

Observers of the Agreement on the International Dolphin Conservation Program (AIDCP) have been tracking purse seine ray interactions for decades, though up until 2016 observers only recorded rays killed in fishing operations, and not live releases. Based on reported giant manta ray catch to the IATTC, including available national observer program data, an average of 135 giant manta rays were estimated caught per year from 1993-2015 in the eastern Pacific purse seine fishery (Table 8 in Miller and Klimovich 2017). During this same time period, estimates of "unidentified manta/devil ray" were 1,795 animals captured per year. From 2016-2021, a total of 14 giant manta rays were discarded dead in the international fleet. This includes information from the U.S. fleet, although no giant manta rays were discarded dead during that time frame in the domestic fishery. As summarized in the final listing rule (and final status review), a preliminary productivity and susceptibility analysis indicated that the giant manta ray is one of the most vulnerable species to overfishing in the purse seine fishery by IATTC vessels.

As mentioned above, changes in climate and oceanographic conditions (e.g., acidification) may affect zooplankton size, composition and diversity as well as distribution. Therefore, migration and distribution of giant manta rays may be affected, particularly those that exhibit site-fidelity to particular areas. Climate change is expected to cause shifts in the productivity of the Humboldt Current System, and increased ocean temperatures, deepening stratification, and changes in wind patterns that may lead to variable effects on primary production and upwelling strength.

Because giant manta rays are filter feeders, plastics ingestion is likely, as is entanglement in marine debris, potentially contributing to increased mortality rates. In just the year 2010, Jambeck et al. (2015) estimated that the United States produced 0.25 to 1 metric tons of plastic waste available to enter the ocean, while Mexico and Central America were estimated to produce 0.01 to 0.25 metric tons.

Tourist attractions at manta ray "hot spots" may also pose a threat to giant manta rays through behavioral disruption or potential inadvertent habitat destruction by scuba divers. In addition, giant manta rays are subjected to boat strikes, particularly in areas of high maritime traffic. Mooring and boat anchor lines may also wound manta rays or cause drowning.

Conservation: Giant manta rays were listed in Appendices I and II of the Convention on the Conservation of Migratory Species of Wild Animals (CMS) in 2011. As a result, harvesting of giant manta rays is no longer permitted internationally. Exceptions include traditional subsistence users. The species was also listed under Appendix II of CITES in September, 2014. Inclusion in Appendix II restricts trade of the species between counties. International trade of Appendix-II species may be authorized by the granting of an export permit or re-export certificate. Permits should only be granted if that trade will not be detrimental to the survival of the species in the wild.

Despite some national and regional (e.g., regional fishery management organizations) protections for giant manta rays, the lack of enforcement and illegal fishing have generally rendered existing regulatory protections inadequate for protecting the species from fishing mortality. However, there have been successes. In Indonesia, giant manta rays were fully protected in the nation's waters with the creation of the world's largest manta ray sanctuary at around 6 million km^2. Targeted fishing for giant manta rays as well as trade in manta ray parts are banned; however, illegal fishing and trade has been documented. Similarly, the Philippines introduced legal protection for manta rays in 1998, although existing regulatory mechanisms are lacking to curb illegal fishing.

In the eastern Pacific portion of the giant manta ray's range, the IATTC implemented a prohibition on the retention, transshipment, storage, landing and sale of all devil and manta rays taken in large-scale fisheries in 2016 (Resolution C-15-04). The success of this depends on the post-release mortality rate, particularly when released in purse seine nets, and that rate is currently unknown. Developing countries were granted an exception for small-scale and artisanal fisheries that catch these species for domestic consumption. Prohibitions on fishing and sale of giant manta rays was implemented in Peru in 2016, and Ecuador implemented similar regulations in 2010. Given that the largest population of giant manta rays is found in waters between Peru and Ecuador, with the Isla de la Plata population estimated at around 1,500 individuals, these prohibitions should provide some protection to the species. However, as with other national protections in place, illegal fishing still occurs in these waters.

2.2.3.2. Oceanic whitetip shark

The oceanic whitetip shark was listed as a threatened species under the ESA on January 30, 2018 (83 FR 4153). NMFS conducted a status review for this species in 2023, which contains updated information on the species, collected since the listing in 2018 (NMFS 2023e).

Description and Geographic Range: Oceanic whitetip sharks are apex predators with a worldwide circumtropical and subtropical distribution. They can be found primarily between latitudes 30°N and 35°S (Compagno 1984; Baum et al. 2015; Young et al. 2018), although the species has been reported as far as 45°N and 40°S in the Western Atlantic (Lessa et al. 1999a). A geographical representation of the species range was provided by Last and Stevens (Figure 10) (2009).

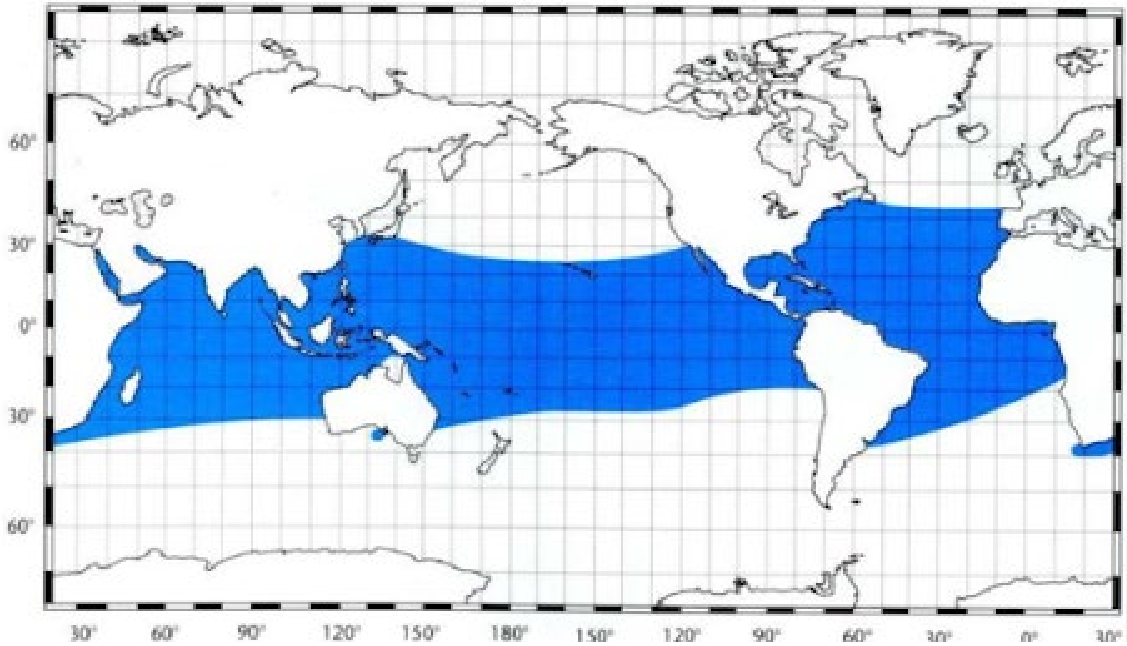

Figure 10. Geographical distribution of the oceanic whitetip shark (Last and Stevens 2009; Young et al. 2018).

Two tagging studies on oceanic whitetip sharks in the Atlantic Ocean have found evidence of site fidelity in this species (reviewed in Young and Carlson 2020). Howey-Jordan et al. (2013) found that oceanic whitetip sharks tagged in the Bahamas (1 male and 10 females tagged but the tag on the male shark failed) stayed within 500 km of their tagging site for at least 30 days, at which point they dispersed in different directions across a wide area with some sharks travelling more than 1,500 km from their tagging site. The six tagged sharks that retained their tags for longer than 150 days (n = 6) were all located within 500 km of their tagging site when their tags popped off. Similarly, Tolotti et al. (2015) tagged 8 oceanic whitetip sharks (sex of sharks was not reported) and found that the tagging and pop-up locations were relatively close to each other, but some individuals traveled long distances (up to 2,500 km) in between these events. Together, these studies suggest that oceanic whitetip sharks can display a high degree of philopatry to certain sites, and may not mix with other regional populations (Howey-Jordan et al. 2013; Tolotti et al. 2015; Young and Carlson 2020).

Few studies have been conducted on the global genetics and population structure of the oceanic whitetip shark, which suggest there may be some genetic differentiation between various ocean basins such as the Indo-Pacific and the Atlantic, but limited structuring between adjacent ocean basins such as the East Atlantic and the Indian Ocean (Camargo et al. 2016; Ruck 2016; Sreelekshmi et al. 2020). Camargo et al. (2016) compared the mitochondrial control region in 215 individuals from the Atlantic and Indian Oceans. They found evidence of moderate levels of population structure resulting from restricted gene flow between the western and eastern Atlantic Ocean, and also of connectivity between the eastern Atlantic Ocean and the Indian Ocean (although the sample size from the Indian Ocean was only nine individuals). This study only used mitochondrial markers, meaning male-mediated gene flow is not reflected in these relationships (Young et al. 2018), although other species in the *Carcharhinus* genus are known to exhibit male-mediated gene flow between populations (Portnoy et al. 2010).

Ruck (2016) compared samples of 171 individual sharks from the western Atlantic, Indian, and Pacific Oceans specifically looking at the mitochondrial control region, a protein-coding mitochondrial region, and nine nuclear microsatellite loci, and found no fine-scale matrilineal structure within ocean basins. Ruck (2016) did detect weak but significant differentiation between the Atlantic and Indo-Pacific Ocean populations. An additional analysis of the samples from both studies (Camargo et al. 2016; Ruck 2016) did detect matrilineal population structure within the Atlantic Ocean basin with three lineages: the Northwest Atlantic, the rest of the Western Atlantic, and the Eastern Atlantic Ocean (C. Ruck, personal communication, 2016 as cited in Young et al. 2018).

Sreelekshmi et al. (2020) looked at the genetic diversity of oceanic whitetip sharks along the coast of India and found no significant genetic differentiation, with evidence of substantial gene flow and connectivity. They further indicate that comparing their data with those of Camargo et al. (2016) and Ruck (2016) indicate significant connectivity and gene flow between the Indian Ocean and the East Atlantic Ocean. Thus, we are unclear of the population structure of oceanic whitetip sharks in the Pacific Ocean, and specifically if there is gene flow between the West and East Pacific Ocean. We assume the weak differentiation found by Ruck (2016) indicates oceanic whitetip sharks in the Pacific Ocean may be their own population. Frequently distinctions are made between the oceanic whitetip sharks in the East Pacific and the West Pacific; however, this distinction appears to be one of convenience based on fishery management areas and may be biologically arbitrary. However, there is currently no scientific evidence indicating a lack of connectivity across the Pacific Ocean.

Abundance of oceanic whitetips appears to be the greatest in pelagic waters 10° on either side of the equator, with worldwide decreased concentrations as the distance from the equator increases and with increasing proximity to continental shelves (Backus et al. 1956; Strasburg 1958; Compagno 1984; Nakano et al. 1997; Bonfil et al. 2008; Clarke et al. 2011a; Hall and Roman 2013; Tolotti et al. 2013; Young et al. 2018).

Thermal preferences by oceanic whitetips suggest inter-ocean basin movements, such as around the southern tip of Africa or South America, are restricted due to thermal barriers (Bonfil et al. 2008; Musyl et al. 2011; Howey-Jordan et al. 2013; Gaither et al. 2016; Young et al. 2018). As many ecothermic sharks, oceanic whitetips exhibit behavioral thermoregulation (Howey-Jordan et al. 2013), which is the capacity to selectively move between waters of different temperatures to maintain constant body thermal capacity, or as a response to optimize energetic benefits (e.g., growth, feeding, digestion, reproduction, gestation time; reviewed in Dell'Apa et al. 2023). Oceanic whitetips are typically found in epipelagic tropical and subtropical waters above approximately 100-125 m depth, in water temperatures between 15ºC and 28ºC, with strong preferences for warmer surface layers greater than 20ºC (Howey-Jordan et al. 2013; Howey et al. 2016; Young et al. 2018; Andrzejaczek et al. 2018). Results from sharks tagged with pop-up satellite tags (PSATs) by Andrzejaczek et al. (2018) exhibited seasonal changes in vertical movement patterns in oceanic whitetips in the tropical Northwest Atlantic that are associated with changes in water temperature, with presence of tagged-and-released individuals showing a negative relationship between the percentage of time this species spent in the upper 50 m and water temperature. Tagged sharks showed a preference for deeper waters during the summer, which the authors interpreted as a thermoregulatory strategy to avoid prolonged exposure to waters warmer than approximately 28°C (Andrzejaczek et al. 2018). Deep dives (>200 m) through the thermocline into the mesopelagic zone have been documented by Howey-Jordan et al. (2013) and Howey et al. (2016) into waters as cold as 7.75 ºC for brief periods, most likely to forage (Young et al. 2018). Although Musyl et al. (2011), Tolotti et al. (2015), and Carlson and Gulak (2012), determined that exposure to such temperatures are not continuous, with 95% of their time greater than 120 m in depth, above the thermocline (Young et al. 2018). The maximum recorded dive of the species was to a depth of 1,082 m (Howey-Jordan et al. 2013).

Several studies have provided valuable insights on oceanic whitetip migration patterns, which are discussed in detail by Young et al. (2018), although knowledge gaps still exist. As a general overview, Musyl et al. (2011) showed complex movement patterns generally restricted to central tropical waters north of the North Equatorial Countercurrent (NEC) in the Pacific (Young et al. 2018). Whereas the NMFS Cooperative Shark Tagging Program (CSTP) studies in the Atlantic have discovered movements by juveniles ranging from the Lesser Antilles west into the central Caribbean Sea, from east to west along the equator, from the northeastern Gulf of America (formerly known as the Gulf of Mexico) to the Atlantic Coast of Florida, from the Mid-Atlantic Bight to southern Cuba, and northeast tracks from southern Brazil (Kohler et al. 1998; Bonfil et al. 2008; Young et al. 2018).

In the equatorial and southwestern Atlantic, oceanic whitetip sharks which were tagged with PSATs in the operational range of the Brazilian longline fleet exhibited some degree of site fidelity, even after traveling several thousand kilometers (Tolotti et al. 2015; Young et al. 2018). Similarly, 11 mature oceanic whitetip sharks were tagged in the Bahamas, and these individuals remained within 500 km of the tagging site for approximately 30 days before dispersing across 16,422 km^2 of the western North Atlantic, and subsequently returning to the Bahamas after 150 days (Howey-Jordan et al. 2013; Young et al. 2018). Additionally, Carlson and Gulak (2012) satellite tagged an oceanic whitetip shark nearby in the Gulf of America which moved a straight-line distance of approximately 238 km from waters off southeast Louisiana to the edge of the continental shelf about 300 km north of the Yucatan Peninsula (Young et al. 2018).

Meanwhile, observations from the Spanish longline fishery targeting swordfish from 1993-2011 in the Indian Ocean, indicate that the distribution of oceanic whitetips is primarily north of 25ºS, most likely influenced by the seasonal expansion or displacement of warm water masses (García-Cortes et al. 2012; Young et al. 2018). The distribution illustrated by Garcia-Cortes et al. (2012) are highly influenced by the effort of the fleet as the data are related to total catches rather than CPUE (Young et al. 2018).

Vertical and horizontal behavior of oceanic whitetip sharks were studied by Filmalter et al. (2012) in the western Indian Ocean using PSATs and mini-PSATs. The study results displayed the ability of these sharks to travel great distances in the pelagic environment (Young et al. 2018). Finally, 56 oceanic whitetip sharks were opportunistically tagged by the Spanish fishing fleet from 1985-2004, which discovered these sharks exhibit a trans-equatorial migration in the Indian Ocean (Mejuto et al. 2005; Young et al. 2018).

Population Status and Trends: Overall, global quantitative abundance estimates and trends are lacking for the oceanic whitetip shark. However, there are several studies on the abundance trends and a recent stock assessment for the oceanic whitetip shark in the WCPO (Tremblay-Boyer et al. 2019). The reported catch of oceanic whitetip shark, which is mainly caught as bycatch, has been affected by the reporting requirements for bycatch species that have changed over time and differ by organization.

To date, only one assessment has been conducted to determine a global population trend for the species. Rigby et al. (2019) used a Bayesian state-space tool for trend analysis of abundance indices (Just Another Red List Assessment, JARA) to determine a global abundance trend for the oceanic whitetip shark, which builds on the Bayesian state-space tool for averaging relative abundance indices by Winker et al. (2018). This global assessment for oceanic whitetip shark was based upon calculating the expected rate of change (%) for each of the regional rates of change weighted by an area-based estimate of the size of each region as a proportion of the species' global distribution. The results indicated that the estimated area-weighted global population trend was a decline of 98-100%, with the highest probability of 80-99% reduction over three generation lengths (61.2 years based on IUCN criteria). However, it should be noted that there was no abundance data that spanned over three generations, and the decline was based on the projected trend from the current observed data (reviewed in NMFS 2023e).

Western and Central Pacific Oceanic Whitetip Shark

The oceanic whitetip shark was historically considered one of the most abundant pelagic shark species throughout the WCPO. For example, tuna longline survey data from the 1950s indicate oceanic whitetip sharks comprised 28% of the total shark catch of fisheries south of 10ºN (Strasburg 1958). Similarly, Japanese research longline records during 1967-1968 indicate that oceanic whitetip sharks were among the most common shark species taken by tuna vessels in tropical waters of the WCPO, and comprised 22.5% and 23.5% of the total shark catch west and east of the International Date line, respectively (Taniuchi 1990). More recently, the oceanic whitetip shark has suffered significant population declines throughout the region, including declining trends in standardized CPUE, biomass and size indices (suggesting growth overfishing) (reviewed in NMFS 2023e). Results by several studies, analyses, and other assessments utilizing data from fisheries operating across the WCPO (including Hawaii, Japan, and observer data from the Secretariat of the Pacific Community) all showed significant declining trends of the species in both longline and purse seine fisheries across the region (Clarke 2011, Walsh and Clarke 2011, Clarke et al. 2012, Brodziak et al. 2013, Rice et al. 2015).

Recently, Tremblay-Boyer et al. (2019) conducted a stock assessment for the oceanic whitetip shark in WCPO utilizing the Stock Synthesis modeling framework (Methot Jr and Wetzel 2013), which is an integrated age-structured population model. The population dynamics model was informed by three sources of data: historical catches, time series of CPUE, and length frequencies. The longline fishery was split into bycatch and target fleets, and the purse-seine fishery into fleets of associated and unassociated sets. This assessment also included scenarios of discard mortality assuming 25%, 43.75% and 100% mortality on discards. The stock of oceanic whitetip shark was found to be overfished and undergoing overfishing, with a biomass decline by 88% since 1995 (Tremblay-Boyer et al. 2019). The current spawning stock biomass (232–-507 metric tons) is predicted to be below 5% of the unfished spawning biomass, and the population could go extinct over the long-term based on current levels of fishing mortality (Tremblay-Boyer et al. 2019; see Figure 14 in NMFS 2023e). The most recent assessment concluded that total biomass in 2010 was 19,740 metric tons, and that biomass declined to 9,641 metric tons by 2016.

In previous biological opinions, NMFS has estimated that the biomass translates to 200,000 sharks (NMFS 2019b) and 264,318 sharks (NMFS 2021b), following an analysis in FAO (2012). The stock assessment conducted by Tremblay-Boyer et al. (2019) included 648 model runs accounting for assumptions about life-history parameters and impact of fishing underpinning the assessment. Using the underlying data from these 648 models in their structural uncertainty grid in Tremblay-Boyer et al. (2019), the authors subsequently estimated the median value of the current total number of individuals in the WCPO (n = 775,214) (see NMFS 2020a). We consider this estimate as the current best available scientific information, and use it as our best estimate of the size of the WCPO portion of the Pacific Ocean population of oceanic whitetip sharks that is in alignment with previous supplements (see NMFS 2022a, 2022b). Based on the foregoing information, the oceanic whitetip shark has experienced, and likely continues to experience, significant abundance declines across the WCPO.

Rice et al. (2021) estimate that WCPO oceanic whitetip sharks will decline by an additional 13.3% (mean; 14.6% median) over 10 years, which equates to an annual decrease of 1.4% (mean; 1.6% median) assuming incidental captures and mortalities remain the same as 2016. If longline fishery mortalities are decreased by 10% across the WCPO, Rice et al. (2021) estimate that the WCPO population will only decline by an additional 0.4% (mean; 1.2% median), which equates to annual declines of 0.04% (mean; 0.13% median). If longline fishery mortalities are decreased further, by 20% across the WCPO, Rice et al. (2021) estimate that the WCPO population will increase by 4.2% (mean; 3.3% median) over the next 10 years, which equates to an annual increase of 0.46% (mean; 0.36% median). Rice et al. (2021) indicate that recent catch is likely bounded by the latter two scenarios, or reductions of between 10% and 20%, due to adoptions of CMMs and slight decreases in the amount of longline fishing effort.

More recently, Bigelow et al. (2022) updated the projections of Rice et al. (2021) with contemporary estimates of at-vessel and post-release mortality rates, and catch reductions facilitated by switching to monofilament leaders. Their results are summarized by projections of the ratio of spawning biomass (projected to 2031) to the equilibrium unfished spawning biomass (i.e., the biomass of an unfished population). This provides a relative measure of the size of the spawning biomass of a population whereby increasing ratios indicate higher biomass. The mean values of these ratios increase from 0.039 estimated for 2016 to 0.118 with updated assumptions regarding at-vessel and post-release mortality reductions, and prohibition of wire leaders and shark lines (Figure 11; see Table 3 of Bigelow et al. 2022). These results are based on optimistic post-interaction mortality rates of 3.4 to 8.1%, with an at-vessel mortality rate of 19.2% (see Table 1 of Bigelow et al. 2022). The implementation of CMM-2022-04 is anticipated to improve the survival of released sharks throughout the WCPO by eliminating wire leaders and shark lines.

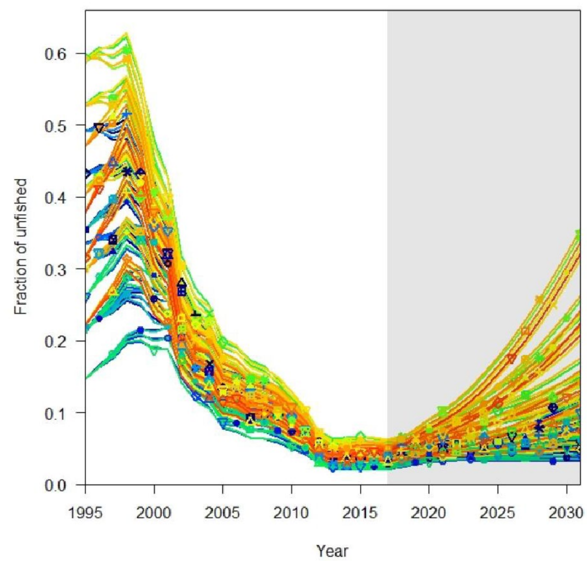

Figure 11. Projected ratios of spawning biomass (projected to 2031) to the equilibrium unfished spawning biomass for WCPO oceanic whitetip sharks with updated at-vessel and post-release mortality rates and the prohibition of wire branchlines and shark line (Figure 7 in Bigelow et al. 2022).

We believe the results by Bigelow et al. (2022) represent the best available information. However, Bigelow et al. (2022) do not provide specific population trends, only indicating that the trends in spawning biomass ratios are anticipated to be positive (Figure 11). Additional years of data are needed before we can calculate an estimated population trend. Given the uncertainty in the applicability of the assumption made by Bigelow et al. (2022) to the broader WCPO fisheries, we consider it reasonable to assess the range of population trends presented in Rice et al. (2021) for reductions in fishery mortality between 10 and 20%. Therefore, we focus our analysis on the scenarios presented by Rice et al. (2021) whereby the actual population trend is between a declining rate of 0.13% per year (median value for 10% reduction in fishery mortalities) and an increase rate of 0.36% per year (median value for 20% reduction in fishery mortalities). These numbers include the loss of individuals from the Hawaii DSLL as currently operated.

Historic declines in abundance of WCPO oceanic whitetip sharks are attributable to impacts from pelagic longline and purse seine fisheries as well as smaller fisheries such as troll, handline and shortline fisheries. As noted above in the *Description and Geographic Range* section, it is possible that oceanic whitetip sharks are philopatric; therefore, the declines in abundance may have resulted in localized depletions resulting in a loss of genetic diversity, and changes in distribution.

East Pacific Oceanic Whitetip Shark

In the EPO, oceanic whitetip sharks comprised approximately 20% of the total shark catch in the tropical tuna purse seine fishery from 2000–2001 (Roman-Verdesoto and Orozco-Zoller 2005), and 9% of the estimated yearly average capture of sharks from 1993-2009 (Hall and Román 2013). However, both nominal catches and encounters with oceanic whitetip sharks in all set types have declined significantly since 1994, representing an 80-95% population decline (Hall and Román 2013). Further, size trends in this fishery show that small oceanic whitetip sharks (<90 cm), which comprised 21.4% of the oceanic whitetip sharks captured in 1993, have been virtually eliminated from the population, indicating the possibility of recruitment failure in the population (Hall and Román 2013; Martin Hall personal communication, in NMFS 2023e). Although it is possible other factors aside from fishing pressure may have affected catches of oceanic whitetip shark during this period, such a significant level of decline makes it unlikely (Hall and Román 2013).

Assuming a similar density of oceanic whitetip shark in the EPO to that of the WCPO, and using the proportion of the area of the WCPO between the latitudes where oceanic whitetip sharks are found to represent 60% of habitat in the entire Pacific Ocean, a previous biological opinion estimated a total population size of 1,292,023 ([775,214/60] x100) oceanic whitetip sharks in the Pacific Ocean (NMFS 2023d). However, given that this estimate requires an assumption regarding the density of oceanic whitetip sharks in the EPO, the analysis considered both 775,214 as a minimum population estimate and 1,292,023 as an upper estimate of the population size assuming the densities of sharks in the EPO is similar to that of the WCPO. Consequently, and based on these assumptions, we consider an estimated population size of 516,809 ([1,292,023/40] x100) oceanic whitetip sharks in the EPO as the best information available for this region.

<u>Limiting Factors and Threats</u>: The 2023 recovery status review report provides extensive details of the known threats facing oceanic whitetip sharks, also considered by region (NMFS 2023e). In the U.S. western Pacific, including Hawaii, American Samoa, Guam, and the Commonwealth of the Northern Mariana Islands, EFH for oceanic whitetip sharks is broadly defined as the water column down to a depth of 1,000 m (3,280 ft) from the shoreline to the outer limit of the EEZ (WPFMC 2009). Based on an examination of published literature and anecdotal evidence, NMFS determined that there are few anticipated impacts from federally regulated and non-federally regulated gears to HMS EFH (which includes oceanic whitetip shark EFH; NMFS 2006a). Because EFH is defined for the oceanic whitetip shark as the water column or attributes to the water column, cumulative impacts from HMS and non-HMS fishing gears on EFH are anticipated to be minimal. However, a better understanding of the specific habitat types and characteristics that influence the abundance of these sharks within those habitats is needed in order to determine the effects of fishing activities on habitat suitability for oceanic whitetip sharks. In addition, EFH regulations also require that FMPs identify non-fishing related activities

that may adversely affect EFH of managed species, either quantitatively or qualitatively, or both. These waters are or may be used by humans for a variety of purposes that often result in degradation of these and adjacent habitats, posing threats, either directly or indirectly, to the biota they support (NMFS 2006a). These effects, either alone or in combination with effects from other activities within the ecosystem, may contribute to the decline of some species or degradation of the habitat; however, the cumulative anthropogenic effects on the species' continued existence are difficult to quantify. Currently, there is no evidence to suggest a range contraction based on habitat degradation for the oceanic whitetip shark.

The primary threat to oceanic whitetip sharks worldwide is intentional targeting and incidental bycatch in commercial fisheries (Young et al. 2018; Young and Carlson 2020). According to the FAO, total catches of oceanic whitetip shark increased drastically in the late 1990s, peaking at 1,480 mt in 2000, and declining to 271 mt as of 2013. Reported worldwide catches for oceanic whitetip shark for the last 5 years of available data (2012-2017) have ranged from 62 to 519 mt per year (FAO data, as cited in NMFS 2023e). Because of their preferred distribution in warm, tropical waters, and their tendency to remain at the surface, oceanic whitetip sharks have high encounter and mortality rates in fisheries throughout their range. They are frequently caught as bycatch in many global fisheries, including pelagic longline fisheries targeting tuna and swordfish, purse seine, gillnet, and artisanal fisheries. They are also a preferred species for the international fin trade, discussed in more detail below.

Oceanic whitetip sharks commonly interact with longline fisheries throughout the Pacific, with at least 20 member nations of the WCPFC recording the species in their fisheries. In addition to being caught indirectly as bycatch, observer records indicate that some targeting of oceanic whitetip sharks has occurred historically in the waters near Papua New Guinea. Given the high value of oceanic whitetip fins and low level of observer coverage, it is likely that targeting has occurred in other areas as well (Rice and Harley 2012). In the U.S., longline observer coverage has been 20% for 20+ years. However, longline observer coverage data is lacking for the distant-water fleets of Japan, South Korea, and Chinese Taipei, which comprise a significant proportion of longline effort in the WCPO (SPC 2010).

Oceanic whitetip sharks can be a significant component of the bycatch in longline and artisanal fisheries in several countries around the EPO, based on limited information available from countries party to the IATTC (IATTC 2007). For example, the oceanic whitetip shark was identified as one of several principal species taken by Mexican fisheries targeting pelagic sharks (Sosa-Nishizaki et al. 2008). Farther south in the EPO, three countries (Costa Rica, Ecuador and Peru) contribute significantly to shark landings, and are important suppliers of shark fins for the Asian market. In a recent 61-year analysis of Peruvian shark fisheries, Gonzalez-Pestana et al. (2014) reported the oceanic whitetip shark in the Peruvian fishery, but provided no additional information on the level of catch. Oceanic whitetip sharks have also been recorded in the catches of the Ecuadorian artisanal fishery. In an analysis of landings from the five principal ports of the Ecuadorian artisanal fishery from 2008-2012, 37.2 mt of oceanic whitetip shark were recorded out of a total 43,492.6 mt of shark catches (Martinez-Ortiz et al. 2015). In Costa Rica, only 10 oceanic whitetip sharks were reported by observers in the Costa Rican longline fishery from

1999 to 2010 (Dapp et al. 2013). However, according to a recent report, landings data from the Costa Rican Fisheries Institute shows that 2,074 oceanic whitetip shark bodies were landed in 2011 alone in Puntarenas, Costa Rica (Arauz 2017). This provides some evidence that the oceanic whitetip shark is much more prevalent in Costa Rican longline fisheries than the observer data indicates; as such, this fishery may be contributing further to the overutilization of the species in the EPO. In addition to longline fleets of Eastern Pacific countries, international fishing fleets operate in the region, particularly around Ecuador's EEZ including the Galápagos Marine Reserve, and illegal retention of oceanic whitetip sharks has been documented. For example, in August 2017, the vessel Fu Yuan Yu Leng 999, of Chinese flag, was detained while crossing through the Galápagos Marine Reserve without authorization. This vessel contained 7,639 sharks with oceanic whitetip shark representing 20% of the catch (~1527 sharks) based on genetic analysis (Bonaccorso et al. 2021).

Available data suggest oceanic whitetip sharks were once frequently encountered by the purse seine fleets (though not as frequently as the longline fishery) in the WCPO, with the oceanic whitetip shark being the 2nd most common species of shark caught as bycatch in purse seine fisheries in this region (Molony 2007), representing nearly 9% of the total shark catch (data from 1993-2009; Hall and Roman 2013). Since 2009, the required observer coverage in the purse seine fleet has increased to 100% (Clarke 2013). Although the oceanic whitetip shark was historically the 2nd most commonly identified shark in associated sets, this species is now rarely observed (Rice et al. 2015). The IATTC requires the collection of data on the primary shark species caught as bycatch in its fisheries. Since 1993, observers have recorded shark bycatch data onboard large purse seiners in the EPO. However, much of this data (especially data collected prior to 2005), is aggregated under the category of "sharks," as opposed to species-specific records. In an effort to improve species identifications in these data, a one-year Shark Characteristics Sampling Program was conducted to quantify at-sea observer misidentification rates. Oceanic whitetip sharks represented approximately 20.8% of the species observed during this project (Roman-Verdesoto and Orozco-Zoller 2005). More recently, species-specific observer data have become publicly available via the IATTC observer database. Estimates of shark catches (tons/year) by species for all purse seines operating in the EPO for all set types combined (floating object + unassociated + dolphin) are based on that data (See Figure 12 below, as reported in NMFS 2023e). To date, the IATTC has not conducted a stock assessment for the oceanic whitetip shark.

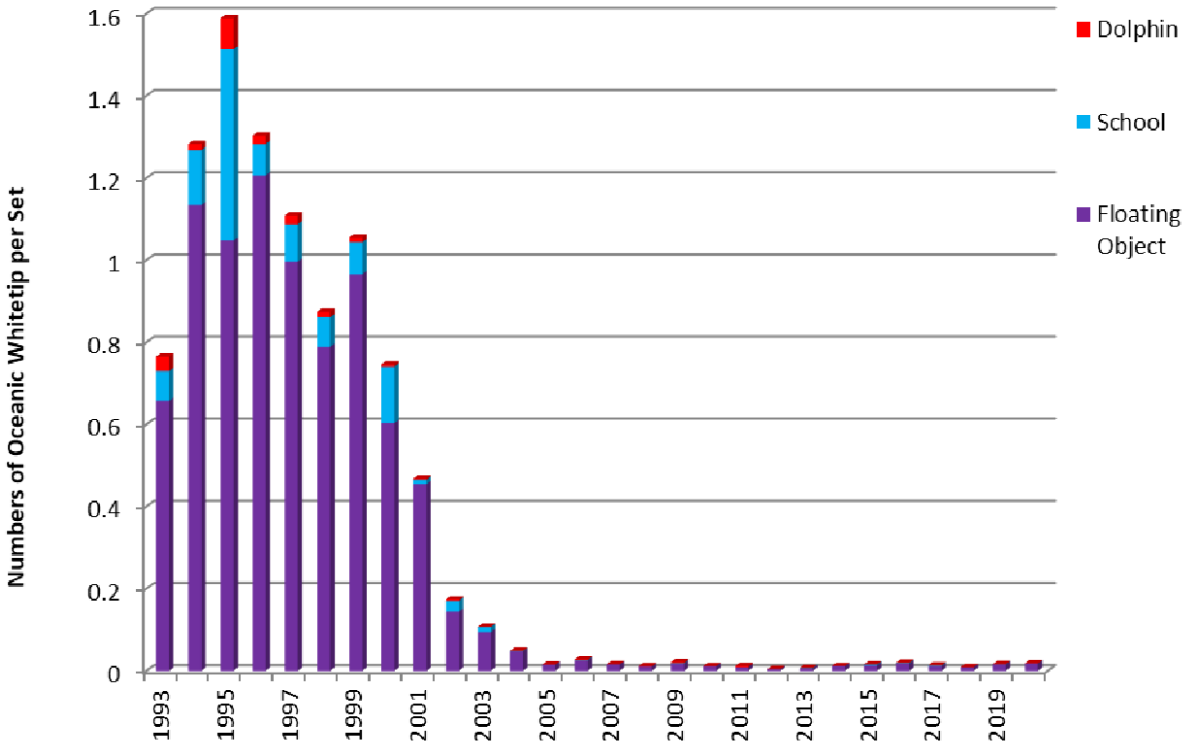

Figure 12. Annual estimated numbers of oceanic whitetip sharks caught per set as bycatch in the tropical tuna purse seine fishery of the Eastern Pacific Ocean. Source: IATTC Observer Database (NMFS 2023e).

Floating object sets are responsible for 90% of oceanic whitetip shark catches in the EPO. The species' capture probability in floating object purse seine sets has decreased over time from a high of 30% capture rate per set between 1994 and 1998, to less than 5% from 2004 to 2008 (Morgan 2014, as cited in Young et al. 2018). Estimated number of sharks caught by set (CPUE) regardless of set type of oceanic whitetip shark peaked in 1995, with approximately 0.52 individuals caught per set. Within 10 years, CPUE dropped dramatically to only 0.005 per set, remaining low through 2020. This is in drastic contrast to catches of the closely related silky shark (*C. falciformis*), with CPUE remaining relatively constant over the same time period. As congeners with similar physiologies that co-occur in similar habitats, this provides some indication that the declines in oceanic whitetip shark catches are not likely the result of environmental factors causing the species to leave the area. Declines in the nominal CPUE and frequency of occurrence of oceanic whitetip sharks is compatible with a drop of 80–95% from the population levels in the late 1990s (Hall and Román 2013). Further, size trends in this fishery show that small oceanic whitetip sharks, which comprised 21.4% of the oceanic whitetip sharks captured in 1993, have been virtually eliminated from the population, indicating the possibility of recruitment failure in the population. Unfortunately, total annual shark bycatch from 2003 to 2018 indicate captures generally below 100 sharks per year and follows the trend from Hall and Román (2013).

A recent study examining environmental predictors with shark bycatch in the eastern Pacific purse-seine fishery indicates oceanic whitetip shark captures on sets with floating objects are more likely to occur in waters with temperatures lower than 28°C and chlorophyll-a concentrations lower than < 2 (<0.1 mg m^{-3}), in oceanic waters (>1,000 km from shore) with depths greater than 4,000 m, and where fishing activity on this set type is higher. Spatiotemporal predictions of oceanic whitetip shark catches indicated that higher catches occurred during the boreal spring (Apr-Jun) with higher catches in the Humboldt current (79− 87°W; 10−16°S), along the central Eastern Pacific between 2− 8°N from 105°W to the westernmost of the IATTC management area, north- west to French Polynesia (147°W, 5°S); and along of central eastern Pacific between 2− 8°S from 111 to 135°W (Díaz-Delgado et al. 2021).

Because fishing effort in the EPO continues to increase, fishing pressure and associated mortality of oceanic whitetip sharks is expected to continue in this region. Although mortality rates of oceanic whitetip sharks in purse seine fisheries are not available, it is likely they experience high mortality rates similar to closely related silky sharks, with mortality rates >85% in WCPO and Indian Ocean purse seine fisheries (Poisson et al. 2014; Hutchinson et al. 2015). Although management measures are now in place that prohibit retention of oceanic whitetip sharks in the EPO (IATTC 2011), they will not likely be sufficient to prevent further population declines due to likely high bycatch-related mortality rates in purse seine nets, including post-release mortality. Therefore, due to the significant decline in catches and virtual disappearance of oceanic whitetip sharks from purse seine fishing grounds in the EPO, it appears that these declines are likely the result of overutilization of the species.

The previously discussed stock assessment (refer back to *Population Status and Trends* section) of oceanic whitetip sharks in the WCPO analyzed fisheries data from 1995-2016 and determined that the greatest impact on the species is attributed to bycatch from the longline fishery, with impacts from target longline activities and purse-seining being negligible (Tremblay-Boyer et al. 2019). Tremblay-Boyer and Neubauer (2019) developed a prediction-model from observer catch rates to apply to known longline and purse-seine effort across the WCPO. Estimated historical catches were developed for the longline bycatch fleet, the longline target fleet, and the purse seine fleet split between associated and unassociated sets. The catches by the longline bycatch fleet are estimated to be much higher than those for the longline target fleet and the purse seine fleets. According to the longline bycatch reconstruction, catches increased steadily from 1995 from 140,000 individuals (median) to peak in 2001 at 563,352 individuals, and have declined steadily since. Catches declined to 154,600 individuals in 2010 to 7,440 in 2016. For the longline target fleet, catches fluctuated more than for the bycatch fleet. Catches fluctuated from 1,000 individuals in 1995, peaked in 1999 at 4,800 sharks and again in 2010 at 9,000 individuals, which later declined to 100 sharks in 2016, likely because retention of these sharks became illegal in 2013. Predicted catches for the purse seine fleets were highest early in the time series. In 1996, median catches were 27,600 and 7,500 sharks for associated and unassociated sets, respectively. Catches declined until 2002, but then peaked again at 18,200 animals in 2003, and then declined to 800 animals in 2016 for associated sets. Catches in unassociated sets were much lower, but had a similar pattern with a peak in 2003 of 1,600 sharks in 2003, and then declined to

400 in 2016. These predicted catches were much lower than those estimated in an earlier assessment by Rice and Harley (2012), but a different measure of effort was used for this fleet in the most recent assessment (Tremblay-Boyer et al. 2019).

Due to continued and increasing fishing pressure in the WCPO, size trends for oceanic whitetip shark have also declined, which is indicative of species overutilization. For example, declining median size trends were observed in all regions and sexes in both longline and purse seine fisheries until samples became too scarce for analysis in the study. These size trends were significant for females in the longline and purse seine fisheries within the species' core tropical habitat areas (Clarke et al. 2011b). This is particularly concerning due to the potential correlation between maternal length and litter size, which has been documented in the Atlantic and Indian Oceans (Bass et al. 1973; Lessa et al. 1999b; Bonfil et al. 2008; Varghese et al. 2016). While Rice et al. (2015) more recently report that trends in oceanic whitetip median length are stable, the majority of sharks observed are immature. Likewise, from 2000–2009, 100% of oceanic whitetips sampled in purse seine fisheries were immature (Clarke et al. 2012).

In the U.S. Pacific, the oceanic whitetip shark was historically a common bycatch species in the Hawaii-based pelagic longline fisheries, comprising approximately 3% of the total shark catch from 1995–2006 (Brodziak et al. 2013). An observer program for the Hawaii-based pelagic longline fisheries was initiated in 1994, with an observer coverage rate ranging between 3% and 10% from 1994–2000, increasing to a minimum of 20% in 2001. The DSLL fishery targeting tuna is currently observed at a minimum of 20% and the SSLL fishery targeting swordfish has 100% observer coverage. Brodziak et al. (2013) concluded that the relative abundance of oceanic whitetip sharks declined within a few years of the expansion of the longline fishery, which suggests these fisheries are contributing to the commercial overutilization of oceanic whitetip sharks within this portion of its range, although retention of oceanic whitetip sharks in these fisheries has been prohibited since 2011. It should be noted that the majority of oceanic whitetip sharks are now released alive in this fishery, with the number of individuals kept exhibiting a declining trend until 2011, after which retention was prohibited. Based on fishery logbook data, a total of 701 oceanic whitetip sharks were caught in 2014, with 100% released. In addition, the U.S. National Bycatch Report First Edition Update 2[17] described estimated bycatch data (by weight) of species caught by the Hawaii-based commercial longline fisheries. These data show that from 2011 to 2013, the SSLL fishery released an estimated 91–96% of all oceanic whitetip sharks caught alive. During the same time period, the DSLL fishery released an estimated 78-82% of all oceanic whitetip sharks caught alive. However, it is unknown how many of these sharks survived after being released.

Hutchinson et al. (2021) show post-release survival rates are high (85%) up to 30 days post-release for oceanic whitetip sharks if they are in good condition at release and trailing gear is minimized, and 23.5% of hooked individuals can survive more than 8 h, with some surviving up to 14 h on the line (Poisson et al. 2010). After release, the oceanic whitetip sharks may resume normal vertical behavior within 5 h (Scott et al. 2023). The amount of trailing gear left on an

[17] https://www.fisheries.noaa.gov/resource/document/national-bycatch-report

animal has a negative effect on post-release survival potential. Because most sharks are released by cutting the line, recommendations to remove as much trailing gear as possible will enhance post-release survival rates. In the WCPFC, no-retention measures for oceanic whitetip sharks may have the intended effect of reducing mortality if the measures included recommendations to reduce the amount of trailing gear left on animals to less than 2.5 m.

Oceanic whitetip sharks are also caught as bycatch in the American Samoa longline fishery (ASLL), which targets albacore tuna and is managed under the Pacific Pelagic Fishery Ecosystem Plan (FEP). This fishery has had an observer program since 2006, with coverage ranging between 6–8% from 2006–2009, and between 19–33% since 2010. While landings of sharks in general have declined in American Samoa, this trend is largely attributed to regulations pertaining to shark finning (e.g., the Shark Finning Prohibition Act) (NMFS 2011).

Recently, wire leaders were prohibited in Hawaii DSLL fisheries in an effort to reduce mortality rates for hooked oceanic whitetip sharks. This rule was developed after longline fishermen voluntarily stopped using wire in favor of monofilament nylon leaders. This regulation is anticipated to reduce mortality rates of hooked oceanic whitetip sharks by about 30% (Bigelow and Carvalho 2021). In addition, new regulations require the removal of trailing gear in all FEP longline fisheries, including the American Samoa, Hawaii DSLL, and Hawaii SSLL fisheries.

Bycatch-related mortality in longline fisheries are considered the primary drivers for the species declines (Clarke et al. 2011a; Rice and Harley 2012; Young et al. 2018), with purse seine (11,139 observed captures from 1995 to 2015; Tremblay-Boyer and Brouwer 2016) and artisanal fisheries being additional sources of mortality. In addition to bycatch-related mortality, the oceanic whitetip shark is a preferred species for opportunistic retention because its large fins obtain a high price in the Asian fin market, which comprises approximately 2% of the global fin trade (Clarke et al. 2006). Despite finning bans and retention prohibitions, this high value and demand for oceanic whitetip fins incentivizes the opportunistic retention and subsequent illegal finning of oceanic whitetip sharks when caught, and thus represents the main economic driver of mortality of this species in commercial fisheries throughout its global range (retention/finning is not practiced in U.S. fisheries).

U.S. fisheries in the Pacific that capture oceanic whitetip sharks include the SSLL, DSLL, and ASLL fisheries, as well as the U.S. purse seine fisheries. The SSLL is estimated to interact with up to 102 oceanic whitetip sharks a year (95th percentile; NMFS 2019b). Also, NMFS anticipated that a mean total number of 1,161 oceanic whitetip sharks would be caught annually in the Hawaii-based DSLL fishery, with a mean number of 402 individuals killed annually (NMFS 2022b).

The impacts of climate change on oceanic whitetip sharks, and pelagic sharks in general, have not been well studied. However, large-scale impacts of climate change such as ocean warming and acidification have the potential to threaten the species, and its prey base, given projected impacts to open ocean shelf habitats where these animals occur. The global ocean has warmed unabated since 1970, and has taken up to more than 90% of the excess heat in the climate system with high confidence (IPCC 2019). It is virtually certain that the ocean will continue warming throughout the 21st century, and by 2100, the top 2,000 m of the ocean will very likely take up 5 to 7 times more heat under representative concentration pathways 8.5 (RCP8.5) than observed heat uptake since 1970 (IPCC 2019). It is very likely that the ocean has taken up to 20 to 30 percent of total anthropogenic carbon dioxide emissions since the late 1980s (IPCC 2019). It is virtually certain that continued carbon uptake through 2100 will exacerbate ocean acidification, and RCP8.5, open ocean surface pH is projected to decrease by around 0.3 pH units by 2081-2100, relative to 2006-2015 (IPCC 2019).

Specific studies on the potential impacts of climate change to the oceanic whitetip shark are limited. However, because oceanic whitetip shark habitat consists of open ocean environments occurring over broad geographic ranges, large-scale impacts such as global climate change that affect ocean temperatures, currents, and potentially food chain dynamics, may affect the species in the future. Data from the Northwest Atlantic suggest oceanic whitetip sharks may face metabolic challenges with habitats close to upper thermal limits and potential overheating. If ocean warming raises temperatures in habitats to upper thermal limits in the future, potential habitat mismatches may occur between oceanic whitetip sharks and their prey, reducing the overall habitat in which they can feed (Andrzejaczek et al. 2018). Also, oceanic whitetip sharks may expand their future horizontal distribution, and will likely shift their vertical distribution to deeper waters as a strategy to maintain optimal physiological performance (reviewed in Dell'Apa et al. 2023). Hence, while avoidance of surface waters will reduce the vulnerability of these sharks to fishing gears targeting this zone, it may increase their vulnerability to deeper-set longlines by minimizing the available habitat and magnifying the spatial overlap of the species' distribution with pelagic longline fisheries that already occurs on a latitudinal scale (Andrzejaczek et al. 2018). Also, warmer and less oxygenated waters may result in increased post-release mortality in ram-ventilating sharks, though based on species-specific sensitivities to oxygen level and metabolic requirements (reviewed in Dell'Apa et al. 2023).

In another study on potential effects of climate change to sharks, Hazen et al. (2012) used data from electronic tagging and a climate change model to predict shifts in habitat and diversity in top marine predators in the Pacific out to the year 2100. Results of the study showed significant differences in habitat change among species groups, which resulted in species-specific "winners" and "losers." The shark guild as a whole had the greatest risk of pelagic habitat loss. The model predictions in Hazen et al. (2012) do not account for factors such as species interactions, food web dynamics, and fine-scale habitat use patterns, which are required to more comprehensively assess the effects of climate change on the pelagic ecosystem. Further, results are not specific to the oceanic whitetip shark. Finally, the complexity of ecosystem processes and interactions complicate the interpretation of modeled climate change predictions and the potential impacts on populations. Thus, the potential impacts from climate change on oceanic whitetip shark habitat are highly uncertain. While their broad distribution and ability to move to areas that suit their biological and ecological needs may buffer impacts from climate change, climate change still has the potential to pose a threat to oceanic whitetip sharks, including habitat changes (e.g., changes in currents and ocean circulation, compression of habitat zone) and potential impacts to prey species.

Conservation: Due to reported population declines driven by the trade of oceanic whitetip shark fins, the oceanic whitetip shark was listed under Appendix II of CITES in 2013. This listing went into effect as of September 2014.

Within the WCPO, finning bans have been implemented by the United States, Australia, Cook Islands, Micronesia New Zealand, Palau, Republic of the Marshall Islands and Tokelau, as well as by the IATTC and the WCPFC. These finning bans range from requiring fins remain attached to the body to allowing fishermen to remove shark fins provided that the weight of the fins does not exceed 5% of the total weight of shark carcasses landed or found onboard. The WCPFC has implemented several conservation and management measures for sharks with the following objectives (Clarke 2013): (1) promote full utilization and reduce waste of sharks by controlling finning (perhaps as a means to indirectly reduce fishing mortality for sharks); (2) increase the number of sharks that are released alive (in order to reduce shark mortality); and (3) increase the amount of scientific data that is collected for use in shark stock assessments.

Also, specific to oceanic whitetip sharks, CMM 2011-04 prohibits WCPFC vessels from retaining onboard, transshipping, storing on a fishing vessel, or landing any oceanic whitetip shark, in whole or in part, in the fisheries covered by the Convention. This CMM was later replaced in 2019 by CMM-2019-04, which was in-turn replaced in 2022 by CMM-2022-04 for all sharks. The measure retains the retention prohibition for oceanic whitetip sharks, and includes additional measures on minimizing bycatch (including some gear restrictions), implementing safe release practices, and prohibiting wire leaders and shark lines for longline fishing.

2.3. Action Area

"Action area" means all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action (50 CFR 402.02). The action area for this Proposed Action is composed of portions of the U.S. West Coast EEZ off the coast of California and Oregon (starting from the second year of the program) (Figure 1). Several no-fishing zones would be considered for specific longline-type EFPs as part of the terms and conditions under the Proposed Action (see conditions #2, #3, #4, #8, #9, #31, and #35 in the *Additional Terms and Conditions for Longline-type Fishing under the Proposed Action*, section 1.3.3). Specifically, the Proposed Action Area for the large-scale modified longline-type fishing gear includes all areas within the U.S. West Coast and west of the 50 nautical mile (nm) contour from the mainland shore and islands off California, including the elements of the adaptive management program, and off Oregon during the second year and subsequent years (Figure 1), with the exclusion of waters off the state of Washington and with a no-fishing zone inside NMSs areas. Also, the Proposed Action Area includes a no-fishing zone within 30 nm of the mainland shore when fishing south of Point Conception, and a no-fishing zone shore-side of the generalized 400 m depth contour when fishing north of Point Conception when fishing with MWSG and XLBG.

2.4. Environmental Baseline

The "environmental baseline" refers to the condition of the listed species or its designated critical habitat in the action area, without the consequences to the listed species or designated critical habitat caused by the Proposed Action. The environmental baseline includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultations, and the impact of State or private actions which are contemporaneous with the consultation in process. The impacts to listed species or designated critical habitat from Federal agency activities or existing Federal agency facilities that are not within the agency's discretion to modify are part of the environmental baseline (50 CFR 402.02).

As described above in the *Status of the Species* sections (Section 2.2), the ESA-listed species that may be adversely affected by the Proposed Action that belong to the same species group (marine mammal, sea turtle, or elasmobranch) are generally exposed to many similar threats throughout their range. Although the action area for this Proposed Action (large portions of the U.S. West Coast EEZ, featuring the waters offshore the SCB and Central California as allowed by regulation) represents only a portion of relatively large ranges for all of these species that are highly mobile and migrate great distances, many of these same threats are present for animals when they do occur in U.S. West Coast waters where the Proposed Action occurs. In this section, we review the available information regarding impacts to ESA-listed species by species group, with reference to individual species as necessary or appropriate based on the available information. Information provided in this section comes from a review of the NMFS marine mammal and sea turtle stranding databases, biological opinions, current scientific research permits, current stock assessment report (SARs), and other material as cited below. There is little to no information on human-related interactions within the action area for giant manta rays, other than risk from California DGN fishery including entanglement.

Effects of climate change on marine species, including in the Proposed Action Area, include alterations in spatial distribution, reproductive seasons and locations, shifts in migration patterns, reduced distribution and abundance of prey, and changes in the abundance of competitors or predators. Variations in sea surface temperature can affect an ecological community's composition and structure, alter migration and breeding patterns of fauna and flora, and change the frequency and intensity of extreme weather events. For species that undergo long migrations (e.g., sea turtles, whales), individual movements are usually associated with prey availability or habitat suitability. If either is disrupted, the timing of migration can change or negatively impact population sustainability (Simmonds and Eliott 2009). Over the long term, increases in sea surface temperature can also reduce the amount of nutrients supplied to surface waters from the deep sea, leading to declines in fish populations, and those species whose diets are dominated by fish.

The ranges of elasmobranch species, such as the giant manta ray and oceanic whitetip sharks, are expected to shift as they align their distributions to match their physiological tolerances under changing environmental conditions (Doney et al. 2012; Harty et al. 2022; Dell'Apa et al. 2023). Climate-related shifts in range and distribution have already been observed in some marine mammal populations. Specialized diets, restricted ranges, or reliance on specific foraging sites may make many marine mammal populations particularly vulnerable to climate change (Silber et al. 2017). MacLeod (2009) estimated that, based upon expected shifts in water temperature, 88% of cetaceans would be affected by climate change, 47% would be negatively affected, and 21% would be put at risk of extinction. Hazen et al. (2012) examined top predator distribution and diversity of top marine predators in the Pacific Ocean in light of rising sea surface temperatures using a database of electronic tags and output from a global climate model. The researchers predicted up to a 35% change in core habitat area for some key marine predators in the Pacific Ocean, with some species predicted to experience gains in available core habitat and some predicted to experience losses. Such range shifts could affect marine mammal and sea turtle foraging success, as well as sea turtle reproductive periodicity (Kaschner et al. 2011). Notably, leatherback sea turtles were predicted to gain core habitat, whereas loggerhead sea turtles were predicted to lose core habitat area (Hazen et al. 2012). Similar results for leatherbacks were reported in a recent study that projected suitable habitat for various HMS in the California Current System based on species distribution models applied to high-resolution downscaled ocean projections under the RCP8.5 scenario and for the period between 1980 and 2100 (Lezama-Ochoa et al. 2024). Results suggest that, by the end of 2100, leatherback sea turtles are expected to gain suitable habitat (57% increase in core habitat area), and also to shift their distribution poleward and offshore as a result of increased habitat suitability in northern waters off OR and WA (Lezama-Ochoa et al. 2024).

Ocean warming can influence the level of dissolved oxygen concentration in the water (mainly in the upper ocean layers) due to the combination of reduced oxygen solubility at higher water temperatures, thermal stratification through the water column, and higher oxygen consumption rates by marine species as temperature increases (Keeling et al. 2010). In turn, depending on the region and/or ocean basin, these changes in dissolved oxygen concentrations can have strong negative impacts on those large pelagic sharks that are obligate ram-ventilators, which due to their specific respiratory mode have a higher metabolic rate and oxygen consumption needs than other less active fish species (Bernal et al. 2012). Results of Leung et al. (2019), based on climate projection outputs from Earth System Models included in the Coupled Model Intercomparison Project 5 (CMIP5) (see Taylor et al. 2012) and using a RCP8.5 scenario, indicate that by the end of 2100, the greatest decreases in global oceanic oxygen content are projected to occur in the eastern North Pacific Ocean (see Figure 8.2 in Leung et al. 2019), which has already lower mean oxygen concentrations than the western half of the basin. Results suggest that within the eastern North Pacific between 20-40°N, which includes the Proposed Action Area, average oxygen concentrations between 200-700 m (656-2,297 feet) depth are projected to decrease by as much as 0.6 ml L^{-1} from 1971-2000 to 2071-2100. Also, by the end of 2100, the greatest projected shoaling of the 3.5 ml L^{-1} oxygen level layer (i.e., a common threshold for hypoxic water conditions for many fish species, including several large pelagic sharks) would be the greatest in the North Pacific, moving upward by approximately 60-100 m (197-328 feet) from a historical average of about 450-600 m (1,476-1,969 feet) depth. In the North Pacific, along 160°W, a projected decrease in oxygen concentrations between 0.8 and 1.0 ml L^{-1}, the largest globally, is centered at approximately 450 m (1,476 feet) depth (Leung et al. 2019).

Warmer, less oxygenated waters can result in higher metabolic stress and fishing mortalities in bycatch species, such as several large pelagic sharks (Schlaff et al. 2014). Reduced levels of oxygen in warmer waters favor higher levels of blood lactate in sharks captured on a longline, which result in higher at-vessel mortality rates (Marshall et al. 2012; Gallagher et al. 2014a). For large pelagic sharks, entanglement in fishing gears and the associated reduction in swimming activity can interfere with their need for a constant uptake of oxygen, resulting in increased metabolic stress. In general, juvenile sharks can have lower tolerances to reduced levels of dissolved oxygen than adults (Crear et al. 2019). The increased metabolic stress due to physical, thermal, and hypoxia-related trauma can contribute to higher at-vessel and post-release mortalities in obligate ram-ventilating sharks (Bernal et al. 2012; Dapp et al. 2016). For bycatch shark species, the combined effect of warmer, less oxygenated waters, and interactions with pelagic longline gears, can lead to higher thermal and hypoxic stresses, capture and fighting related traumas, and in some cases even to eventual asphyxiation due to the inability for ram-ventilating species to receive sufficient level of oxygen while remaining on the line (Dell'Apa et al. 2023). In general, for sharks that are caught and released in pelagic longlines, their survival significantly decreases as water temperature increases, dissolved oxygen levels decrease, and soaking time increases, as these conditions favor asphyxiation and increased induced metabolic stress (Skomal and Bernal 2010; Reinhardt et al. 2018), though at different rates depending on the species (Gallagher et al. 2014b).

Significant impacts to marine mammals and sea turtles from ocean acidification may be indirectly tied to foraging opportunities resulting from ecosystem changes. Nearshore waters off California have already shown a persistent drop in pH from the global ocean mean pH of 8.1 to as low as 7.43 (Chan et al. 2017). The distribution, abundance, and migration of baleen whales reflects the distribution, abundance, and movements of dense prey patches (e.g., copepods, euphausiids or krill, amphipods, and shrimp), which have in turn been linked to oceanographic features affected by climate change (Learmonth et al. 2006). Sea turtles have temperature-dependent sex determination, and many populations already produce highly female-biased offspring sex ratios, a skew likely to increase further with global warming (Jensen et al 2018). For example, female-biased green sea turtle sex ratios have been reported for East Pacific green turtles at foraging locations in San Diego Bay, California (Allen et al. 2015). A fundamental shift in the demographics of species such as sea turtles may lead to increased instability of populations that are already at risk from several other threats. In addition to altering sex ratios, increased temperatures in sea turtle nests can result in reduced incubation times, reduced clutch size, and reduced nesting success due to exceeded thermal tolerances (Fuentes et al. 2011).

Environmental changes associated with climate change are occurring within the Action Area and are expected to continue into the future. Marine populations that are already at risk due to other threats are particularly vulnerable to the direct and indirect effects of climate change.

2.4.1. Sea turtles (North Pacific loggerhead DPS, leatherbacks, olive ridleys, and green sea turtles Eastern Pacific DPS)

As described above in the *Status of the Species* section (Section 2.2), North Pacific DPS loggerheads, leatherbacks (which originate from nesting beaches located in the WPO), olive ridleys and Eastern Pacific DPS green sea turtle (originating from eastern Pacific nesting beaches) have been and continue to be affected by numerous activities within the Proposed Action Area. The Proposed Action Area encompasses a vast portion of the Pacific Ocean, including the offshore waters of the California Current in the north Pacific and west to the EEZ off California and off Oregon (second year only for this proposed action). Because impacts on these species are similar, we look at the environmental baseline on these four species together, calling out differences among species as appropriate. Given the stranding patterns of sea turtles off California and Oregon, along with observed and reported fisheries interactions within the U.S. West Coast, we consider the action area to be important for the survival and recovery of leatherbacks, and to a lesser extent to loggerheads. The time/area closures (described below) which were put in place in 2001 for the DGN fishery (leatherbacks) and in 2003 (loggerheads) highlight the importance of the area to these two species, depending on the time of year, and, in the case of North Pacific loggerheads, the time of year and oceanographic conditions associated with their presence off southern California. Olive ridleys rarely strand in the action area, and when they do, they are generally considered out of habitat, as they are usually "cold-stunned." Olive ridleys rarely interact with fisheries. For those reasons, we do not consider the action area to be important to survival and recovery of olive ridleys.

As for green sea turtles, three resident foraging populations are known to occur in southern California nearshore waters. South San Diego Bay has been identified as an important foraging area for the East Pacific green sea turtle DPS along the U.S. West Coast, with the shallow waters providing valuable food resources such as seagrasses, mobile and sessile invertebrates, and marine algae (Lemons et al. 2011). South San Diego Bay serves as important habitat for a year-round resident population of up to about 60 juvenile and adult green turtles (Eguchi et al. 2010), with some adults leaving the area to migrate southward toward their breeding grounds in Michoacán, Mexico, and at the Revillagigedos Islands, offshore central Mexico (Seminoff et al. 2015). There is also a population of green sea turtles that are persistent in the San Gabriel River and surrounding coastal areas in the vicinity of Long Beach, Seal Beach, and Huntington Beach, California (Lawson et al. 2011; Crear et al. 2016; 2017; Hanna et al. 2020; Massey et al. 2023). Seasonal shifts in movement and distribution of green turtles in the Long Beach/Seal Beach area show that green turtles in the San Gabriel River use warm effluent from two power plants as a thermal refuge, although the river sustains juveniles and adults year-round (Crear et al. 2016). Hanna et al. (2023) have observed increased use of Seal Beach National Wildlife Refuge and adjacent shallow water habitat areas, and suggested the number of green turtles in the refuge will likely increase over time and their spatial distribution may expand. In addition, a small resident foraging population has been documented at La Jolla Shores (Hanna et al. 2021). These green turtles have been documented foraging primarily on eelgrass and algae, so unless they are migrating to and from their nesting beaches, they are found predominantly in the coastal waters, including estuaries and embayments.

Fisheries Interactions: Along the west coast of the U.S. in the CCE, the four sea turtle species considered in this Opinion are occasionally reported and/or observed interacting with fishing gear, including pot/trap gear, recreational hook and line gear, and gillnets. Also, all four species of sea turtles considered in this Opinion have been observed taken in the California DGN historically (Carretta 2024), although sea turtle interactions are now considered rare events in this fishery since the Pacific Leatherback Conservation Area was put in place in 2001 and the Pacific Loggerhead Conservation Area was put in place in 2003 (NMFS 2013). Since the 2001 time/area closure off central California and southern Oregon, two loggerheads were observed taken and released alive in the DGN fishery (one in 2001 and one in 2006[18]). In addition, two leatherbacks were observed taken and released alive in the California DGN, one in 2009 and one in 2012 (Carretta 2024). Only one olive ridley (in 1999) and one green sea turtle (in 1999) have been documented interacting with the DGN fishery in the SCB (Carretta 2024).

In the U.S. West Coast DGN fishery, NMFS authorized the incidental take, annually, of up to: 3 loggerheads (1 loggerhead anticipated to die); 2 leatherbacks (1 leatherback anticipated to die); 1 olive ridley sea turtle (anticipated to die); and 1 green sea turtle (anticipated to die) (NMFS 2023c). Additionally, NMFS authorized the incidental take of up to 1 leatherback, annually, in the sablefish pot/trap fishery included in the Pacific Coast Groundfish Fishery (PCGF), with an anticipation that this turtle would die (NMFS 2012a). It is anticipated that the estimated take of up to 1.67 leatherback sea turtles in any one year, and an estimated annual average take of up to 0.86 leatherbacks over any 5-year period) will continue to occur as a result of the proposed continued operation of the PCGF (NMFS 2024b). Incidental take of leatherbacks occurs as a result of entanglement with fishing gear as a consequence of fishing activity. This take is expected to occur in the sablefish pot/trap fishery. In the effects section for the proposed continued operation of the PCGF, NMFS estimated an average of 0.38 leatherback sea turtles per year entangled by proposed fishing, with a maximum of 1 leatherback sea turtle entangled in a single year. Therefore, the incidental take limit for leatherback sea turtles in the PCGF is a 5-year average of 0.38 leatherback sea turtle injury or mortality per year, with up to 1 leatherback sea turtle injury or mortality in a single year.

As shown in Figure 13, in over 40 years (1969 through mid-2024), only five loggerheads, 13 leatherbacks, and 39 green turtles were documented stranded with fishing gear in California. Note that this may include recreational fishing gear and does not include information reported from observer programs, including the DGN observer program.

[18] A new interaction (not included in the DEIS; NMFS 2024a) with a single loggerhead sea turtle was observed in the DGN on November 20, 2023, and recorded as "dead."

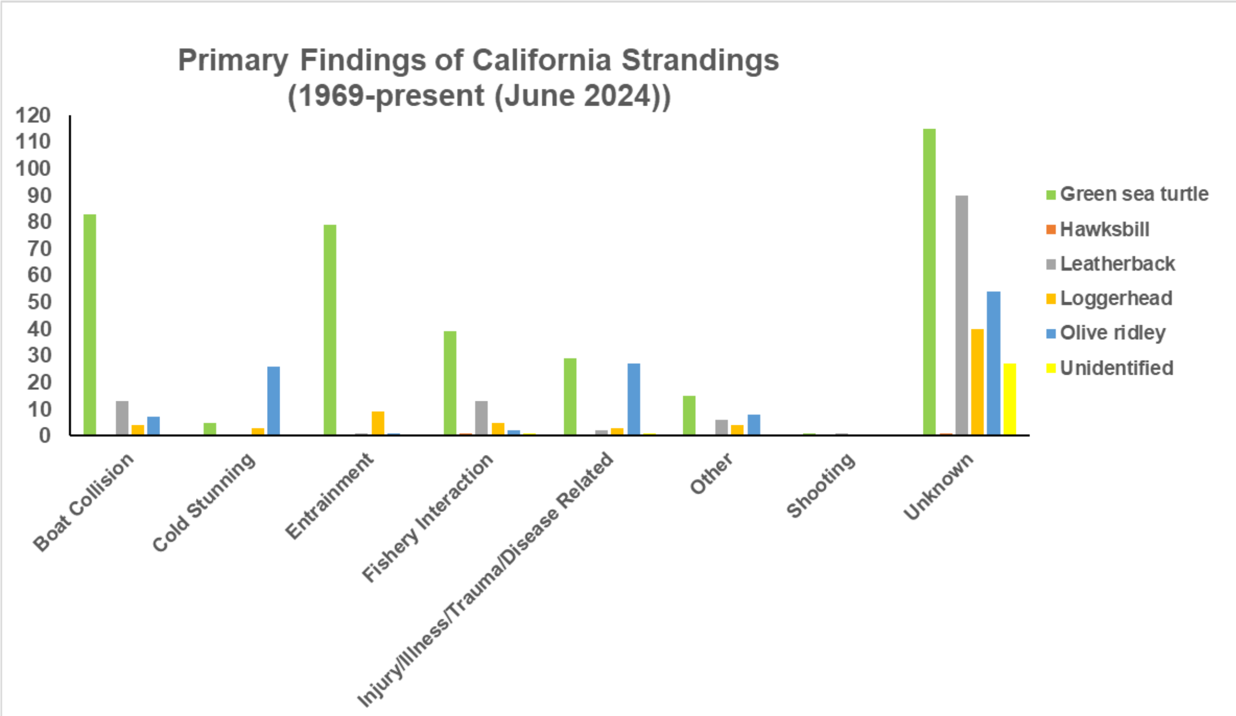

Figure 13. Known cause of sea turtle strandings in California, 1969-June, 2024 (NMFS-SWFSC, unpublished data).

In other commercial fisheries along the U.S. West Coast, sea turtle bycatch has only rarely been documented. In 2008, one leatherback was found entangled (dead) in sablefish trap gear fishing offshore California (NMFS 2012a). No leatherbacks have been observed entangled in this gear since 2008, through 2022 (data from 2002-2022; Benson et al. 2021; NMFS-WCR groundfish observer program, unpublished data). Under a 2012 biological opinion for the West Coast groundfish fishery, NMFS anticipated the maximum level of entanglements across five years to be 1.9. Over the most recent 5-year period analyzed for this fishery, Benson et al. (2021) estimated that zero leatherbacks had been caught by the fleet. One leatherback was found dead entangled in unidentified pot/trap gear in 2015 off central California, and one leatherback was found entangled in Dungeness crab pot gear and released alive in 2016 (NMFS WCR stranding database, unpublished). On November 24th, 2023 another leatherback was found dead near the Farallon Islands, CA entangled in Dungeness Crab pot gear. In 2019, a dead leatherback was found floating offshore in Ventura County entangled in lines attached to two buoys, which was subsequently identified as rock crab gear.[19] A review of the most recent stranding records (2017 through mid-2024) reveal two reports of loggerhead interactions with fishing gear, one off Oxnard in Ventura County (in 2017, unidentified netting reported) and one entangled off Warrenton, Oregon (in 2020) with unidentified netting and fishing line in its mouth (NMFS WCR unpublished stranding data).

Green turtles have been found entangled and hooked in fishing gear; but most, if not all, have been documented interacting with recreational fishing gear. Of 154 green turtles that stranded off

[19] https://media.fisheries.noaa.gov/dam-migration/wcr-nmfs_2019_entanglement_report_final-508_5-11-2020_rev.pdf

California between 2017 and June, 2024, 23 animals were found hooked (including ingested hooks) or entangled (or ingested) in fishing gear, all of it appearing to be recreational fishing gear (NMFS WCR unpublished stranding data). All were found within bays and estuaries or in the nearshore coastal areas, which further suggest that the likely interactions were with hook and line (recreational) gear. Most (n=13) were found alive, and most were able to be released either following the removal of gear, or following rehabilitation. No olive ridley turtles were found interacting with fishing gear, either commercial or recreation, during the same most recent time period (2017-June, 2024).

When considering the impact of U.S. West Coast Federal fisheries on ESA-listed species of turtles, recent biological opinions have found no jeopardy to any of these species (NMFS 2012a, 2016a, 2023c). There are two state gillnet fisheries in California that may interact with sea turtles: the set gillnet fishery targeting halibut and white seabass; and the small mesh drift gillnet fishery targeting yellowtail, barracuda, and white seabass. No sea turtle interactions have been documented historically or recently, given the limited and irregular observer coverage of those fisheries.

<u>*HMS Experimental Fisheries Permits*</u>: In 2018 and 2019, NMFS SFD consulted upon and/or issued four EFPs for HMS species recommended by the PFMC that may occur within the proposed action area. These EFPs include: DSBG issued in 2018 (NMFS 2018a); DSLBG issued in 2018 (NMFS 2018b); Longline Gear (LL), including DSLL and SSLL, issued in 2019 (NMFS 2018a); and Deep-Set Shortline (DSSL) consulted on in 2019 (NMFS 2019c). Through consultation NMFS ultimately determined that ESA-listed species, including all ESA-listed species considered in this Opinion, would not be adversely affected by three of these EFPs: DSBG, DSLBG, and DSLL. Through formal consultation, NMFS determined that the LL EFP was likely to result in the take of ESA-listed sea turtles, including North Pacific DPS loggerhead, leatherback, and olive ridley sea turtles. Specifically, over the course of two years the LL EFP was expected to result in: as many as two loggerhead sea turtle entanglements, with one mortality; as many as two leatherback sea turtle entanglements, with one mortality; and no more than one olive ridley sea turtle entanglement and mortality (NMFS 2018a). The LL EFP was issued in April, 2019, and was set to expire after two years. Two fishermen fished DSLL and SSLL for around three months in 2019 with no interactions with sea turtles (100% observer coverage). On December 20, 2019, a federal court vacated the EFP, final EA, and biological opinion as a result of litigation on the issuance of the LL EFP. In addition, SFD consulted upon and issued two EFPs for HMS in the U.S. West Coast EEZ off California and Oregon, one in 2022 (for one vessel to fish between 2022 through 2023, NMFS 2022c) and one in 2024 (for up to five vessels to fish between 2024 through 2025, NMFS 2024c), to fish with night-set buoy gear (NSBG). Similar to other consultations above, NMFS determined that ESA-listed species, including all ESA-listed species considered in this Opinion, would not be adversely affected by these two EFPs for NSBG. Apart from these two EFPs for NSBG from 2022 through 2025, no other longline fishing activity has occurred within the U.S. West Coast EEZ under the EFP since the court's ruling in 2019.

Entrainment in Power Plant: In 2006, a biological opinion was completed and analyzed the effects of sea turtle entrainment in the two federally-regulated nuclear power plants located in California, the Diablo Canyon Power Plant found in San Luis Obispo County and the San Onofre Nuclear Generating Station found near San Clemente California (NMFS 2006b). While historically loggerheads, leatherbacks and olive ridleys were observed entrained in the power plants in very low numbers, since 2006, there have been only ten reported entrainments: two in the San Onofre Nuclear Generating Station; one olive ridley (alive) in 2009, and one loggerhead (alive) in 2010; and seven green sea turtle (all alive – most recently in 2023) and one loggerhead (alive) in 2024 at Diablo Canyon Power Plant (NMFS 2025b). In addition, the San Onofre station began de-commissioning in 2014, although some cooling water is still drawn in to cool the reactors (D. Lawson, NMFS personal communication 2015). The incidental take statement covering both power plants estimates up to 6 loggerheads taken, 6 leatherbacks taken, and 6 olive ridleys taken (with two serious injuries each and two mortalities each for all three species) over a one-year period. (NMFS 2006b). As mentioned above, based on monitoring reports received from the two nuclear power plants, three incidents of entrainment (all released alive and uninjured) have been reported since the consultation was completed.

There are other coastal power plants in California (non-nuclear and state-managed) where sea turtle entrainment has occurred (typically green sea turtles). Although these facilities have all been required to install large organism excluder devices by the State of California (California State Water Resources Control Board (CASWRB) 2010), occasional instances of green turtle entrainments (typically alive) continue to be reported. As shown in Figure 13, only nine loggerheads were entrained in power plants over the last 40 years (1969 through mid-2024), and a review of the records from 2017-June, 2024 showed two reports of entrained loggerheads; one in Ventura County in 2023, and one in San Luis Obispo County in 2024. During that same time period (1969 through mid-2024), 79 green turtles were entrained (most released alive). Since then, only five green turtles have been entrained in power plants, all released alive (2017-June, 2024); NMFS-WCR unpublished stranding records). Over that same earlier time period, no leatherbacks or olive ridleys have been entrained in power plants based on stranding data from 2017-2024 (NMFS-WCR unpublished stranding data).

Scientific Research: NMFS issues scientific research permits to allow research actions that involve take of sea turtles within the CCE. Currently, there are 2 active permits that allow directed research on sea turtles, typically involving either targeted capture or sampling of individuals that may have stranded or incidentally taken in some other manner. These permits allow a suite of activities that include tagging, tracking, and collection of biological data and samples. These activities are intended to be non-injurious, with only minimal short-term effects. But the risks of a sea turtle incurring an injury or mortality cannot be discounted as a result of directed research. Prior to completing a section 7 ESA consultation on the Southwest Fisheries Science Center's programmatic research program, one leatherback was found during a scientific trawl net survey in 2011 and was released alive (NMFS 2015). The most recent biological opinion analyzed the effects of proposed SWFSC research surveys and estimated that one ESA-listed sea turtle found within the action area (any species of leatherback, North Pacific loggerhead, olive ridley and East Pacific green turtle) may be captured in CCE trawl surveys and one ESA-listed sea turtle may be captured/entangled in longline surveys, with both released alive (NMFS 2020b). The section 7 ESA consultation on the Northwest Fisheries Science Center's programmatic research program was completed in 2023 and estimated one loggerhead taken annually, one leatherback taken annually, one olive ridley taken annually, and one green sea turtle taken annually (no mortalities; NMFS 2024d).

Vessel Collision: Vessel collisions are occasionally a source of injury and mortality to sea turtles along the U.S. West Coast, and particularly in California. A review of the strandings database for the U.S. West Coast maintained by NMFS indicates that green sea turtles and leatherbacks are reported most often as stranded due to the impact by vessels strikes (Figure 13, although only approximately 15 leatherbacks were reportedly struck by vessels between 1969 and mid-2024 (around 1 every 3 years), and many of these collisions occur off Central California, when they are foraging in or near the approach to the ports of San Francisco and Oakland, and southern California. A review of the stranding records from 2017-June, 2024 indicated no reported vessel strikes on leatherback off California and Oregon. As shown in Figure 13, four loggerheads were reportedly struck by a vessel in the last 40 years (1969-mid 2024), although a review of the records from 2017-June, 2024 revealed that two loggerheads were reportedly struck by vessels off Los Angeles (Long Beach) and San Diego County (Pacific Beach; NMFS WCR unpublished stranding data). During the same period (2017-June, 2024) four olive ridleys were reported struck by vessels (NMFS-WCR unpublished starnding data).

In southern California (and including the state of California), green turtles are by far the most frequent species of sea turtles struck by vessels (including jet skis, small power boats, etc.). As shown in Figure 13, from 1969 through mid-2024, 83 green turtles were suspected to be struck by vessels, with most resulting in mortality. In a review of the stranding records from 2017-June, 2024, of 116 reported strandings of green turtles in California and Oregon, 49 green turtles were reported (suspected) struck by vessels in California and Oregon, with almost all of them dead (42 animals; NMFS WCR unpublished stranding data). Most were in moderate to advanced decomposition, which often makes it difficult to determine a cause of death, although a cracked carapace or deep lacerations are usually a good indicator of blunt force trauma with a vessel's hull or propeller.

The United States Coast Guard (USCG or Coast Guard) is responsible for safe waterways under the Port and Waterways Safety Act (PWSA) and establishes shipping lanes and traffic separation schemes (TSSs). In February 2017, NMFS completed section 7 consultation on the USCG's codification of the shipping lanes that vessels use to approach the ports of Los Angeles/Long Beach and San Francisco. Following formal consultation under ESA section 7, NMFS concluded that the proposed TSS lanes were not likely to adversely affect or jeopardize ESA-listed sea turtles, including green, North Pacific DPS loggerhead, olive ridley, and leatherback sea turtles. On December 7, 2022 the United States District Court issued an order in *Center for Biological Diversity, et al. v. NOAA Fisheries, et al.,* Case No. 4:21-cv-00345-KAW (N.D. Cal.), vacating the biological opinion. On June 5, 2023, the Coast Guard announced the availability of the study results of the Pacific Coast Port Access Route Study (88 FR 36607). This study evaluated safe access routes for the movement of vessel traffic proceeding to or from ports or places along the western seaboard of the United States. As a result of this study, the Coast Guard recommended establishing a number of voluntary vessel traffic fairways, including a coastwide fairway that follows existing vessel traffic patterns and connects with existing TSSs (Strait of Juan de Fuca, San Francisco, Santa Barbara, and Los Angeles – Long Beach) and key ports. This study also recommends a number of fairways in specific areas, including a Point Mugu Fairway to direct traffic from LA/LB around the Channel Islands National Marine Sanctuary and to make accommodations for Department of Defense training and testing ranges (88 FR 36607). If these fairways are implemented by the Coast Guard in the future, there could be some impact on vessel traffic patterns in the action area, although to what extent is uncertain at this time.

<u>*El Niño/ Changing Climate*</u>: El Niño events occur with irregularity off the U.S. West Coast and are associated with anomalously warm water incursions. Sea turtles may be affected by El Niño events through a change in distribution or abundance of their preferred prey, which may result in a change in sea turtle distribution or behavior. These warm water events often bring more tropical marine species into normally temperate waters and therefore may affect the local ecosystem and normal predator-prey relationships. For largely pelagic species that are wide ranging such as olive ridleys and Pacific leatherbacks, such events may not affect them in the waters off the U.S. West Coast. Conversely, North Pacific loggerheads have been encountered off the U.S. West Coast in large numbers during an El Niño. Loggerhead presence in the SCB was first documented in the California DGN fishery during the 1990s, when they were taken by the fishery during years associated with El Niño events (1992-93 and 1997-98). Anomalously warm waters bring pelagic red crabs, a preferred prey item of loggerheads and may have brought loggerheads into the area, although they have also been documented associating with pyrosomes during the 2014 incursion of warm water into the waters off California.

We considered the effect of climate change on sea turtles foraging in the action area and/or migrating to and from their nesting beaches or other areas of the Pacific Ocean. While climate change effects have been documented extensively on sea turtle nesting beaches, there is less information available on the effects of climate change on sea turtles specifically within the action area. Generally, we suspect that some sea turtle species may shift their distribution north as sea surface temperatures increase, which could bring them into more contact with human activities that occur off the U.S. West Coast. The recent research described in Section 2.2.1.1 above suggests that the presence of loggerhead sea turtles should be expected to increase if warmer sea surface temperatures in the SCB occur and persist in the future (Eguchi et al. 2018; Welch et al. 2019). Similarly, it is expected that leatherback sea turtles would shift their distribution poleward and offshore within the U.S. West Coast by the end of 2100 due to an increase in projected suitable habitat (57% gain in core habitat area) across the California Current System (Lezama-Ochoa et al. 2024). Similar distribution shifts (poleward and offshore) and increase in suitable habitat (52% gain in core habit area) by 2100 have also been projected for the target species (i.e., swordfish) of the longline-type fishing for the Proposed EFP, resulting in an expected 5% increase in niche overlap between swordfish and leatherback within the California Current System by the end of this century (Lezama-Ochoa et al. 2024), which in the long-term (more than 50-60 years from now) could result in higher probability of leatherback interactions with future fishing activities targeting swordfish in the U.S. West Coast. However, over the limited anticipated duration of the Proposed Action over the next ten years, it will be difficult to detect or distinguish if these shifts associated with climate change are happening in context with the highly dynamic and variable marine environment off the U.S. West Coast. As described throughout Section 2.2 *Rangewide Status of the Species*, analyses of the potential effects of climate change on the distributions of ESA-listed species and exposure to threats that are resulting from or exacerbated by climate change are almost exclusively examining time horizons of ~50-100 years with regard to illustrating how these dynamics could play out in a clear and measurable way.

<u>Other Threats</u>: Strandings of sea turtles along the U.S. West Coast reflect in part the nature of interactions between sea turtles and human activities, as many strandings are associated with human causes. Sea turtles have been documented stranded off California (and Oregon and Washington, though in less frequent numbers) through their encounters with marine debris, either through ingesting debris or becoming entangled in the debris. Concentrations of plastic debris have been documented widely in the last decade, with the North Pacific Ocean showing similar patterns in other oceans, with plastics concentrating in the convergence zone of all five of the large subtropical gyres. Since the 1970s, the production of plastic has increased five-fold, with around 50% of it buoyant (summarized in Cozar et al. 2014). Studies documenting marine debris ingestion by sea turtles indicate impaired digestive capability, "floating syndrome," or reduced ability to swim, in addition to death (Casale et al. 2016). In addition, studies of marine debris ingestion in green turtles (Santos et al. 2015) and loggerheads (Casale et al. 2016) indicated that the potential for death is likely underestimated, as is the magnitude of the threat worldwide, particularly for highly migratory species. A study by Harris et al. (2011) assessed the health of leatherbacks foraging off California and measured hematologic and plasma chemistry values. When these values were compared to nesting female leatherbacks in French Guiana and St. Croix, the foraging turtles were found to have elevated levels of Cadmium. However, the authors noted that biomagnification of trace elements via trophic transfer might be limited in this species due to their preference for cnidarian zooplankton. The authors note that hard-shelled turtles such as loggerheads, which have a more varied diet such as crustaceans and bivalves, have shown high levels of polychlorinated biphenyls (PCBs) and dichlorodiphenyldichloroethene (DDE), when compared to more herbivorous consumers, such as green turtles. Domoic acid, which is a potent marine algal toxin that has been shown to cause neurologic disease in marine mammals and sea turtles, was found in a stranded dead leatherback in 2008 (Harris et al. 2011).

Additionally, the Central Valley of California is the largest and densest agricultural aggregation in the world with many water sources that connect to the ocean (i.e. the San Francisco Bay and Elkhorn Slough). Some of the pesticides used by agricultural activities are known endocrine disruptors and, when washed into marine waters, interact with organisms in the surface waters, which can affect reproductive output in leatherbacks (Kavlock et al. 1996, Barraza et al. 2021). Leatherbacks foraging off the California coast are exposed to heavy metals due in part to terrestrial runoff. In addition to carrying a variety of contaminants, runoff introduces nutrients to coastal waters, which can cause eutrophication of nearshore waters. This can result in harmful algal blooms (HABs), depletion of oxygen in the water column, acidification of waters, and alteration of marine ecosystems from the bottom-up because of an increase in primary productivity. Domoic acid, which is a potent marine algal toxin that occurs during HABs, was found in a stranded dead leatherback in 2008 (Harris et al. 2011).

The potential effects to ESA-listed sea turtles from oil spills and other activities associated with oil and gas development off southern California have been evaluated in previous consultations with BOEM BSEE, including most recently in 2024 (NMFS 2024e). Previously, NMFS had concluded these activities were not likely to adversely affect ESA-listed sea turtles. However, in the most recent consultation with BOEM/BSEE on oil and gas development in southern California, NMFS concluded that offshore oil and gas reserves development and production will adversely affect sea turtles off the U.S. West Coast, specifically off of California (NMFS 2024e). These adverse effects include up to one vessel collision with an East Pacific DPS green turtle every 10 years, and exposure of a relatively small number of East Pacific DPS green turtles (and their proposed critical habitat) to an oil spill (NMFS 2024e).

Energy exploration has been pushed more in recent years, especially offshore wind. However, the development and maintenance of offshore energy introduces loud sounds to the marine environment but the effects to marine life is poorly understood. The role of hearing in leatherbacks and sea turtles in general is also poorly understood but is likely to aid in navigation, locating prey, avoiding predators, and for general environmental awareness (Piniak et al. 2016). Studies suggest leatherbacks and other sea turtles are likely most sensitive to low frequency sounds (Piniak et al. 2016). In addition to the sounds of pile driving during the development of offshore wind farms, the operation of wind turbines also generates sound that can affect leatherbacks and other marine life. This sound is low-intensity and usually below 1 kHz (Lindell 2003, Madsen et al. 2006, Tougaard et al. 2009, Pangerc et al. 2016, Yang et al. 2018) but it falls within the range of hearing for sea turtles (Southwood et al. 2008). Although there have not been extensive studies on how offshore wind farm noise affects sea turtles, the overlap in the sound generated by turbines and the frequency at which turtles hear may suggest turtle behavior may be altered.

Other documented threats to sea turtles found off the U.S. West Coast include illness, gunshot wounds, and unknown illnesses (usually cold-stunning, particularly for olive ridleys). Because not all dead stranded sea turtles are necropsied, the stranding database does not provide full documentation of the source of many threats to sea turtles, and the causes of a majority of strandings are unknown. This is especially true for leatherbacks, since they are often difficult to access and transport to a laboratory, given their size and rate of decomposition (Harris et al. 2011).

Figures 14 and 15 show the historical data on sea turtle strandings off the U.S. West Coast (CA, OR, and WA) since 1969, including information on trends, species, and area along the coast. There are fewer strandings of sea turtles in the Pacific Northwest (Figure 15), although they do occur and are documented. A review of the most recent stranding information (2017-June, 2024) for leatherbacks revealed six stranded turtles (two fishery-related strandings, described above). One juvenile leatherback stranded dead in Orange County, California in 2017 with evidence of trauma, but this may have been post-mortem. In 2020, a leatherback was found in San Francisco Bay, but cause of death could not be determined as the animal was never recovered. Similarly, a leatherback was found dead on a beach in Monterey County in 2022, but the cause of death could not be determined due to the advanced state of decomposition of the carcass. Finally, in 2021 an adult leatherback stranded dead in Douglas County, Oregon with unknown cause of death, but the animal had markings indicative of a predation event and also had puncture wounds and pieces of plastic in stomach/intestines (NMFS WCR unpublished stranding data).

A review of the most recent stranding information (2017-June, 2024) for loggerheads, revealed 28 strandings off California and Oregon. All but one were identified as juveniles (five were unknown age class but likely all juveniles). Eleven loggerheads stranded in Oregon during the winter months (January throughMarch) over this eight-year period, mostly cold-stunned, although two showed signs of trauma/predation. One loggerhead stranded in northern California in February, so was likely also cold-stunned. One loggerhead stranded in Oregon and another in the SCB with signs of fishery interactions (described above), while two loggerheads stranded in southern California with signs of a vessel strike (described above). One loggerhead stranded with a string around its neck, was disentangled and released alive. Lastly, three loggerhead turtles stranded in San Diego County where cause of death could not be determined (NMFS WCR unpublished stranding data).

Strandings of olive ridleys increased in northern California and the Pacific Northwest since late 2014 (NMFS WCR stranding data, unpublished), with most of them cold-stunned (n=20 from 2017-June, 2024), likely following the warm water incursion associated with a strong El Niño, which occurred during that time period through the fall of 2016.

Many green turtles have been reported stranded off California and Oregon where the cause of injury/death cannot be determined, especially when some are found with moderate to advanced decomposition. From 2017-June, 2024, 80 green sea turtles stranded alive, injured and/or dead off California and Oregon, with the cause of death undetermined. In most cases, NMFS experts could not determine whether human interaction played a factor in the stranding, either because of the lack of details or the moderate to advanced decomposition of the animal. From 2010-2023, a total of 74 green sea turtle strandings (64 dead and 10 alive) from the San Diego Bay area were reported to NMFS (NMFS unpublished data). Most of these strandings are of unknown origin, although boat collisions and interactions with recreational fishermen are likely the cause of many of these strandings. In the past, boat collisions and propeller injuries have caused up to 80% of turtle deaths reported in San Diego Bay and Mission Bay, combined (McDonald and Dutton 1992).

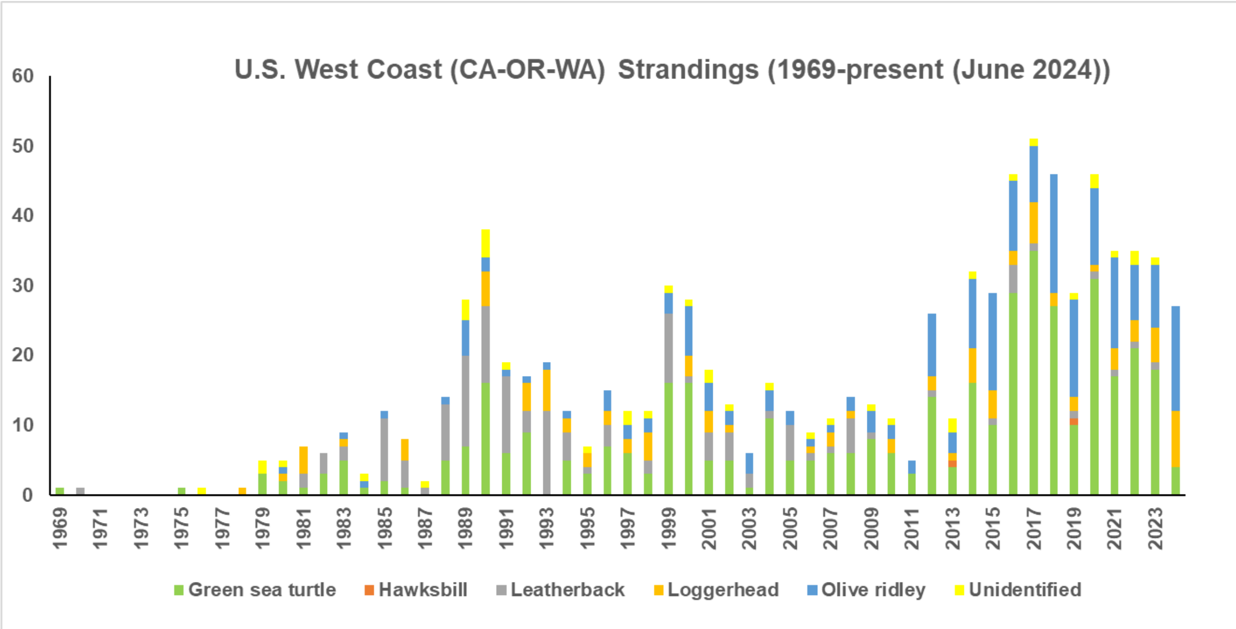

Figure 14. U.S. West Coast (CA, OR, and WA) Sea Turtle Strandings, 1969 through mid-2024 (NMFS-SFWSC, unpublished data).

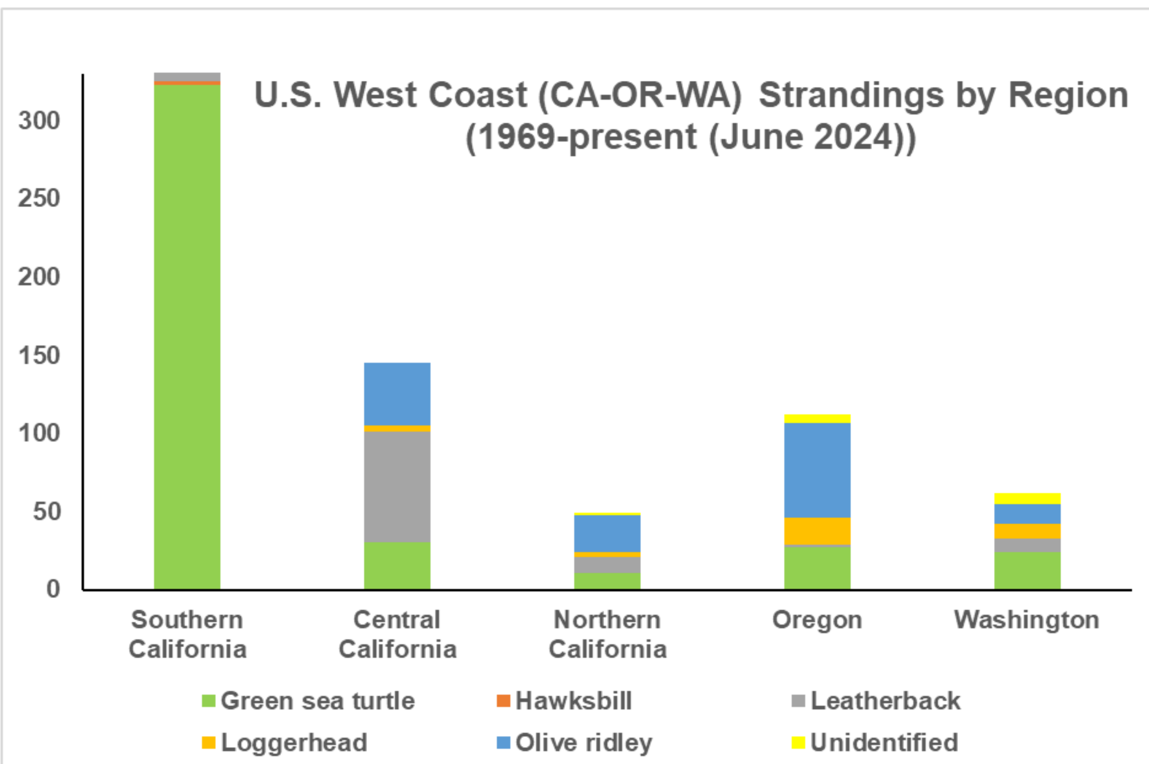

Figure 15. U.S. West Coast (CA, OR, and WA) Sea Turtle Strandings by region and species, 1969 through mid-2024 (NMFS-SWFSC, unpublished data).

2.4.2. Guadalupe fur seals

Up until the mid-2000s, fewer than 10 Guadalupe fur seals stranded along the U.S. West Coast. In 2007 through 2009, an unusual mortality event (UME) was declared for the species in the Pacific Northwest due to elevated strandings. Subsequently, a new UME was defined as occurring between January 1, 2015, to September 2, 2021, with a total of 715 Guadalupe fur seals strandings in California, Oregon, and Washington during this period. All stranded seals, most of which were young post-weaning (around 1 year old), were malnourished or emaciated, and many had verminous and/or bacterial pneumonia, inflammation caused by parasites and/or bacteria, and a few animals had seizures due to domoic acid toxicity or hypoglycemia (Norris et al. 2017). Given the emergence of a warm water anomaly that persisted across the Northeast Pacific Ocean, with severe marine heatwaves occurring in the California Current region in the spring of 2014 and 2019-2020, and the strong 2015/2016 El Niño event that developed in the tropical Pacific, Guadalupe fur seals may have experienced a shortage of their favored prey species, squid. According to scientists, and based on available data, the most likely cause of these UMEs was attributed to malnutrition in Guadalupe fur seal pups and yearlings due to ocean warming in the Northeast Pacific that resulted in reduced or changed prey availability, which most likely impacted the weaned pups' ability to feed (https://www.fisheries.noaa.gov/national/marine-life-distress/unusual-mortality-event-2015-2021-guadalupe-fur-seal-and-2015).

Fisheries Interactions: Drift and set gillnet fisheries may cause incidental mortality of Guadalupe fur seals in Mexico and the United States. From the WCR observer program, there have been no reports of incidental mortalities or injuries of Guadalupe fur seals in commercial fisheries, based on data from 1990-2014 (Carretta et al. 2017a). However, a new interaction with a single Guadalupe fur seal was observed in the DGN on January 25, 2023, and recorded as "dead" (Carretta 2024). This was the first Guadalupe fur seal observed interaction with the DGN fishery. Juvenile female Guadalupe fur seals have stranded in central and northern California with net abrasions around the neck, fish hooks and monofilament line, and polyfilament string (Hanni et al. 1997). During the most recent five-year period (2017-2021), stranding data included several cases of entanglements in gillnet, longline (Hawaii-based SSLL source) or a net fishery of unknown origin, most of which resulted in serious injury/mortality (31 of 42 cases) (Carretta et al. 2023b). During the 2015 UME off California, 2 of 98 stranded animals (2%) were found entangled in fishing gear in 2015, and 9 of 26 animals were found entangled in 2016 (Norris et al. 2017). No information is available for human-caused mortalities or injuries in Mexico that may be eventually sighted and reported off the U.S. West Coast; however, similar drift gillnet fisheries for swordfish and sharks exist along the entire Pacific coast of Baja California, Mexico, and may take animals from the population.

El Niño/Changing Climate: Guadalupe fur seal abundance off the U.S. West Coast may be influenced by El Niño as they may move northward following warmer conditions created by El Niño (Rick et al. 2009). In 1997 there were reports of 14 Guadalupe fur seals, including 11 juveniles along Central and Northern California (Etnier 2002). In addition, a single pup was born on San Miguel Island during the 1997 El Niño year (Rick et al. 2009). This northward movement of Guadalupe fur seals may be attributed to the 1997 El Niño (Etnier 2002). El Niño may also affect prey availability for Guadalupe fur seals through their response to the warm water and depression of the thermocline, which reduces the supply of phytoplankton production, zooplankton, producing mass mortalities of fish and thus otariids. Warm waters may also push the prey further away from the Guadalupe fur seal's foraging distribution, particularly for young juveniles. While species such as California sea lions are able to exploit the deeper water column, Guadalupe fur seals disperse over an extended horizontal layer, usually no deeper than 50 meters (Aurioles-Gamboa and Camacho-Rios 2007). Similarly, climate change may affect the distribution of Guadalupe fur seals, bringing them into a more northern range, potentially recolonizing parts of the Channel Islands. Over time, their northward shift may expose Guadalupe fur seals to the threat of capture in U.S. fisheries, entrainment in state and federal power plants, shootings, etc.

Other Threats: In addition to fisheries interactions mentioned above, NMFS has documented (2017-2021) serious injury and/or mortality of Guadalupe fur seals due to marine debris (including discarded fishing gear (hooks/line; twine), balloon ribbon/string, plastic/styrofoam in the stomach/esophagus), blunt force trauma, shootings, and other unidentified human interactions (Carretta et al. 2023b). Also, as summarized above, Guadalupe fur seals are susceptible to domoic acid toxicity, bacterial pneumonia and other associated impacts from emaciation/malnourishment (Norris et al. 2017). Military activities in southern California could affect Guadalupe fur seals through behavioral and physiological impacts from mid-frequency active sonar, underwater detonations, missile launches, and sonic booms felt on the Channel Islands following a rocket launch. Such activities may include: (1) the U.S. Navy's major training exercises conducted off southern California (and whose training area includes areas south of the California/Mexico border and near Guadalupe Island); (2) the U.S. Air Force's rocket launches off Vandenberg Air Force Base, Lompoc, California; and (3) the U.S. Navy's missile launches off San Nicolas Island. Scientific research is conducted on Guadalupe fur seals, primarily animals on San Miguel Island, including capture and tagging of pups, juveniles and adult females. There have been no documented injuries or deaths associated with such research. Lastly, with oil production occurring off southern California and within the range of Guadalupe fur seals, the potential for an oil spill exists which may threaten individual Guadalupe fur seals, depending on the extent of the spill. However, in the most recent consultation with BOEM/BSEE on oil and gas development in southern California, NMFS concluded that offshore oil and gas reserves development and production will NLAA Guadalupe fur seal off the U.S. West Coast; specifically off of California (NMFS 2024e).

2.4.3. Giant manta ray

Little is known regarding threats to the giant manta ray within the action area other than what has been documented in the California DGN, where the species is occasionally observed as bycatch (Miller and Klimovich 2017), though in low numbers and primarily during El Niño events. From 1990-2006, only 14 giant manta rays were observed caught, with 36% released alive. The estimated (extrapolated) catch for that period was 90 individuals (95% CI: 26-182; CV=0.48) (Larese and Coan 2008). Since 2010, no giant manta rays have been observed in this fishery

(Pacific Fisheries Information Network public data: https://reports.psmfc.org/pacfin and additional data available from: NOAA Fisheries West Coast Drift Gillnet Fishery Catch Summaries). While purse seine fishing has posed a threat to giant manta rays in the eastern tropical Pacific Ocean, we have no records of this species being taken in our coastal pelagic species purse seine fishery. In the U.S. West Coast DGN fishery, NMFS authorized the incidental take, annually, of up to one giant manta ray, with this individual anticipated to be killed (NMFS 2023c).

Although giant manta rays are rarely found off the U.S. West Coast, and there have been no identified individuals or subpopulations within the EEZ, any manta ray foraging off the coast could be impacted by plastics ingestion or entanglement in marine debris. Climate change and ocean acidification could affect the distribution and abundance of zooplankton, which giant manta rays depend on, so individuals may have to travel further distances to find their preferred prey.

2.4.4. Oceanic whitetip shark

The action area is located within the EPO, where the oceanic whitetip shark is caught on a variety of gear outside of the U.S. West Coast EEZ, including longline and purse seine gear targeting tunas and swordfish (see the species *Population Status and Trends*, Section 2.2.3.2). While the range of the oceanic whitetip shark in the EPO has been described as extending as far north as southern California waters (Compagno 1984), based on the available data, the distribution of the species appears to be concentrated in areas farther south, and in more tropical waters. Observer data from the West-Coast based U.S. fisheries further confirms this finding, with oceanic whitetip sharks not observed in the catches over several decades. No interactions have been noted with oceanic whitetip sharks in any West Coast Highly Migratory Species fishery to date (C. Villafana and C. Fahy pers. comm. to J. Rudolph; March 7, 2019, as cited in NMFS 2023e). When considering observer data (for the years 2004 through 2019) from the Hawaii-based longline fishery east of 140°W, which is the fishery in the EPO region with a species assemblage and thermal environment more similar to the action area than the WCPO, catch data indicate that a total of 4 oceanic whitetip shark (3 released alive, and 1 dead) were caught by the Hawaiian SSLL fishery between 2004 and 2019 (see Appendix 3 in the FEIS; NMFS 2025a). Also, in the California/Oregon DGN fishery, which targets swordfish and common thresher sharks and operates off the U.S. Pacific coast, observers recorded zero oceanic whitetip sharks in sets conducted over the past 30 years (from 1990-2021[20]) (NMFS 2023c).

Although oceanic whitetip sharks are not frequently found off the U.S. West Coast, climate change and ocean acidification could affect the distribution of this species as a result of changes in thermal conditions, also impacting oxygen levels mainly in the upper ocean layer where the

[20] https://www.fisheries.noaa.gov/west-coast/fisheries-observers/west-coast-region-observer-program#data-summaries-and-reports

species is more commonly found, and/or abundance of the prey they depend upon, thus resulting in individuals inhabiting deeper waters or traveling further distances to find their preferred preys.

2.5. Effects of the Action

Under the ESA, “effects of the action” are all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action but that are not part of the action (see 50 CFR 402.02). A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action

As described in the *Background* (Section 1.1), longlining is currently prohibited off the U.S. West Coast EEZ. Therefore, as described in detail in the Analytical Approach (Section 2.1), information regarding the timing, occurrence and location (given oceanographic and other environmental factors) of Pacific leatherbacks, North Pacific loggerheads, olive ridleys, East Pacific green sea turtles DPS, Guadalupe fur seals, giant manta rays, and oceanic whitetip sharks is derived from bycatch in other west coast-based fisheries (primarily, and in a hierarchical sense, the Hawaii-based SSLL and DSLL fisheries data east of 140˚W, the California DGN fishery, and the West Coast DSLL fishery, and secondarily the data collected by EFP fishing trials in the action area during a 3-month period in 2019), sightings from aerial and ship-board surveys, satellite telemetry studies, and, to a lesser extent, strandings. While strandings are a helpful indicator of sea turtle presence, because the action takes place outside of 30 nm from the mainline shore and islands and mostly outside of the SCB, they are less important in analyzing impacts to these sea turtle species, although the seasonality and location data are useful as are the determined causes of strandings (i.e., threats).

There are other potential impacts that could occur as a result of the Proposed Action, such as vessel collisions or impacts related to any pollution or marine debris generated by this action. Pelagic longline fisheries may generate different amounts of marine debris in the form of gear loss of various types (e.g., lines, clips, buoys, gangions, hooks) and material (e.g., stainless steel, polyethylene, polypropylene, polyamides). Because pelagic longline fisheries are not currently allowed in the U.S. West Coast EEZ, there is no baseline data that could be used to determine the potential impacts of gear loss from longline-type fishing gears in the Proposed Action Area. However, available information in the Western Pacific region about gear loss rates and estimates of gear items lost per year in the Hawaii and American Samoa pelagic longline fisheries indicates that these fisheries, combined, resulted in a mainline loss rate of 0.141 miles/1 million hooks set (±95% CI: 0, 0.284%). When considering the total amount of observer coverage over the 10-year period from 2011 through 2020, an estimated 250 (±95% CI: 5, 496) floats, and 5,714 (±95% CI: 916,10,512) hooks and branchlines are lost each year, as well as 8.46 (±95% CI: 0, 17) miles of monofilament mainline (NMFS 2024f). It is also conceivable that impacts to prey might affect ESA-listed species, or that avoidance of pelagic longline-type gear could lead to increased energetic expenditure or temporary exclusion from important foraging resources.

At this time, the available information does not suggest that any of these additional factors are likely to affect ESA-listed species as a result of the Proposed Action. Previously, NMFS has consulted on numerous fishery actions that have involved effort, gear, and/or target species that are similar or related to what is expected to occur under the Proposed Action, including both within the U.S. West Coast EEZ (e.g., NMFS 2016a, 2018a, 2018b, 2019d, 2023c, and 2024c) and other places such as U.S. and international waters surrounding Hawaii (e.g., NMFS 2014, 2019b, 2019c, 2022b, 2023b). Generally speaking, these activities involve relatively slow-moving vessels, especially during harvest operations, and gear that is spread out across large areas that is not known or suspected by NMFS to cause disturbances or other disruptive impacts beyond the risks associated with bycatch. While there is some risk of gear loss, the maximum amount of gear that may be associated with the Proposed Action is less than 1 million hooks set per year. Using information from other pelagic longline fisheries in the Pacific, this would suggest that less than 0.14 miles of gear might be lost per year from this Proposed Action. During the previous consultations mentioned, NMFS has not identified any likely scenarios where these potential pathways were expected to lead to adverse effects for similar types of activities as the Proposed Action, given the limited extent of risks. Therefore, given the similarities in activities and available information surrounding the potential effects, we infer that these factors will not affect ESA-listed species as a result of the Proposed Action. As a result, the effects analysis will concentrate on the impact of bycatch of ESA-listed species under the Proposed Action.

Because North Pacific loggerheads and leatherbacks both originate from Western Pacific nesting beaches, migrate east and through the central north Pacific Ocean, to forage off the U.S. west coast, we used the approach described in the FEIS and section 2.1 (Analytical Approach) of this Opinion (NMFS 2025a) to assess the likelihood of these two species interacting with longline-type gear used off the U.S. West Coast. Since both shallow-set and deep-set fishing gear are proposed, we looked at both components of the Hawaii-based longline fishery east of 140ºW latitude, and data from the California DGN fishery, as a proxy dataset to assess probable seasonality, area, and potential risk to leatherbacks, and loggerheads of each type of gear that may be deployed within the U.S. West Coast EEZ. For olive ridleys and green sea turtles likely originating from Eastern Pacific nesting beaches, we considered for our analysis the same dataset described above, although we acknowledge it could be different populations that interact with the Hawaii-based longline fishery. The same dataset as above was also used as a proxy to assess the probability for encounter and potential risk to the other ESA-listed species (i.e., Guadalupe fur seals, giant manta rays, and oceanic whitetip sharks). Additionally, due to data confidentiality issues that arise when less than three vessels participate in a given fishery, available data from the U.S. West Coast DSLL included catch for 2019-2020 with limited information. Using these data provides us with information on both the seasonality and location of sets over a combined nineteen-year period (2001-2020 for the California DGN fishery, and 2004-2019 for the Hawaii-based longline fishery east of 140ºW), as well as information on species bycatch and condition.

Guadalupe fur seals are found primarily south of the U.S.-Mexico border, where their main rookery is located (Guadalupe Island). Some animals travel north into U.S. waters and may be beginning to expand their range to areas they historically occupied, such as the northern Channel Islands. Because of the limited documented interactions of Guadalupe fur seals in U.S. fisheries beyond the 2023 interaction in the California DGN fishery (other than reported in stranded animals, with unidentified fishing gear), including 0 (zero) catches from the California DGN fishery over the period analyzed as the proxy dataset, we used the most recent interaction data from the Hawaii-based longline fishery east of 140ºW longitude and information gleaned from the most recent unusual mortality event off California (e.g., satellite tracking data from post-released stranded Guadalupe seals) to understand the risk of the proposed action to this species.

Giant manta rays and oceanic whitetip sharks are both found primarily offshore in more tropical and subtropical waters. Although giant manta rays have also been documented as far north as southern California, they are occasionally observed as bycatch in the California DGN fishery. For oceanic whitetip sharks, they are mainly epipelagic (found primarily in waters above approximately 100 m) with a preference for warmer waters, also showing a preference for deeper waters during the summer to avoid prolonged exposure to water warmer than approximately 28°C (Andrzejaczek et al. 2018). For both species we used the most recent interaction data from the Hawaii-based longline fishery east of 140ºW, and for giant manta ray also information taken from the California DGN fishery, to assess the risk of the Proposed Action to these species.

We acknowledge that there is considerable uncertainty about how the use of the proxy dataset applies to longline-type effort within the U.S. West Coast EEZ. Also, we recognize that there is potential for the risks of shallow-set and deep-set longline-type gears within the U.S. West Coast EEZ to be different from outside the EEZ, for numerous reasons including differential habitat usage and abundance/density of ESA-listed species in the Action Area as compared to the areas where the Hawaii longline fisheries operate. However, general information about the ecology of these species makes use of the proxy data reasonable to inform our expectations, in the absence of more specific data from the Action Area about the likely interaction rates with longline-type gear, as well as a lack of any density estimates or other data that could be used to quantitatively evaluate what the relative exposures may be across large areas of the North Pacific Ocean in comparison to other areas where longline fisheries occur. As already discussed, the proxy data from the Hawaii longline fisheries originates from an area immediately adjacent to the Action Area (outside the U.S. West Coast EEZ east of 140ºW), and additional proxy data from fisheries targeting highly migratory species inside the EEZ were used to inform our assessment of impacts. Generally speaking, the migratory routes and life history of the ESA-listed species considered in this Biological Opinion, including leatherbacks and loggerhead sea turtles, involve transits across a wide area within the North Pacific Ocean Basin, including movements back and forth from breeding areas to foraging or juvenile rearing areas. As indicated in the proxy datasets, individuals that will be present in the Action Area inevitably must have passed through the areas (generally) where the Hawaii longline and other West Coast HMS fisheries operate. In the offshore waters within the U.S. EEZ where most, if not all, of the Proposed Action will operate, these individuals likely share similar behaviors in these environments to their behaviors in the offshore environment, including likely vulnerability to being co-located with longline-type gear. While a precise understanding of the environmental drivers and influences on the migratory paths of these species across and throughout the entire North Pacific Ocean has not been well established, generally speaking, the oceanographic and biological features that might be most influential to the presence and abundance of ESA-listed species in offshore area are highly dynamic and ephemeral across most of the North Pacific Ocean Basin, as influenced by significant ocean currents that stretch across the offshore waters of the entire Basin. In light of how these species distribute and behave throughout the offshore ocean environment, we conclude the use of proxy data from existing fisheries within the Proposed Action Area and adjacent areas that share similar open ocean features and influences is a reasonable starting place for understanding what to expect from this Proposed Action.

Our use of this data is further informed by consideration of differences in mitigation that we anticipate may result in lower interaction rates under this Proposed Action, as compared to the rates of interaction derived from the use of proxy data alone. Throughout the BA, NMFS describes the potential effect and benefits of mitigation measures that have been included as part of the Proposed Action, including additional measures that may be implemented through the adaptive management program. In total, 45 mitigation measures were identified for operations in the Proposed Action Area and qualitatively evaluated in the BA, with 32 of those measures being implemented as part of EFP terms and conditions at the outset for at least some operations that are expected to occur as part of the Proposed Action. SFD indicates that the lack of available data surrounding their effectiveness in the Proposed Action Area has limited the ability to incorporate them into quantitative estimates of impacts based proxy datasets. It was acknowledged that these measures could result in fishing practices that result in fewer interactions than predicted by the estimates, including the potential for no interactions with ESA-listed species altogether. Ultimately, SFD concluded that the mitigation measures for the EFPs under the Proposed Action and the adaptive management program, will ensure that interactions and mortalities do not exceed the projected estimates over the monitoring period, and will continually drive the performance of EFPs in a manner that minimizes take of leatherback sea turtles over the duration (10 years) of the Proposed Action.

Qualitative Effects of Mitigation Measures

Here we expand upon the qualitative assessment of these proposed mitigation measures in consideration of the potential effects of this Proposed Action. One of the key principles of the quantitative estimates that have been generated is that equal risk is applied on a hook-by-hook basis to all effort across the different operations and fishing practices that may occur under the Proposed Action. Notably, the suite of measures that are proposed for use by large-scale operations under the Proposed Action include mitigation measures implemented for the Hawaii shallow-set and deep-set longline fisheriesthat have operated outside of the Proposed Action Area, as well as additional mitigation measures based on lessons learned and expertise developed in managing HMS fisheries inside the Proposed Action Area. Notably, at least 50% of the effort that could occur under the Proposed Action would be associated with small-scale operations (including the unallocated effort). Both the large-scale and small-scale operations include the use of reduced limits on the number of hooks, mainline length, and/or soak times relative to the Hawaii longline fisheries--all of which all likely present some opportunity for reduction in the risk of interactions. The small-scale operations, which further reduce the hooks per set (e.g., hooks per set are 30% or less than in the shallow-set and deep-set longline fisheries operating outside of the EEZ) likely present smaller risks of interaction in comparison to the large-scale operations (e.g., hooks per set are 70% or less than in the shallow-set and deep-set longline operating outside of the EEZ).

Up to now, reviews of sea turtle and shark bycatch data across various world-wide longline fisheries have often been inconclusive as to whether the extent of gear length and/or consequent soak time has significant impact on sea turtle or shark interactions rates, although reduction of soak time during daylight hours has been shown to effectively reduce sea turtle bycatch, and reduction in soak time is seen as one of the most promising measures for reducing bycatch of these species in longline gear (see review in Swimmer et al. 2020). While not related to sea turtle or shark interactions, we note that mainline length was identified as a key variable to pilot whale bycatch and predation in longline fisheries in the Atlantic, and has been implemented as the foundation to achieving goals related to minimizing the mortality and serious injury of pilot whales and other marine mammals (74 FR 23349). In addition to the risk of interactions occurring, we also consider the potential influence that soak time of longline-type fishing gear may have in determining mortality for ESA-listed species, including post-release mortality. Presumably, the longer the soak time, which may vary with mainline length and more hooks (e.g., longer mainline in modified large-scale vs. small-scale operations), the more stress/injury, including risk of injury and mortality from predation, may be experienced by a bycaught animal, which could influence post-release survival probability (Swimmer and Gilman 2012; Swimmer et al. 2020; Griffiths et al. 2024). What most studies appear to have lacked to this point is dedicated efforts to explicitly test reductions in soak time and gear length. However, based on what is known and/or reasonable to infer from available information, we conclude that the small-scale operations proposed under this Proposed Action likely present reduced risks of interactions and the extent of injuries relative to our quantitative assessment based on proxy datasets.

In addition to the differences across the proposed longline-type configurations and mitigation measures, we also consider the features of the Proposed Action that may lead to reduced risk that have not been quantified, including key components of the adaptive management program. In particular, given the context presented above about the likely reduced risks associated with small-scale operations, we note that the adaptive management program contains explicit elements that facilitate the shift in effort from large-scale operations to small-scale operations, if interactions with leatherbacks are occurring in large-scale operations, which is considered more likely based on the higher number of hooks and mainline length per set (and thus, a lower capacity to tend the gear) relative to the small-scale operations. Elements of the adaptive management program also require gap years for large-scale operations if multiple leatherback interactions are occurring annually. Finally, we acknowledge that the tiger team process is designed to react to leatherback interactions in relatively short order, with proactive recommendations for revised EFP terms and conditions to reduce the risk (and/or severity) of future leatherback interactions based on how the Proposed Action is unfolding and the potential qualitative benefits associated with implementation of increasingly conservative measures.

Ultimately, despite the weight of qualitative support for reduced risks of interactions with ESA-listed species compared to our quantitative assessment of impacts, especially leatherbacks, associated with the Proposed Action, we do not further modify our expectations for anticipated effects that have been quantified in this Biological Opinion beyond what will be described in the preceding sections. However, we conclude there is a reduced potential for the Proposed Action to result in interactions and post-intereaction injuries or mortalities, than what is anticipated based on the proxy datasets alone. Therefore, the probability of this Proposed Action exceeding what is anticipated based on the proxy data is low.

2.5.1. Sea Turtles

Longline fishing affects sea turtles primarily by hooking, but also by entanglement and trailing gear that remains attached to an animal. Hooking may be external, generally in the flippers, head or the beak, or could be internal, when the animal is attempting to forage on the bait and ingests the baited hook. When a sea turtle ingests a hook, they may attempt to get free of the hook or get hauled in by the vessel's hydraulics. Either situation can exacerbate injuries, through piercing the esophagus, stomach, or other organs, or by pulling organs from their connective tissue. Once a hook has pierced an organ, infection may occur, which may result in death of the animal (Ryder et al. 2006). Sea turtles can also become entangled in fishing gear; based on information from the Hawaii-based longline fisheries, this is less common for hard shelled turtles but fairly common for leatherbacks (NMFS 2012b; NMFS 2014).

Entanglement can occur in monofilament line (mainline or branchline) or polypropylene line (float line), and can result in substantial wounds, including cuts, constriction, or bleeding. In addition, entanglement can directly or indirectly interfere with mobility, causing impairment in feeding, breeding, or migration. Once a turtle is brought to the vessel, per the mitigation requirements, all attempts to cut branch lines as close to the turtle as possible should minimize the trailing line left on the animal. However, lines left on an animal may be swallowed, which could block the gastrointestinal tract and/or cause other serious injuries. Trailing line can also become snagged on a floating or fixed object, further entangling the turtle, or the drag can cause the line to constrict around an appendage until the line cuts through it (Ryder et al. 2006).

Sea turtles can be forcibly submerged by longline-type gear, which may occur through a hooking or entanglement event, where the turtle is unable to reach the surface to breathe. This can occur at any time during the set, including the setting and hauling of the gear, and generally occurs when the sea turtle is hooked by or entangled in a line that is too deep below the surface or is too heavy to be brought up to the surface by a swimming sea turtle. For example, a sea turtle that is hooked on a 3 meter branchline attached to a mainline set at depth by a 6 meter floatline will generally not be able to swim to the surface unless it has the strength to drag the mainline approximately 3 more meters. Additionally, soak time and the depth of the fishing gear may have a significant effect on the fishing mortality, including post-release mortality, of a sea turtle that is hooked or entangled as they may increase the probability of forced submergence in the animal (Swimmer and Gilman 2012). In general, longer soak time and deeper depth of the fishing gear can arguably result in higher stress and injury, including risk of injury and mortality from predation, in sea turtles (Swimmer and Gilman 2012). Although specific mortality data are limited regarding the impact of being forcibly submerged, a number of studies have examined physiological and other effects of bycatch in various fisheries (Stabenau et al. 1991; Harms et al. 2003; Stabenau and Vietti 2003; Snoddy et al. 2009; Wilson et al. 2014; García-Párraga et al. 2014; Phillips et al. 2015).

Sea turtles forcibly submerged for extended periods of time show marked, even severe, metabolic acidosis as a result of high blood lactate levels. With such increased lactate levels, lactate recovery times are long (even as much as 20 hours), indicating that turtles are probably more susceptible to lethal metabolic acidosis if they experience multiple captures in a short period of time, because they would not have had time to process lactic acid loads (*in* Lutcavage and Lutz 1997). Kemp's ridley turtles (*Lepidochelys kempii*) that were stressed from capture in an experimental trawl experienced significant blood acidosis, which originated primarily from non-respiratory (metabolic) sources. Visual observations indicated that the average breathing frequency increased from approximately 1-2 breaths/minute pre-trawl to 11 breaths/minute post-trawl (a 9 to 10-fold increase). Given the magnitude of the observed imbalance, complete recovery of acid-base homeostasis may have required 7 to 9 hours (Stabenau et al. 1991). Similar results were reported for Kemp's ridleys captured in entanglement nets - turtles showed significant physiological disturbance, and post-capture recovery depended greatly on holding protocol (Hoopes et al. 2000).

Presumably, however, a sea turtle recovering from a forced submergence would most likely remain resting on the surface (given that it had the energy stores to do so), which would reduce the likelihood of being recaptured by a submerged longline. Recapture would also depend on the condition of the turtle and the intensity of fishing pressure in the area. NMFS has no information on the likelihood of recapture of sea turtles by HMS fisheries. However, in the Atlantic Ocean, turtles have been reported as captured more than once by longliners (on subsequent days), as observers reported clean hooks already in the jaw of captured turtles. Such multiple captures were thought to be most likely on three or four trips that had the highest number of interactions (Hoey 1998).

Stabenau and Vietti (2003) studied the physiological effects of multiple forced submergences in loggerhead turtles. The initial submergence produced severe and pronounced metabolic and respiratory acidosis in all turtles. As the number of submergences increased, the acid-base imbalances were substantially reduced; although successive submergences produced significant changes in blood pH, PCO^2, and lactate. Increasing the time interval between successive submergences resulted in greater recovery of blood homeostasis. The authors conclude that as long as sea turtles have an adequate rest interval at the surface between submergences, their survival potential should not change with repetitive submergences.

Respiratory and metabolic stress due to forcible submergence is also correlated with additional factors such as size and activity of the sea turtle (including dive limits), water temperature, and biological and behavioral differences between species and will therefore also affect the individual's survivability. For example, larger sea turtles are capable of longer voluntary dives than small turtles, so juveniles may be more vulnerable to the stress of forced submergence than adults. Gregory et al. (1996) found that corticosterone concentrations of small loggerheads captured were higher than those of large loggerheads captured during the same season. During the warmer months, routine metabolic rates are higher, so the impacts of the stress due to entanglement or hooking may be magnified (e.g., Gregory et al., 1996). In addition, disease factors and hormonal status may also play a role in anoxic survival during forced submergence. Any disease that causes a reduction in the blood oxygen transport capacity could severely reduce a sea turtle's endurance on a longline, and since thyroid hormones appear to have a role in setting metabolic rate, they may also play a role in increasing or reducing the survival rate of an entangled sea turtle (*in* Lutcavage and Lutz 1997). Turtles necropsied following capture (and subsequent death) by Hawaii-based longliners were found to have pathologic lesions. Two of the seven turtles (both leatherbacks) had lesions severe enough to cause probable organ dysfunction, although whether or not the lesions predisposed these turtles to being hooked could not be determined. Recent studies of decompression sickness (DCS) in sea turtles caught in gillnet and trawl fisheries indicate that 25.9% (29/112) of loggerheads initially observed to be active and behaving normally upon capture developed life-threatening gas embolism (formation of gas bubbles within the bloodstream; the cause of DCS) over a period of hours (Stacy et al. 2016). Members of a sea turtle stranding response team determined that one bycaught leatherback had also contracted DCS following a forceable submergence (B. Stacy, NMFS-Headquarters, personal communication, 2017), so we can assume leatherbacks that might appear active upon capture may later develop DCS.

2.5.1.1. Loggerheads - North Pacific DPS

The stressors, exposure, response, and risk portion of the effects analysis for North Pacific loggerhead turtles are described below.

North Pacific loggerhead turtles are expected to be exposed to interactions directly caused by the Proposed Action due to hooking and entanglement by fishing gear deployed by each vessel participating in the EFP, both when they are deep-setting or shallow-setting. As described in the FEIS (NMFS 2025a) and in our analytic approach (section 2.1), the expected number of loggerheads taken was based on the takes observed in the Hawaii-based longline fishery (both shallow-setting and deep-setting, calculated separately) east of the 140ºW meridian (the proxy dataset, with data from 2004 through 2019), divided by the observed number of hooks in that fishery (each component, separately), then multiplied by the number of hooks anticipated in each component of the EFP, respectively (i.e., deep-setting and shallow-setting). As indicated in Section 3 of the FEIS (NMFS 2025a), NMFS considers several fishery-dependent datasets in which fishing occurred east of 140ºW meridian where waters more closely resemble the temperate and subtropical conditions within the EEZ off the West Coast and fishing activities are distributed across the migratory paths of loggerheads entering the EEZ. Section 3 of the FEIS conveys a hierarchical approach to determining potential interaction rates under the Proposed Action based on the robustness and relevance of the fishery-dependent datasets considered in the analysis. Accordingly, with the expected number of hooks (244,000) in the shallow-set component of the Proposed Action, up to approximately 2.8 loggerheads are expected to be taken each year based on the rate of interactions documented in the shallow-set longline fishery in the proxy dataset (2004-2019), which amounts to 28 loggerheads over the ten years of the Proposed Action. Based on observer's data from the proxy dataset (i.e., Hawaii-based longline fishery east of the 140ºW meridian), it is predicted that 2% of loggerhead would be dead from the shallow-setting component of this EFP, while approximately 98% would be released alive but injured.[21] This is not unexpected since in SSLL fisheries, sea turtles can generally come up to the surface to breathe, and, while they may experience injuries from the hook or entanglement event, they do not experience forced submergence for long periods of time, which increases their survival rate.

Similarly, and according to the FEIS (NMFS 2025a), given the expected number of hooks (662,400) in the deep-set component of the EFP, it is anticipated that approximately 0.2 loggerheads will be taken per year based on the rate of interactions documented in the deep-setting component of the proxy dataset (average of approximately 20% observer coverage for the period 2004-2019). This annual interaction rate translates into two loggerheads caught over a 10-year period of the Proposed Action. Based on observer's data from the proxy dataset, all loggerhead interactions with the deep-setting component of this proposed EFP are expected to be fatal (100% mortality).

The Pacific Loggerhead Conservation Area (LCA) was established for the California DGN fishery in 2003 to protect loggerhead sea turtles in an area (SCB) and during periods of higher risk due to anomalously warm sea surface conditions usually associated with a forecast or occurring El Niño event. This time/area closure was implemented in the mid-summer of 2014, and during June, July and August, 2015 and 2016. No loggerheads were observed captured by the California DGN fishery during that period or throughout the rest of those fishing seasons (through January). Given that the applicants propose to fish mainly outside of the SCB, we anticipate the risk to loggerheads to be low. However, recent ship-board (fall, 2014) and aerial surveys (fall, 2015) have documented loggerhead sea turtles outside of the closure area (i.e., west of the 120ºW meridian) and during months outside of the time period of the closure (S. Benson, NMFS-SWFSC, personal communication, 2015; T. Eguchi, NMFS-SWFSC, personal communication, 2016, as reported in NMFS 2018a). While these sightings were during a time when anomalously warm water was found off California, longlining activity could affect North Pacific loggerheads if another warm-water event occurs off the U.S. West Coast during the 10-year proposed period of this action. Therefore, based on the available data we conclude it is reasonable to anticipate that up to 30 loggerhead interactions involving hooking and/or entanglement with longline-type gear associated with the Proposed Action could occur over the course of ten years, based on a general expectation that up three loggerhead interactions may occur per year. However, we also recognize that rare event bycatch is difficult to predict over a short time frame acknowledging that the probability and variability of rare events is difficult to predict in any one year. As a result, although the proxy data suggest that three loggerhead

[21] According to the Pacific Island Regional Office (PIRO)'s observer program, all sea turtle interactions in the Hawaii-based longline fishery are classified as "injured" (or dead), simply on account of the encounter, even though the sea turtle was released without any trailing gear or hooks. A post-interaction mortality rate is then assessed, based on the nature of the interaction, the amount of gear left on the animal, and the criteria detailed in Ryder et al. (2006).

interactions could occur in any given year, we assume that an additional interaction could occur based on variable conditions and exposure during any given year. Consequently, we anticipate that as many as four loggerhead interactions could occur during any year. Recent aerial surveys have provided estimates of thousands of juvenile loggerheads foraging off central Pacific Baja California, Mexico (Seminoff et al. 2014), as well as recently off southern California (Eguchi, et al. 2018). Loggerheads observed captured in the California DGN fishery were all juveniles. For these reasons, we assume that all 30 loggerhead interactions that may occur as a result of the Proposed Action will be juveniles.

The quantifiable response to capture in fishing gear in the Proposed Action is the number of mortalities that can be expected to result from interactions with the fishing gear. Loggerhead response to the predicted exposure (28 interactions in shallow-setting and 2 interactions in deep-setting over a 10-year period) can be converted into a number of estimated mortalities resulting from this exposure. Due to the lack of any available data or existing modeling on loggerhead exposure and interactions with longline fisheries across the U.S. West Coast EEZ, we assume that loggerheads would behave (e.g., foraging or migrating) or be impacted similarly between the central north Pacific Ocean and the Proposed Action Area, and that the response of loggerheads to bycatch in longline-type gear along the U.S. West Coast would be sufficiently similar to the response to bycatch in the Hawaii fishery. Importantly, all loggerheads that were released alive in the entire Hawaii-based SSLL fishery (2004-2023) likely suffered responses ranging from high stress immediately following post release, to more severe injuries that may have impacted their feeding, migration, or even breeding success (NMFS 2019b; NMFS 2024g). Therefore, we assume that similar responses should be expected in loggerheads that will be released in the shallow-setting component of the proposed EFP and in the Proposed Action Area, though the exact amount of this stress that can translate into post-release mortality is unknown.

Accordingly, we use the fishery mortality rate for loggerhead sea turtle interactions for the entire Hawaii-based SSLL fishery, which was recently estimated to be 16.8% CI = 13% to 21.4%), taken from the most recent biological opinion on the continued authorization of this fishery in regards to effects to North Pacific loggerhead sea turtles (NMFS 2024g). This mortality rate was estimated using the post-release injury mortality coefficients of Ryder et al. (2006), which is based on the nature of the interaction, the amount of gear left on the animal, and other criteria (details can be found in Ryder et al. 2006). Applying this corresponding mortality rate (i.e., 16.8%), we estimate that of the total of 28 interactions in shallow-setting in the proposed EFP, approximately 5 loggerheads (28*0.168=4.7, round up to 5) will be killed as the result of the ten-year period of the Proposed Action. As described above, and based on observer's data from the proxy dataset (deep-setting only), all loggerheads interactions with the deep-setting component of this proposed EFP are assumed to be fatal (100% mortality). Hence, we expect two loggerheads to be killed in the deep-setting component of this EFP over the 10-year period of the proposed action, and we estimate a total of seven loggerheads to be dead as the result of the Proposed Action over ten years. Because most of the interactions are expected to occur in the shallow-set component, we would expect no more than one mortality to occur during most years, with up to four loggerhead interactions. However, because some deep-set interactions are expected, there could be individual years where two mortalities could occur.

In order to estimate the risk that the Proposed Action poses to the North Pacific loggerhead DPS, which has a population estimate of 8,733[22] nesting females, we need to assess the number of loggerheads, and especially females, removed from this population, while also considering that the abundance of subadult loggerheads foraging in the EPO is at least a magnitude greater than the nesting population. Due to the lack of specific available information about the sex ratio of loggerheads that may be found foraging off the U.S West Coast EEZ, we rely upon information included in the most recent biological opinion for the DGN fishery (NMFS 2023c; 2024g). This information is based on results by Martin et al. (2020a) about sex ratios for loggerheads that may be vulnerable to Hawaii longline fisheries, and assume that females constitute 65% of the juvenile population. Accordingly, and based on data collected from loggerheads observed caught in the DGN fishery and other known information described above, we assume that loggerheads that are likely to be present off the U.S. West Coast EEZ are mainly juveniles (NMFS 2023c; 2024g). Also, and based on information included in previous biological opinions (NMFS 2023c; 2024g), we assume the expected survival rate of juvenile loggerheads to adulthood to be 0.80 (Snover 2008; Conant et al. 2009; Martin et al. 2020a). Therefore, we expect that up to four mortalities or serious injuries could occur to juvenile female loggerheads that otherwise would have survived to adulthood (up to 7 individuals * 0.8 survival rate for juveniles to adulthood * 0.65 sex ratio = ~ 3.64, rounded up to 4) over a 10-year period of the Proposed Action.

As described in section 1.3.4 *Adaptive Management Program under the Proposed Action*, and in section 2.5.1.2 *Leatherbacks* below, NMFS proposes to take increasingly protective measures in response to leatherback interactions, to limit the amount of them that occur as a result of the Proposed Action. Some of those measures, such as those that might restrict large-scale operation effort, could also work to limit the risk of loggerhead bycatch, and reduce the total number of loggerhead interactions that occur as a result of the Proposed Action. However, we acknowledge that other potential measures that might be implemented under this adaptive management program, such as PLCA closure for a period of time, could lead to effort distributions that might make loggerhead interactions more likely than with effort occuring within the PLCA. Given the level of uncertainty surrounding how frequently the adaptive management program may be implemented, and what measures may be implemented, we cannot generate clear expectations of what impacts this element should have on the number of loggerhead interactions that may occur during the Proposed Action. On balance, we assume it does not change our expectations.

2.5.1.2. Leatherbacks

The stressors, exposure, response, and risk portion of the effects analysis for leatherback turtles are described below. NMFS expects that leatherback turtles directly affected by fishing

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[22] As mentioned in the Status section, the North Pacific DPS nesting beach population has been increasing at approximately 9% per year since 2003/2004 (Y. Matsuzawa, Sea Turtle Association of Japan, personal communication, 2017), so this is likely a minimum estimate.

interactions associated with the Proposed Action will be from the Western Pacific population. Direct effects of the action on this population and any indirect effects on other populations are related to the species as a whole in the Integration and Synthesis of Effects (Section 2.7).

The general effect of entanglement and hooking in longline gear, as described in section 2.5.1 for sea turtles, also applies to leatherbacks, although since leatherbacks typically forage on jellies, they are more likely to get entangled in the longline gear, rather than ingesting a hook. Their long pectoral flippers and extremely active swimming behavior make leatherback sea turtles particularly vulnerable to fishing gear. Observed leatherback sea turtle entanglements have primarily involved the front flippers and/or the neck and head region. A leatherback entangled by longline gear most likely continues trying to swim, expending valuable amounts of energy and oxygen. Young leatherbacks studied in captivity for almost two years swam persistently and continuously into tank sides without ever recognizing it as a barrier (Deraniyagala 1939, *in* Wyneken 1997; Jones 2009). In addition, leatherbacks store an enormous amount of oxygen in their tissues, similar to marine mammals, and have comparatively high hematocrits, which is efficient for such a deep-diving turtle but means that they have relatively less oxygen available for submergence. While leatherbacks routinely dive to 50+ meters, they can dive to depths as much as 1,000 meters (Lutcavage and Lutz 1997), but maximum dive duration for the species is substantially less than half that of other turtles. The disadvantage of this is that they are not able to hold their breath as long and are probably more vulnerable to drowning in deep fishing sets of long duration. As available oxygen diminishes, anaerobic glycolysis takes over, producing high levels of lactic acid in the blood. Unlike the shelled turtles, leatherbacks lack calcium, which helps to neutralize the lactic acid build-up by building up bicarbonate levels. Lastly, because leatherbacks have more delicate skin and softer tissue and bone structures than hard-shelled turtles, their risk from longline-related injury is considered to be higher.

Leatherbacks are expected to be exposed to interactions directly caused by the Proposed Action due to hooking and entanglement by fishing gear deployed under an EFP, likely only during shallow-setting based on available information. As described in the FEIS (NMFS 2025a) and in our analytic approach (section 2.1), the expected number of leatherback interactions was based on the interactions observed in the shallow-set component of the proxy dataset (i.e., the Hawaii-based longline fishery east of the 140ºW meridian) divided by the observed number of hooks in that fishery from 2004 through 2019, then multiplied by the number of hooks anticipated in the shallow-set component of the EFP (244,000). According to the FEIS (NMFS 2025a), with an expected number of hooks (244,000) in the shallow-set component of the proposed action, up to two leatherbacks (approximately 1.9) are expected to be taken annually based on the observed interactions in the proxy dataset (2004-2019), which amounts to an estimated total of 19 leatherbacks (1.9*10=19 leatherbacks) over the 10-year period of the Proposed Action. Based on observer's data from the proxy dataset, it is predicted that all leatherbacks caught would be expected to be released alive but injured.

Similarly, given the expected number of hooks (662,400) in the deep-set component of the Proposed Action, and based upon the interaction rate documented in the deep-setting component of the proxy dataset (average of approximately 20% observer coverage for the period 2004-2019), we would expect no (zero) leatherbacks to be taken in deep-sets for the Proposed Action.

The quantifiable response to capture in fishing gear from the Proposed Action is the number of mortalities that are expected to result from interactions with the type of fishing gear used. We converted the projected total numbers of leatherback interactions over a 10-year period (19 interactions in shallow-setting) into a number of estimated mortalities resulting from this exposure. Similar to the loggerhead analysis above, we assume that the response of leatherbacks to bycatch in longline-type gear along the U.S. West Coast would be similar to the response to bycatch in the Hawaii-based longline fisheries.

From 2004-2023, the shallow-set component of the Hawaii-based longline fishery interacted with 131 leatherbacks, all released alive and "injured" (note caveats in footnote #20), with no mortalities observed (0% immediate mortality rate) (PIRO, unpublished data). This is not unexpected since in SSLL fisheries, sea turtles can generally come up to the surface to breathe, so while they may experience injuries from the hook or entanglement, they do not experience forced submergence for long periods of time, which increases their survival rate. However, leatherbacks may experience post-interaction mortality, with criteria described in Ryder et al. (2006). Overall, leatherbacks experience a higher post-interaction mortality rate when compared to hard shelled turtles, likely as a result of their lack of a hard shell, increased likelihood of constriction of body, foreflippers, etc. given their morphology and less resilient protective covering. Since the longline-type gear under the Proposed Action is similar in nature to pelagic longline gear employed in other fisheries, we looked at post-interaction mortality rates in the Hawaii-based shallow-set longline fishery. In the most recent biological opinion for the reauthorization of the entire Hawaii-based SSLL fishery, the fishery mortality of adult leatherbacks was estimated to be 20% (i.e., 20% were anticipated to die given the amount of gear remaining on the animal and/or behavior of the animal post-release), using the criteria described in Ryder et al. (2006) (NMFS 2019b). Therefore, if the anticipated 19 leatherbacks interact with the shallow-based longline component of the EFP over 10 years, application of a 20% post-interaction mortality rate indicates up to nearly four animals (19*0.20 = 3.8, round up to 4) could die as a consequence of their encounter. As described above, we anticipate that zero leatherbacks would interact with the deep-setting component of this proposed EFP. Therefore, we estimate a total of four leatherbacks to be killed as the result of the Proposed Action over 10 years. However, we also recognize that rare event bycatch is difficult to predict over a short time frame acknowledging that the probability and variability of rare events is difficult to predict in any one year. As a result, although the proxy data suggest that two leatherback interactions could occur in any given year, we assume that an additional interaction could occur based on variable conditions and exposure during any given year.

The adaptive management program associated with the Proposed Action was developed to help address uncertainty in the estimation of projected leatherback interactions with longline-type fishing practices in the Proposed Action, due to the use of proxy dataset, and to minimize the number of leatherback interactions that occur under the Proposed Action (see *Adaptive Management Program under the Proposed Action* – section 1.3.4). This approach was taken to limit the take of leatherback that would occur under the Proposed Action, over a 5-year monitoring period, operated on a rolling basis throughout the 10-year proposed action. Given the reactive and proactive elements of this component, we considered how this additional set of programmatic terms and conditions and potential management measures for responding to instances of leatherback take and mortality under the proposed adaptive management program would influence the extent of effects that would be expected to occur throughout the duration of the Proposed Action.

In our analysis, we consider the occurrence of the range of logical and feasible possible scenarios (i.e, hypothetical) for leatherback interactions in the EFP small-scale and large-scale components, while operating simultaneously under the suite of programmatic terms and conditions included under the Proposed Action (see *Adaptive Management Program under the Proposed Action* section, Section 1.3.4). Specifically, the analysis of interactions for these scenarios was considered under a 5-year monitoring period that is operated on a rolling basis throughout the 10-year period of the Proposed Action. While we are unable to succinctly summarize and present all hypothetical scenarios that we considered in this Opinion, we provide one illustrative example that helped define the boundaries of what may be expected to occur under the Proposed Action below.

The following table (Table 6) includes a hypothetical scenario that is described in detail below to illustrate the rationale used throughout the various scenario analyses considered, and to help generate the maximum number of interactions that would be expected could occur over a 10-year period during the Proposed Action under the adaptive management program conditions described in section 1.3.4, including the assumption that no more than two leatherback interactions occur per year as anticipated by the proxy dataset:

Table 6. Hypothetical scenario of maximum number of leatherback interactions that occur under the adaptive management program.

EFP Operations	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Total Number of Interactions
Small-scale	2	1	0	1	0	1	1	0	1	1	17
Large-scale	0	1	1	1	2	Gap	1	2	Gap	1	

Year 1: after two leatherback interactions in the small-scale sector, all EFP vessels with the same fishing practice are required to cease fishing immediately and for the remainder of the calendar year. EFP vessels involved in other fishing practices under Proposed Action can continue fishing.

Year 2: both the small-scale and large-scale sectors have one leatherback interaction each, for a total of two interactions for Year 2. This scenario would require all EFP vessels with the same practices to cease fishing immediately and for the remainder of the calendar year.

Year 3: All EFP fishing is ceased for the remainder of the calendar year for EFP fishing practices that have been involved in leatherback interactions because of the occurrence of five leatherback interactions within three consecutive years of the monitoring period (2 interactions in Year 1 + 2 interactions in Year 2 + 1 interaction in Year 3 = 5 interactions). Also, these EFP fishing practices cannot resume into the subsequent year until NMFS revise terms and conditions of EFPs for those fishing practices, as they have resulted in leatherback interactions during the monitoring period.

Year 4: All EFP fishing is ceased for the remainder of the calendar year for EFP fishing practices that have been involved in leatherback interactions because of the re-occurrence of five leatherback interactions within three consecutive years of the monitoring period (2 interactions in Year 2 + 1 interaction in Year 3 + 2 interactions in Year 4 = 5 interactions). Also, these fishing practices cannot resume in the subsequent year until NMFS revises terms and conditions of EFPs for those fishing practices.

Year 5: All EFP fishing is ceased for the remainder of the calendar year for EFP fishing practices that have been involved in leatherback interactions because of the re-occurrence of five leatherback interactions within three consecutive years of the monitoring period (1 interaction in Year 3 + 2 interactions in Year 4 + 2 interactions in Year 5 = 5 interactions). Also, all large-scale operations under the Proposed Action are required to observe a gap year, and therefore are not authorized to operate throughout the duration of Year 6.

Year 6: Large-scale operations are not authorized to fish throughout the duration of the calendar year due to the two interactions the previous year, while all small-scale operations are authorized to operate in Year 6. However, if one of the two interactions of leatherbacks in the large-scale sector in Year 5 resulted in a mortality, then effort in Year 6 for the large-scale sector will be shifted to the shallow-set component only and throughout the duration of Year 6. Specifically, if the mortality in Year 5 occurred in the deep-set component of the large-scale sector, then effort will shift to the deep-set component of the small-scale sector in Year 6. Conversely, if the mortality in Year 5 occurred in the shallow-set component of the large-scale sector, then effort will shift to the shallow-set component of the small-scale sector in Year 6. In this case, at most, small-scale fishing practices could have one leatherback interaction in Year 6 before ceasing due to the re-occurrence of five leatherback interactions within three consecutive years across the monitoring period (2 interactions in Year 4 + 2 interactions in Year 5 + 1 interaction in Year 6 = 5 interactions), with revised EFP terms and conditions that would be expected when those fishing practices resume the following year.

Year 7: Large-scale operations are re-authorized to fish after the gap year in Year 6. Both small-scale and large-scale fishing practices have one leatherback interaction in Year 7, for a total of two interactions for that year. In this case, EFP fishing is ceased for the remainder of the calendar year for EFP fishing practices that have been involved in leatherback interactions because of the re-occurrence of five leatherback interactions within three consecutive years of the monitoring period (2 interactions in Year 5 + 1 interaction in Year 6 + 2 interactions in Year 7 = 5 interactions). Also, these fishing practices cannot resume into the subsequent year until NMFS revises terms and conditions of EFPs for those fishing practices.

Year 8: All EFP fishing is ceased for the remainder of the calendar year for EFP fishing practices that have been involved in leatherback interactions because of the re-occurrence of five leatherback interactions within three consecutive years across the monitoring period (1 interaction in Year 6 + 2 interactions in Year 7 + 2 interactions in Year 8 = 5 interactions). Also, these fishing practices cannot resume into the subsequent year until NMFS revises terms and conditions of EFPs for those fishing practices. Additionally, all large-scale operations under the Proposed Action are required to observe a gap year, and therefore are not authorized to operate throughout the duration of Year 9.

Year 9: Large-scale operations are not authorized to fish throughout the duration of the calendar year, while all small-scale operations are authorized to operate under the Proposed Action in Year 9. Similar to what described in Year 6, if one of the two interactions of leatherbacks in the large-scale sector in Year 8 resulted in a mortality, then effort in Year 9 for the large-scale sector will be shifted to the shallow-set component only, throughout the duration of Year 9. Specifically, if the mortality in Year 8 occurred in the deep-set component of the large-scale sector, then effort will shift to the deep-set component of the small-scale sector in Year 9. Conversely, if the mortality in Year 8 occurred in the shallow-set component of the large-scale sector, then effort will shift to the shallow-set component of the small-scale sector in Year 9. In Year 9, at most, small scale fishing practices could have one leatherback interaction in Year 9 before ceasing due to the re-occurrence of five leatherback interactions within three consecutive years across the monitoring period (2 interactions in Year 7 + 2 interactions in Year 8 + 1 interaction in Year 9 = 5 interactions), with revised EFP terms and conditions that would be expected when those fishing practices resume the following year.

Year 10: EFP fishing is ceased for the remainder of the calendar year for EFP fishing practices that have been involved in leatherback interactions because of the re-occurrence of five leatherback interactions within three consecutive years of the monitoring period (2 interactions in Year 8 + 1 interaction in Year 9 + 2 interaction in Year 10 = 5 interactions).

This scenario is consistent with anticipation of two leatherback interactions per year, which should be considered conservative since these scenarios assume a commensurate risk of interactions across all fishing practices and operation using proxy data from longline fisheries (see *Qualitative Effects of Mitigation Measures* in Section 2.5). In addition, throughout the Proposed Action, the adaptive management program is expected to continue implementing measures in response to leatherback interactions, starting from the initial interactions (if they occur), that are expected to decrease the risk of additional, future leatherback interactions during and across the entire duration of the Proposed Action (discussed further in *Qualitative Effects of Mitigation Measures*). In particular, the elements that require cessation of fishing and/or revisions of EFP terms and conditions if five interactions occur over three years for fishing practices with a history of interactions within the monitoring period, and implementation of gap years for large-scale operations if two interactions occur in these fishing practices should functionally limit the potential for two interactions to occur every year throughout the course of the Proposed Action. Even in the limited possibility that three interactions happened in one year, presumably over a short time period before the adaptive management program has had a chance to iterate through implementation of additional measures, the adaptive management program will be activated and sensitive to additional interactions even more quickly in subsequent years. Similarly, if the injuries sustained by leatherback from interactions are more severe than expected (20% post-release mortality estimated on average), provisions of the adaptive management program would catch up with this increased level of impact, further minimizing the number of interactions that might occur before fishing practices that have been involved in interactions must be adjusted, or cease altogether until further authorized. If interactions of leatherbacks continue under the Proposed Action, we expect NMFS/tiger team to implement increasingly cautious EFP terms and conditions, making it unlikely that interaction rates remain high over the duration of the Proposed Action. Therefore, it should be expected that the adaptive management program will reduce the total risk of leatherback interactions associated with the Proposed Action, and the total number of leatherback interactions that might occur under the Proposed Action, compared to a static perception of risk associated with total effort expectations under the Proposed Action.

In conclusion, the maximum number of interactions that are expected to occur in this hypothetical scenario, with leatherback interactions happening at the high end of what has been anticipated, with leatherback interactions happening regularly each year throughout the duration of the Proposed Action despite implementation of the adaptive management program, under EFP terms and conditions described above, is 17 leatherbacks over 10 years. We also conclude that interactions will be limited to two per year, although we anticipate it is possible that there is one year where three interactions could occur, most likely before the adaptive management program is able to start addressing risk and the potential for interactions to accumulate.

When applying the 20% fishery mortality of adult leatherbacks considered in the most recent biological opinion for the reauthorization of the entire Hawaii-based SSLL fishery (NMFS 2019b), which is based on criteria described in Ryder et al. (2006), it is anticipated that up to four animals (17*0.20 = 3.4, round up to 4) would die as a consequence of interactions with the EFPs over a 10 year period. As described above, we anticipate that zero leatherbacks would interact with the deep-setting component of this proposed EFP. Therefore, we estimate a total of four leatherbacks to be killed as the result of the Proposed Action over 10 years. Given the relatively low rate of mortality anticipated for leatherback interactions (20%), we assume only one of the two (or three) interactions that may occur in a given year would result in mortality.

Importantly, we consider that leatherbacks are more likely to be captured during the Proposed Action when fishing effort under the Proposed Action will occur in the area encompassed by the PLCA, where information suggests there is a higher chance to catch swordfish compared to areas outside of the PLCA (NMFS 2024a). Eguchi et al. (2017) recently reviewed the effectiveness of the timing associated with the time/area closure by developing statistical models of leatherback turtle presence inside the PLCA based on environmental variables. They also examined finerscale spatiotemporal patterns of potential overlap between the California DGN fishery and leatherback turtle foraging habitat. Their results showed that the temporal extent of the closure period was the shortest and most effective in protecting the turtles while allowing fishing during low bycatch-risk periods. Howell et al. (2015) found an overlap between the Hawaii-based longline fishery east of the 140ºW longitude and leatherback presence, and surmised that the overlap is the crossover between the fishery and the southwestern migration pathway used by leatherbacks departing foraging grounds off California. Integrating Pacific leatherback use-intensity distributions, Roe et al. (2014) identified areas of predicted bycatch risk for leatherback turtles in longlines in the Pacific Ocean, which showed relatively higher use-intensity distributions for leatherbacks by annual quarter. Leatherback use areas adjacent to the U.S. West Coast EEZ were relatively high during Quarters 3 (July through September) and 4 (October through December), with less intensity during Quarters 1 (January through March) and 2 (April through June), suggesting that risk to leatherbacks due to longline-type fishing off California and Oregon (2nd year only) as proposed would be higher during the summer and fall months. As part of the proposed additional terms and conditions for EFPs, fishing would be prohibited during the closure period (August 15 to November 15) of the PLCA to the deep-setting component of large-scale modified longline effort under the Proposed Action. The condition may also be implemented for other components or EFP types through the adaptive management program

One hundred percent of leatherbacks interacting with the California DGN fishery and hand-captured off California originated from the Western Pacific (Dutton et al. 2007), with the majority of them assumed to come from the Bird's Head component of the nesting population. Studies suggest that the Western Pacific population has a clear separation of migratory destinations for summer vs. winter nesters, with summer nesters moving into the temperate north Pacific Ocean or into tropical waters of the South China Sea. Winter nesters, on the other hand, generally migrate into temperate and tropical large marine ecosystems of the southern hemisphere (Benson et al. 2011).

In order to estimate the risk that the Proposed Action poses to leatherbacks, in general, we would need to determine the number of adult females removed from the Western Pacific subpopulation. The Hawaii-based longline fishery has historically interacted with male and female leatherbacks, some (few) of which are subadults and juveniles. In addition, based on aerial surveys conducted off central California from 1990-2003, the majority of leatherbacks observed were larger subadults or adults (Benson et al. 2007b). Only five leatherbacks observed captured in the California DGN fishery were measured by observers, and they were assumed to be large subadults or adults. The sex ratio of the Western Pacific population is unknown, but researchers that have captured leatherbacks in-water off central California have documented that approximately two out of three leatherbacks were females (~67%) (Benson et al. 2007b). Therefore, we will assume that of the four leatherbacks captured and killed over a period of ten years as a result of the Proposed Action, three could be adult females (4 individuals * 0.67 sex ratio = 2.68, rounded up to 3).

The response of leatherbacks to interactions with gear deployed under the Proposed Action is the death (post-interaction) of three adult female leatherbacks, over ten years. Therefore, we will assess the risk of removing three adult females from a population estimate of approximately 1,054 nesting females in the WPO.

2.5.1.3. Olive ridleys

The stressors, exposure, response, and risk portion of the effects analysis for olive ridley turtles are described below. Olive ridley turtles directly affected by fishing interactions associated with the EFP are expected to be from the eastern Pacific nesting assemblages. Direct effects of the action on this population and any indirect effects on other populations are related to the species as a whole in the Integration and Synthesis of Effects (Section 2.7).

The general effect of entanglement and hooking in longline gear, as described in section 2.5.1 for sea turtles, also applies to olive ridleys. Like leatherbacks, olive ridleys are largely pelagic throughout their life history and are deep divers, routinely diving to around 50 meters, with a maximum dive depth of 290 meters (Lutcavage and Lutz 1997). Therefore, it is not surprising that they are often hooked on deep-set longline gear.

Olive ridley sea turtles are expected to be exposed to interactions directly caused by hooking and entanglement in fishing gear deployed under the Proposed Action, both when they are deep-setting or shallow-setting. As described in the FEIS (NMFS 2025a) and in our analytic approach (section 2.1), the expected number of olive ridleys interactions was based on the takes observed in the Hawaii-based longline fishery (both shallow-set and deep-set, calculated separately) east of the 140ºW meridian (the proxy dataset), divided by the observed number of hooks in that fishery from 2004-2019 (each component, separately), then multiplied by the number of hooks anticipated in each component of the Proposed Action, respectively (i.e., deep-setting and shallow-setting). According to the FEIS (NMFS 2025a), and based on the observer's data from the proxy dataset, with an expected number of hooks (244,000) in the shallow-set component of the Proposed Action, approximately 0.1 olive ridleys are expected to be taken annually, which translates into one olive ridley taken over the 10-year period of the Proposed Action. Based on observer's data from the proxy dataset, it is predicted that any olive ridley caught with shallow-set gear would be expected to be released alive but injured.

Similarly, given the expected number of hooks (662,400) in the deep-set longline component of the Proposed Action, and based on the interaction rate documented in the deep-setting component of the proxy dataset (average of approximately 20% observer coverage for the period 2004-2019), approximately 0.5 olive ridleys are anticipated to be captured each year, which amounts to five olive ridleys' interactions over ten years. In total on an annual basis, we could expect that one olive ridley interaction could occur. However, we also recognize that rare event bycatch is difficult to predict over a short time frame acknowledging that the probability and variability of rare events is difficult to predict in any one year. As a result, although the proxy data suggest that only one olive ridley interaction would be expected to occur in any given year, we assume that an additional interaction could occur based on variable conditions and exposure during any given year. Consequently, we anticipate that as many as two olive ridley interactions could occur during any given year.

Based on observer's data from the proxy dataset, approximately two-thirds of the olive ridleys interactions with the deep-setting component of this proposed EFP will be considered dead (67% mortality). However, in reviewing the dataset for the entire Hawaii-based deep-set longline fishery (i.e., including west of the 140ºW longitude) from 2004 through 2023 (~20% coverage), a total of 228 olive ridleys were caught, of which 207 were dead and 21 were released alive but injured (PIRO, unpublished data), which resulted in a 91% mortality. This high level of mortality is not unexpected since in DSLL fisheries, sea turtles cannot swim to the surface to breathe, so they may experience forced submergence for long periods of time, decreasing their survival rate.

The response to the stressors that can be quantified in the Proposed Action is the number of mortalities that can be expected to result from interactions with fishing gear used. We converted the projected total numbers of olive ridley interactions over a 10-year period (1 interaction in shallow-setting and 5 interactions in deep-setting) into a number of estimated mortalities resulting from this exposure. Similar to the loggerhead and leatherback analyses above, we assume that the response of olive ridleys to bycatch in longline-type gear along the U.S. West Coast would be similar to Hawaii-based longline fisheries. Hence, we use the fishery mortality rate for olive ridley sea turtle interactions for the entire Hawaii-based SSLL fishery taken from the most recent biological opinion on the continued authorization of this fishery, which was approximately 0% (NMFS 2019b). This mortality rate was estimated using the injury mortality coefficients of Ryder et al. (2006), which is based on the nature of the interaction, the amount of gear left on the animal, and other criteria (details can be found in Ryder et al. 2006). Applying this corresponding mortality rate (i.e., 0%), we estimate that of the total of one interaction in shallow-setting over a 10-year period of the Proposed Action, this individual will be released alive but injured. However, for olive ridleys taken with longline-type gear, it is expected that sea turtles released alive would likely suffer from effects ranging from high stress immediately following post release to more severe injuries that may affect feeding, movement, or even breeding success. These effects may decline over time as the surviving turtles heal from their injuries, although the extent to which such sublethal injuries occur or persist are not known (NMFS 2019b).

As described above, we anticipate a total number of five olive ridleys would be taken in the deep-set component of this Proposed Action over the 10-year period. Since the gear proposed to be deployed is similar to the pelagic longline gear employed in the Hawaii-based fishery, we looked at fishery mortality rates in their DSLL fishery. Based on the most recent biological opinion on the authorization of the entire Hawaii-based DSLL fishery, which considers post-interaction mortality criteria by Ryder et al. (2006), 93% of olive ridleys were expected to die as a result of their interaction with the fishery. Hence, we expect all five olive ridleys interactions (5*0.93=4.65, round up to 5) in the deep-setting component will result in mortality. Due to the lack of existing data on observed bycatch of this species that could help distinguish the age-class, size, or sex of individuals that are likely to interact with fisheries in the Proposed Action Area, including the DGN fishery (NMFS 2023c), we will conservatively assume that these animals could all be adult females. As a result of expectations for high mortality of olive ridleys within deep-setting gear, we expect that any one or both individuals that may be captured annually could be killed.

The response of olive ridleys interactions with longline-type gear deployed under the Proposed Action is considered to be the mortality of five adult females over ten years. Therefore, we will assess the risk of removing five adult females from a population estimate of approximately one million animals nesting in the EPO.

As described in section 1.3.4 *Adaptive Management Program under the Proposed Action*, and in section 2.5.1.2 *Leatherbacks* above*,* NMFS proposes to take increasingly protective measures in response to leatherback interactions, to limit the amount of them that occur during the Proposed Acton. Some of those measures, such as those that might restrict large-scale operation effort, could also work to limit the risk of olive ridley bycatch, and reduce the total number of olive ridley interactions that occur during the Proposed Action. However, we acknowledge that other potential measures that might be implemented under this adaptive management program, such as PLCA closure for a period of time, could lead to effort distributions that might make olive ridley interactions more likely than with effort occuring within the PLCA. Given the level of uncertainty surrounding how frequently the adaptive management program may be implemented, and what measures may be implemented, we cannot generate clear expectations of what impacts this element should have on the number of olive ridley interactions that may occur during the Proposed Action. On balance, we assume it does not change our expectations.

2.5.1.4. Green sea turtles – Eastern Pacific DPS

The stressors, exposure, response, and risk portion of the effects analysis for Eastern Pacific DPS of green sea turtles are described below. Green sea turtles directly affected by fishing interactions associated with the EFP are expected to be from the Eastern Pacific nesting assemblages. Direct effects of the action on this population and any indirect effects on other populations are related to the species as a whole in the Integration and Synthesis of Effects (Section 2.7).

The general effect of entanglement and hooking in longline gear, as described in section 2.5.1 for sea turtles, also applies to green sea turtles. Importantly, and contrary to leatherbacks, green sea turtles are more coastal than other sea turtles included in this Opinion. However, as adults they also have a pelagic phase. Therefore, it is not surprising that they are also found occasionally hooked in longline-type gear.

Green sea turtles are expected to be exposed to interactions directly caused by hooking and entanglement in fishing gear deployed under the Proposed Action, and most likely when they are deep-setting. As described in the FEIS (NMFS 2025a) and in our analytic approach (section 2.1), the expected number of green sea turtles taken was based on the takes observed in the Hawaii-based longline fishery (both shallow-set and deep-set, calculated separately) east of the 140ºW meridian (the proxy dataset), divided by the observed number of hooks in that fishery from 2004-2019 (each component, separately), then multiplied by the number of hooks anticipated in each component of the EFP, respectively (i.e., deep-setting and shallow-setting). According to the FEIS (NMFS 2025a), with an expected number of hooks (244,000) in the shallow-set component of the Proposed Action, 0 (zero) green sea turtles are expected to be taken based on the observer's data from the shallow-set component of the proxy dataset (2004-2019). Similarly, given the expected number of hooks (662,400) in the deep-set longline component of the Proposed Action, less than one (approximately 0.4) green sea turtles are anticipated to be taken annually, which amounts to a total number of four green sea turtles taken over the 10-year period of the Proposed Action. Based on observer's data from the proxy dataset, it is expected that all green sea turtles caught by the deep-setting component of this EFP would be dead (100% mortality). This is also in line with a review of the dataset for the entire Hawaii-based DSLL fishery (i.e., including west of the 140ºW longitude) from 2004 through 2023 (~20% coverage), where a total of 27 green sea turtles were caught, of which 26 were dead and one was released alive but injured (PIRO, unpublished data), which equates to a 96% mortality rate. This high level of mortality is not unexpected since in DSLL fisheries, sea turtles cannot swim to the surface to breathe, so they may experience forced submergence for long periods of time, decreasing their survival rate.

The response to the stressors that can be quantified in the Proposed Action is the number of mortalities that can be expected to result from interactions with fishing gear used. We converted the projected total number of green sea turtle interactions over a 10-year period (4 interactions in deep-setting) into a number of estimated mortalities resulting from this exposure. Similar to the loggerhead and leatherback analyses above, we assume that the response of green sea turtles to bycatch in longline-type gear along the U.S. West Coast would be similar to the Hawaii-based longline fisheries. Accordingly, we use the mortality rate for green sea turtle interactions for the entire Hawaii-based DSLL fishery taken from the most recent biological opinion on the continued authorization of this fishery, which was approximately 96% (NMFS 2023b). This mortality rate was estimated using the injury mortality coefficients of Ryder et al. (2006), which is based on the nature of the interaction, the amount of gear left on the animal, and other criteria (details can be found in Ryder et al. 2006). By applying this mortality rate (i.e., 96%), we expect a total of four mortalities for green sea turtles caught in the deep-set component of the Proposed Action over a 10-year period. Therefore, we expect a total of four green sea turtles to be dead as the result of interactions with fishing gear in the EFP over the 10-year period of the Proposed Action. In total on an annual basis, we could expect that up to one green turtle interaction could occur. However, we also recognize that rare event bycatch is difficult to predict over a short time frame acknowledging that the probability and variability of rare events is difficult to predict in any one year. As a result, although the proxy data suggest that only one green turtle interaction would be expected to occur in any given year, we assume that an additional interaction could occur based on variable conditions and exposure during any given year. Consequently, we anticipate that as many as two green turtle interactions could occur during any year.

Due to the lack of existing data on observed bycatch of this species that could help distinguish the age-class, size, or sex of individuals that are likely to interact with fisheries in the Proposed Action Area, including the DGN fishery (NMFS 2023c), we will conservatively assume that all four of these animals could be females, potentially all adults. As a result of expectations for high mortality of green sea turtles within deep-setting gear, we expect that any one or both individuals that may be captured in a given year could be killed.

The response of green sea turtle interactions with longline-type gear deployed under the Proposed Action is considered to be the mortality of four adult females over ten years. Therefore, we will assess the risk of removing four adult females from a population estimate of approximately 20,000 animals nesting in the Eastern Pacific.

As described in section 1.3.4 *Adaptive Management Program under the Proposed Action*, and in section 2.5.1.2 *Leatherbacks* above, NMFS proposes to take increasingly protective measures in response to leatherback interactions, to limit the amount of them that occur as a result of the Proposed Action. Some of those measures, such as those that might restrict large-scale operation effort, could also work to limit the risk of green sea turtle bycatch, and reduce the total number of green turtle interactions that occur as a result of the Proposed Action. However, we acknowledge that other potential measures that might be implemented under this adaptive management program, such as PLCA closure for a period of time, could lead to effort distributions that might make green turtle interactions more likely than with effort occuring within the PLCA. Given the level of uncertainty surrounding how frequently the adaptive management program may be implemented, and what measures may be implemented, we cannot generate clear expectations of what impacts this element should have on the number of green turtle interactions that may occur during the Proposed Action. On balance, we assume it does not change our expectations.

2.5.2. Marine Mammals

Based on observer records in the Hawaii-based longline fishery and on data collected from scientific research cruises involving longline gear, marine mammals, and particularly pinnipeds, are rarely taken in longline-type gear, likely because of the selectivity of the gear, and the area and depths fished, unlike the non-selectivity of gillnet. The probability that a marine mammal will initially survive an entanglement in longline-type fishing gear depends largely on the species and age of marine mammal involved. For instance, larger animals such as balaenopterids and sperm whales may become entangled or hooked by a longline and likely survive the entanglement or even break the gear. An entanglement or hooking may compromise the animal by causing cuts or impeding mobility or feeding, which may make the animal more susceptible to disease or predation. In addition, although marine mammals have evolved to handle a wide variety of stressors, including a saline environment, predation, food shortages, etc, only healthy animals have an optimal healing response. Cetaceans in particular have developed a unique healing process, which requires salt and water to kill several cell layers to block penetration of additional salt water. After this process is completed, healing from within can begin. A sustained stress response, such as repeated or prolonged entanglement in gear, makes marine mammals less able to fight infection or disease. Pinnipeds have a physiologically different response to stress than cetaceans. Chronic exposure to stress causes an imbalance of numerous hormones or enzymes that can lead to metabolic anomalies, such as increased sodium concentration in the blood, tissue necrosis, and hypoxia. Such symptoms may not manifest for several days after entanglement, and in severe cases, death could result, even though superficially an animal might appear healthy (Angliss and DeMaster 1998).

In the Hawaii-based longline fishery, observers record detailed information on marine mammals that are hooked or entangled. Marine mammals that have been entangled and/or hooked and are released alive without any gear attached usually only have minor abrasions from the interaction. However, as discussed for sea turtles above, effects from the stress of capture may cause temporary and/or long-term effects that may not be visible upon release. Because no long-term stress studies have been conducted on the impacts of capture by a fishery on marine mammals, NMFS is only able to make assumptions on the condition of marine mammals that have been released unharmed from a longline. Although marine mammals released unharmed may not have visible injuries, they may have been stressed from being hooked or entangled in longline gear. This stress may cause an interruption in essential feeding behaviors or migration patterns; however, NMFS believes this effect, if experienced, is likely to be temporary and short-term.

Serious injury categories and criteria have been developed for marine mammals, including small cetaceans, large cetaceans, and pinnipeds (NMFS 2012c), further revised in 2023[23], which provide guidance to NMFS experts to assess the documented injury inflicted to seals/sea lions. As required under section 117(a) of the MMPA, NMFS is required to prepare stock assessment reports for all marine mammal stocks that occur in waters of the jurisdiction of the U.S., including an estimate of the annual human-caused mortality and serious injury, by source. Through a policy directive in 2012, NMFS interpreted the regulatory definition of serious injury (i.e., any injury that will likely result in death) as any injury that is “more likely than not” to result in mortality, or any injury that presents a greater than 50% chance of death to a marine mammal (NMFS 2012d). A review of the criteria indicates that NMFS makes serious injury determinations for interactions in the following relevant categories (NMFS 2023f):

- Ingest gear or hook(s)
- Hook(s) in mouth (in lip is case specific)
- Gear attached in any manner to free-swimming animal with potential to:
    - 1) become a constricting wrap on animal;
    - 2) be ingested;
    - 3) accumulate drag; or
    - 4) become snagged on something in the environment, anchoring the animal
- Gear wrapped and constricting any body part or likely to become constricting as the animal moves or grows

2.5.2.1. Guadalupe fur seals

The stressors, exposure, response, and risk portion of the effects analysis for Guadalupe fur seals are described below. NMFS expects that Guadalupe fur seals directly affected by fishing interactions associated with the EFP would be from the Mexico stock, which breeds primarily on

[23] NMFS 2023f: www.fisheries.noaa.gov/s3/2023-02/02-238-01%20Final%20SI%20Revisions%20clean_kdr.pdf

Guadalupe Island and the San Benito islands. Direct and indirect effects on this population, as listed, are summarized in the *Integration and Synthesis of Effects* (Section 2.7).

Pinnipeds are rarely encountered interacting with U.S. pelagic longline gear in the Pacific Ocean, though they are more frequently observed as bycatch in hook and line fisheries. Through a review of recent records (2017-2021) of human-related serious injury/mortality for U.S. West Coast pinniped stocks found entangled in pelagic longline and hook and line gear, we found that California sea lions were the most common pinniped interactions, often hooked in the mouth area, likely predating on the bait used during research or active fishing activities (NMFS 2023b). Documented activities and subsequent injuries included:

- Scientific research, shark longline: hooking in the lip (hook not removed to avoid further injury, non-serious injury)
- Scientific research: hooked with a baited longline hook (hook not removed to avoid further injury, serious injury)
- Scientific research: deeply hooked in mouth (hook not removed, leader cut approximately 10 inches from the mouth, serious injury)
- Shallow-set in the Hawaii-based longline fishery: unidentified sea lion hooked in lower mouth (hook not removed, serious injury)

Northern elephant seals (*Mirounga angustirostris*) have also been found interacting with the Hawaii-based SSLL fishery. From 2010-2014, two animals were both hooked by the longline gear, one in the lip (non-serious injury) and one in the mouth (serious injury) (Carretta et al. 2016). In general, and from the description of the interactions, the animals were feisty, swam away vigorously, or in one case (elephant seal), the animal was struggling as it was being hauled in. While NMFS made serious injury determinations for a few of the interactions documented due to the amount of gear (hook/leader) left on the animal, no mortalities were documented. From 2017-2021, three animals were captured by the hook and line fishery in California, hooked in the chin, mouth, or rear flipper, with two of these interactions resulting in serious injury determinations (Carretta et al. 2023b).

From 1994-2014, there had been no observed records of Guadalupe fur seals interacting with Hawaii-based longline gear. However, in late 2015, there was one confirmed interaction of a mouth-hooked Guadalupe fur seal in the Hawaii-based SSLL fishery. U.S. West Coast pinniped experts positively identified the fur seal upon review of the videotape of the interaction. The injury was determined not to be serious (Carretta et al. 2018). Additional videos of two unidentified pinnipeds that were hooked in the mouth in 2015 in the same fishery were also reviewed. NMFS scientists were not able to positively identify these animals, but they could have been Guadalupe fur seals. These interactions occurred outside of the U.S. EEZ, west of the California Current (Carretta et al. 2017b). When reviewing the observer’s data from the entire Hawaii-based SSLL fishery from 2004 through 2023 (100% coverage), a total of 13 Guadalupe fur seals were caught (1 dead and all the remaining 12 released alive but injured), and other 2 unidentified otariids were reported (both released alive but injured) (PIRO unpublished data). Based on these observations and records of other U.S. West Coast pinniped stocks interacting with pelagic longline gear, we anticipate that the gear used in the Proposed Action may capture Guadalupe fur seals; primarily the shallow-set component.

Guadalupe fur seals are expected to be exposed to interactions directly caused by hooking (likely) and/or entanglement in the leader for fishing gear deployed under the Proposed Action, likely for shallow-setting only. We do not anticipate that Guadalupe fur seals will interact with the deep-set longline-type gear based on a review of the records. However, we note that Guadalupe fur seal strandings have increased off the U.S. West Coast since early 2015, and this trend continues through the present; and Guadalupe fur seals are wide-ranging, based on published data and satellite telemetry of post-release stranded pups off central California (T. Norris, The Marine Mammal Center, personal communication, 2016 and 2017, as cited in NMFS 2018a). Guadalupe fur seals continue to strand off California in unprecedented numbers, and the population is growing by 10% per year, which could bring more animals north of the U.S./Mexico border and into the Proposed Action Area. Three pups that were satellite-tagged on Guadalupe Island in 2016 traveled 200-1,300 kilometers north of the island, with one animal stranding in Oregon (Norris et al. 2017). According to the FEIS (NMFS 2025a), and based on observed captures in the Hawaii-based SSLL fishery east of the 140ºW longitudinal line between 2004 and 2019 (the proxy dataset), with an expected number of hooks (244,000) in the shallow-set component of the Proposed Action, the expected number of captures of Guadalupe fur seals is less than 1 (0.6 individuals) annually. When translated to the total length of the EFP, we expect a total number of up to 6 Guadalupe fur seals to be taken over the 10-year period of the Proposed Action in the shallow-set component.

The requirement to use mackerel-type bait in the shallow-set longline EFP and the prohibition of squid as bait may minimize the attraction to the bait, given that Guadalupe fur seals primarily forage on squid (see Section 2.2.2.1, *Description and Geographic Range*). Given the expected number of hooks (662,400) in the deep-set longline component of the Proposed Action and the rate of interactions with the 2004-2019 Hawaii-based DSLL effort east of the 140ºW longitudinal line, we expect that no (zero) Guadalupe fur seals will be captured.

In total on an annual basis, we could expect that up to one Guadalupe fur seal interaction could occur. However, we also recognize that rare event bycatch is difficult to predict over a short time frame acknowledging that the probability and variability of rare events is difficult to predict in any one year. As a result, although the proxy data suggest that only Guadalupe fur seal interaction would be expected to occur in any given year, we assume that an additional interaction could occur based on variable conditions and exposure during any given year. Consequently, we anticipate that as many as two Guadalupe fur seal interactions could occur during any year.

The quantifiable response to capture in the gear used in the Proposed Action is the number of mortalities that result from interactions with the fishing gear used. A review of the serious injury/mortality records of U.S. West Coast pinniped stocks that have interacted with pelagic longline gear in the last five years (2017-2021; Carretta et al. 2023b), and a limited review of the pinniped interactions with the shallow-set component of the Hawaii-based longline fishery, indicate that Guadalupe fur seals would survive their initial encounter with longline gear used in this proposed EFP. With little information on the post-interaction survival rate of pinnipeds that are hooked/entangled in pelagic longline gear, we are hesitant to assume that a Guadalupe fur seal that is hooked/entangled will survive, particularly if a hook is ingested or remains externally hooked in the mouth/lip, and if a significant amount of line remains on the animal. Otariids, particularly California sea lions, have been seriously injured and killed by hook and line gear, which suggests that ingestion of hooks and/or entanglement in lines may serve as a serious threat to their survival. From 2017-2021, 136 pinnipeds were found seriously injured or killed by the hook and line fisheries off the U.S. West Coast, representing 8% of the total human-caused serious injury/mortality for this taxonomic group and the 3rd highest cause of serious injury/death (Carretta et al. 2023b).

For the 13 interactions of Guadalupe fur seals with Hawaii SSLL fishery that have been documented, five have been determined to have resulted in a serious injury, with one additional mortality (Carretta et al. 2023b; 2024 *in draft*). This equates to a mortality rate of approximately 46% for previous interactions of Guadalupe fur seals with longline gear in the Hawaii longline fishery. Therefore, given the risk of serious injury for pinnipeds posed by longline-type gear, we assume that about half of the Guadalupe fur seals that may interact with longline gear associated with the Proposed Action may die eventually as a result of their encounter, through impairment of feeding, infection, constriction of line around a head, body or appendage, etc. Even though animals may swim vigorously away following release, they could incur a serious injury that could lead to death. Therefore, we assume that up to three of the six Guadalupe fur seals that may be captured by the Proposed Action would ultimately be killed. Without more detailed information on the age class or sex of the Guadalupe fur seal that may encounter longline gear associated with this proposed EFP, we assume these individuals could be from any age class or sex, including post-weaned pups, juveniles, subadults or adults. Given the limited total of Guadalupe fur seal interactions anticipated over the entire Proposed Action, we expect that each of the two interactions that might occur during any year could lead to a mortality.

The response of Guadalupe fur seals to interactions with gear deployed under the Proposed Action is the death of three Guadalupe fur seals over ten years. Therefore, we will assess the risk of removing three Guadalupe fur seals from a minimum population estimate of approximately 31,019 animals.

As described in section 1.3.4 *Adaptive Management Program under the Proposed Action*, and in section 2.5.1.2 *Leatherbacks* above, NMFS proposes to take increasingly protective measures in response to leatherback interactions, to limit the amount of them that may occur as a result of the Proposed Action. Some of those measures, such as those that might restrict large-scale operation effort, could also work to limit the risk of Guadalupe fur seal bycatch, and reduce the total number of Guadalupe fur seal interactions that may occur as a result of the Proposed Action. However, we acknowledge that other potential measures that might be implemented under this adaptive management program could lead to effort distributions that might make Guadalupe fur seal interactions more likely. Given the level of uncertainty surrounding how frequently the adaptive management program may be implemented, and what measures may be implemented, we cannot generate clear expectations of what impacts this element should have on the number of Guadalupe fur seal interactions that may occur during the Proposed Action. On balance, we assume it does not change our expectations.

2.5.3. Marine Fish

The most significant hazard the deep-set and shallow-set EFPs in the Proposed Action presents to listed elasmobranchs results from hooking and entanglement by gear which can injure or kill individuals, similar to effects described above for sea turtles and marine mammals. Elasmobranchs that are hooked or entangled may not immediately die from their wounds, but experience physiological and metabolic stress that can result in delayed mortality, even after being released alive after capture. Additionally, they can suffer impaired swimming or foraging abilities, altered migratory behavior, and altered breeding or reproductive patterns. Although survivability studies have been conducted on some listed species captured in longline fisheries, long-term effects are nearly impossible to monitor; therefore, a quantitative measure of the effect of longlining on giant manta ray and oceanic whitetip shark populations is very difficult. Even if listed species are not injured or killed after being entangled or hooked, these interactions can be expected to elicit stress-responses that can have longer-term physiological or behavioral effects, also resulting in latent mortality in these species.

Based on observer records in the Hawaii-based longline fishery and on preliminary data collected by observers from the West Coast DSLL fishery utilizing longline gear, giant manta rays and oceanic whitetip sharks are rarely taken, likely because of the selectivity of the gear, and the area and depths fished, unlike the non-selectivity of gillnet. Similar to marine mammals, the probability of survival after initial capture in fishing gear for elasmobranchs is species-specific and age-specific of the individual involved. For instance, larger pelagic sharks hooked by a longline are more likely to survive the interaction or even break the gear than smaller individuals.

2.5.3.1. Giant manta ray

The stressors, exposure, response, and risk portion of the effects analysis for giant manta rays are described below.

Similar to sea turtles, when giant manta rays interact with longline gear, they are particularly prone to being entangled in fishing gear because of their body configuration and behavior. The giant manta ray tends to be more vulnerable to entanglement and foul hooking as opposed to being hooked in the mouth (Sales et al. 2010; Domingo et al. 2012). If entangled in a monofilament branch line or polypropylene float line, the giant manta ray is at risk of severing of the cephalic and pectoral fin, severe injuries that can lead to a reduction in feeding efficiency and even death.

There is very little information on the evidence and impact of entanglement on the giant manta ray. However, there are data regarding the reef manta (*Mobula alfredi*) which is a reasonable surrogate species since, prior to 2009, these two manta species are so similar that they were categorized as a single species. Surveys of the reef manta from 2005-2009 at an aggregation site off Maui, Hawaii, revealed that 10% of the population had an amputated or non-functional cephalic fin (Deakos et al. 2011). Most of these injuries were attributed to entanglement in fishing line (most likely from recreational or nearshore fisheries) since the straight edge cut of all amputated cephalic fins resemble the severing effects of monofilament (Deakos et al. 2011). In fact, eight individuals had physical evidence of entanglement with fishing line: two individuals had hooks in the cephalic fin, two had monofilament wrapped around the cephalic fin, another two had scars from previous line entanglements, and two individuals had line that had begun to cut part way through the cephalic fin (Deakos et al. 2011).

Deakos et al. (2011) observed that individuals in this population with an amputated cephalic fin appeared healthy; however, considering the function of the cephalic fin to guide food into the manta's mouth, feeding efficiency is most likely reduced, and the absence of this fin may negatively affect size, growth rate and reproductive success. Lastly, Deakos et al. (2011) report that videos show two reef manta rays in Hawaii, which were entangled in mooring lines, perish, and become immediately consumed by sharks. Although mooring lines are not used in this fishery, the material is similar to polypropylene float line, and shows that predators are quick to take advantage of an entangled animal.

The giant manta ray primarily feeds on planktonic organisms such as euphausiids, copepods, mysids, decapod larvae and shrimp, but some studies have noted their consumption of small and moderate sized fishes (Bigelow and Schroeder 1953; Carpenter and Niem 2001 as cited in Miller and Klimovich 2017). Due to its foraging behavior the giant manta ray tends to be more vulnerable to foul hooking as opposed to being hooked in the mouth (Mas et al. 2015).

As with other marine species described in this section, even if the hook is external and removed, a captured giant manta ray is still at risk of post-release tissue and physiological trauma (Miller and Klimovich 2017). But because they are seldom boarded due to their large size, fishermen tend to cut the branch line instead of removing the hook. If the giant manta ray does ingest the hook, the process of movement, either by the manta ray's attempt to get free of the hook or by being hauled in by the vessel, can traumatize the internal organs or pull the organs from their connective tissue. Once the hook is set and pierces an organ, infection may ensue, which may result in the death of the animal.

Given their size, giant manta rays are seldom boarded, and similar to leatherback sea turtles, fishermen are instructed to cut the line as close to the hook as possible after the observer views the animal on trips that are observed. Occasionally, the branch line breaks during an interaction and the majority of the line may remain attached to the animal. If entangled in trailing line, the giant manta ray is at risk of severing of the cephalic and pectoral fin, which are considered severe injuries that can lead to a reduction in feeding efficiency and even death. Trailing line can become snagged on a floating or fixed object, further entangling the giant manta ray or the drag from the float can cause the line to constrict around a manta's cephalic fin until the line cuts through the appendage.

Giant manta rays are expected to be exposed to interactions directly caused by hooking and entanglement in fishing gear deployed under the Proposed Action, both when they are deep-setting or shallow-setting. As described in the FEIS (NMFS 2025a) and in our analytic approach (section 2.1), the expected number of giant manta rays was based on the takes observed in the Hawaii-based longline fishery (both shallow-set and deep-set, calculated separately) east of the 140ºW meridian (the proxy dataset), divided by the observed number of hooks in that fishery from 2004-2019 (each component, separately), then multiplied by the number of hooks anticipated in each component of the EFP, respectively (i.e., deep-setting and shallow-setting). According to the FEIS (NMFS 2025a), and based on the observer's data from the proxy dataset, with an expected number of hooks (244,000) in the shallow-set component of the Proposed Action, 0 (zero) giant manta rays are expected to be taken annually or over the 10-year period of the Proposed Action. However, documentation of giant manta ray off the U.S. West Coast exists, and observer data from the California DGN fishery from 2001 through 2020 indicate that one giant manta ray was caught by this fishery and released dead (see Appendix 4 in the FEIS, NMFS 2025a). Hence, although observer data from the Hawaii-based 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, a review of existing data for other fisheries conducted in the Proposed Action Area (i.e., California DGN) suggests that giant manta ray can interact with longline-type fishing gears in the proposed EFP. Therefore, based on the qualitative assessment that this risk cannot be discounted, we assume that an estimated total number of one giant manta ray would be taken by each of the two components (both shallow-set and deep-set) of the EFP, for a total of two giant manta ray interactions over the 10-year period of the Proposed Action. In total on an annual basis, we could expect that up to one giant manta ray interaction could occur. However, we also recognize that rare event bycatch is difficult to predict over a short time frame acknowledging that the probability and variability of rare events is difficult to predict in any one year. As a result, although the proxy data suggest that only one giant manta ray interaction would be expected to occur in any given year, we assume that both interactions anticipated over the Proposed Action could occur based on variable conditions and exposure during any given year. Consequently, we anticipate that as many as two giant manta ray interactions could occur during any year.

Similar to all sea turtle species analyses above, we assume that the response of giant manta rays to bycatch in longline-type gear along the U.S. West Coast would be similar to the Hawaii-based longline fisheries. Accordingly, we use the fishery mortality rates for giant manta ray interactions for the entire Hawaii-based longline fishery taken from most recent biological opinions on the continued authorization of this fishery, both SSLL (NMFS 2019b) and DSLL (NMFS 2023b). These mortality rates were estimated to be approximately 41% in the SSLL and 43% in the DSLL. Due to the lack of sufficient information to estimate post-interaction mortality in giant manta rays[24], and given the similarities between giant manta ray and leatherback sea

[24] An extensive review of the literature for post-release survivorship for *Mobulidae* spp. has determined that there are no studies specific to longline fisheries that assess the effect of remaining gear on manta and mobulid species or the effect of stress and injuries that may be sustained during capture (Mas et al. 2015; Griffiths and Lezama-Ochoa 2021).

turtles in regards to interactions with longlines, these mortality rates were based on information from leatherbacks as an appropriate surrogate species and using the post-interaction criteria by Ryder et al. (2006) applied to leatherback interactions with this fishery (NMFS 2019b; NMFS 2023b). Therefore, we estimate a total number of two giant manta ray interactions (one interaction in each of the two components of the EFP), resulting in a total of two mortalities (1*0.41=0.41, round up to 1, in the SSSL; 1*0.43=0.43, round up to 1, in the DSLL) over the 10-year period of the Proposed Action. As stated above, since we anticipate both interactions could occur in the same year, we expect both of those mortalities could occur in the same year.

Therefore, the response of giant manta rays to interactions with gear deployed under the Proposed Action is the death of two giant manta rays over a maximum of ten years. Thus, we will assess the risk of removing two giant manta rays from a minimum population estimate of approximately 1,000 animals.

As described in section 1.3.4 *Adaptive Management Program under the Proposed Action*, and in section 2.5.1.2 *Leatherbacks* above, NMFS proposes to take increasingly protective measures in response to leatherback interactions, to limit the amount of them that occur as a result of the Proposed Action. Some of those measures, such as those that might restrict large-scale operation effort, could also work to limit the risk of giant manta ray bycatch, and reduce the total number of giant manta ray interactions that may occur as a result of the Proposed Action. However, we acknowledge that other potential measures that might be implemented under this adaptive management program could lead to effort distributions that might make giant manta ray interactions. Given the level of uncertainty surrounding how frequently the adaptive management program may be implemented, and what measures may be implemented, we cannot generate clear expectations of what impacts this element should have on the number of green turtle interactions that may occur during the Proposed Action. On balance, we assume it does not change our expectations.

2.5.3.2. Oceanic whitetip shark

The stressors, exposure, response, and risk portion of the effects analysis for oceanic whitetip sharks are described below. NMFS expects that oceanic whitetip sharks directly affected by fishing interactions associated with the EFP are from the EPO's population. Direct and indirect effects on this population, as listed, are summarized in the Integration and Synthesis of Effects (Section 2.7).

Although most pelagic sharks tend to be hooked by longline gear, they can sink the gear as they dive and if they begin rolling, can become entangled in the monofilament branch lines and mainline. An entanglement as such, could cause the shark to perish if it is unable to circulate water through its gills, especially for ram-ventilating species, such as the oceanic whitetip sharks, and in warmer and less oxygenated waters (Bernal et al. 2012, Schlaff et al. 2014, Dell'Apa et al. 2023). The literature on sharks captured on longline gear is primarily focused on the effects of hooking, post-release handling, and post-hooking mortality, not entanglement in longline gear. However, marine debris data compiled in NOAA's 2014 Marine Debris Program Report reveals several accounts of sharks entangled in natural fiber rope and monofilament (NOAA Marine Debris Program 2014). A shortfin mako shark (*Isurus oxyrinchus*) entangled in natural fiber rope, resulted in scoliosis, abrasions and was undernourished (Wegner and Cartamil 2012), and the monofilament found encircling a blacknose shark (*Carcharhinus acronotus*) caused its spine to be deformed (Schwartz 1984). In general, entanglement could directly or indirectly interfere with the shark's mobility, causing impairment in feeding, breeding, or migration.

Pelagic sharks can be incidentally caught by longlines when they bite baited hooks or depredate on catch, resulting in injuries that can be external-generally in the mouth, jaw, gills, roof of mouth, tail and fin or ingested internally (considered deeply hooked or gut-hooked). Even if the hook is removed, which is often possible with a lightly hooked shark, the hooking interaction is believed to be a significant event. As previously mentioned, capture on a longline is a stressful experience. On average, soak times in the Hawaii DSLL are approximately 21 hours and may last longer. During capture, the amount of water flowing over the gills is limited and biochemical recovery can take up to 2 to 7 days, and even longer for injured sharks (Campana et al. 2009). Also, sharks are vulnerable to predation while being captured due to their restricted mobility, and after their release due to exhaustion and injury. Furthermore, handling procedures can cause additional damage (e.g., cutting the jaw, tail, gaffing, etc.), stress, or death.

A gut-hooked shark is at risk of severe damage to vital organs and excessive bleeding. Campana et al. (2009) found in a post-release mortality study that 33% of tagged blue sharks (*Prionace glauca*) with extensive trauma, such as a gut-hooking, perished. Campana et al. (2009) attribute rapid post-release mortality of sharks to occur because of the trauma from the hooking rather than any interference with digestion or starvation.

Excessive trailing gear could directly or indirectly interfere with a shark's mobility, causing impairment in feeding, breeding, or migration. Further, trailing line can also become snagged on a floating or fixed object, further entangling the shark or the drag from the float can cause the line to constrict around the body of the shark or its fins. Members of the Western and Central Pacific Fisheries Commission are required to regulate their vessels consistent with the conservation and management measures (CMM) for the oceanic whitetip shark. Pursuant to CMM 2011-04 (provisionally updated to CMM 2022-04), NMFS has implemented regulations (50 CFR 300.226 and 50 CFR 665.811) requiring vessels to release any oceanic whitetip shark that is caught as soon as possible after the shark is brought alongside the vessel, and to do so in a manner that results in as little harm to the shark as possible. In accordance with this measure, the amount of trailing gear shall be minimal as to cause as little harm as possible.

According to information provided by WCR SFD, oceanic whitetip sharks are expected to be exposed to interactions directly caused by the Proposed Action due to hooking and entanglement by fishing gear deployed by the shallow-setting component only, with no expected interactions in the deep-setting component of the Proposed Action. As described in the FEIS (NMFS 2025a) and in our analytic approach (section 2.1), the expected number of oceanic whitetip sharks was based on the takes observed in the Hawaii-based longline fishery (both shallow-set and deep-set, calculated separately) east of the 140ºW meridian (the proxy dataset), divided by the observed number of hooks in that fishery from 2004-2019 (each component, separately), then multiplied by the number of hooks anticipated in each component of the EFP, respectively (i.e., deep-setting and shallow-setting). According to the FEIS (NMFS 2025a), and based on the observer's data from the proxy dataset (2004-2019), with an expected number of hooks (244,000) in the shallow-set component of the Proposed Action, less than one (approximately 0.3) oceanic whitetip sharks are expected to be taken annually, which amounts to a total number of three individuals over the 10-year period of the Proposed Action. Based on observer's data from the proxy dataset, it is predicted that one-fourth of oceanic whitetip sharks (25%) would be expected to be caught dead in the shallow-set component of the EFP.

Similarly, given the expected number of hooks (662,400) in the deep-set component of the EFP, and based on the interaction rate documented in the deep-setting component of the proxy dataset (average of approximately 20% observer coverage for the period 2004-2019), it is estimated that 0 (zero) oceanic whitetip sharks would be taken in the proposed EFP. However, based on information from the most recent biological opinion to authorize the entire Hawaii-based DSLL fishery (i.e., including west of the 140ºW longitude), it is reported that oceanic whitetip sharks have been incidentally captured in the Hawaii DSLL fishery every year since 1994 (NMFS 2023b). However, it was not until 2004 that observations of the species in this fishery were separated from the Hawaii SSLL fishery. From 2004 to 2022, 6,139 *observed* interactions with oceanic whitetip sharks were reported in the Hawaii-based DSLL fishery. After adjusting these numbers to account for the percentage of observer coverage (~20%), approximately 31,467 oceanic whitetip sharks are likely to have been captured in the Hawaii-based DSLL fishery between 2004 and 2022 (NMFS 2023b). As described in the species *Description and Geographic Range* at section 2.2.3.2, oceanic whitetip sharks in the Pacific Ocean may be one population, as there is currently no scientific evidence indicating a lack of connectivity across the Pacific Ocean between the West Pacific and East Pacific populations, given the fact that the species can migrate long distances. Although oceanic whitetip sharks were not observed captured in the California DGN fishery from 2001-2020, this fishery uses fishing gear different from that being used under the Proposed Action. Also, oceanic whitetip sharks have been observed in southern California waters and around the Channel Islands, more commonly during warmer water years (Ebert et al. 2017), most likely because oceanic whitetip sharks are generally considered a warmer water species more frequently distributed in southern waters in the EPO. Therefore, based on the qualitative assessment that this risk cannot be discounted, we assume that an estimated total number of one oceanic whitetip shark would be captured by the deep-set component of the Proposed Action over ten years.

We quantified the response to the stressors in the Proposed Action as the number of oceanic whitetip shark mortalities that can be expected to result from interactions with fishing gear used. The response to the predicted exposure, which is anticipated to be four interactions over a 10-year period (three interactions in the shallow-set component and one interaction in the deep-set component of the EFP), is converted into a number of estimated mortalities resulting from this exposure. As described above, and similar to giant manta rays, we assume that the exposure of oceanic whitetip sharks throughout the Hawaii-based longline fishery, both SSLL and DSLL components of the fishery, would not be different than the exposure to the same fishery east of 140ºW longitude. Therefore, we considered the fishing mortality rates estimated in the most recent biological opinions on the continued authorization of the Hawaii-based SSLL fishery, which was calculated as an annual range between 23% and 59% (NMFS 2019b), and the Hawaii-based DSLL fishery, which was estimated as an annual range between 27% and 30% (NMFS 2023b[25]). When considering these mortality rates for each component of the EFP, separately, we estimate that a total number of two oceanic whitetip sharks in the shallow-set component (3*0.59=1.77, round up to 2) and one oceanic whitetip sharks in the deep-set component (1*0.3=0.3, round up to 1) could be killed as a result of EFP interactions over the 10-year period of the Proposed Action. In total on an annual basis, we could expect that only one oceanic whitetip shark interaction could occur. However, we also recognize that rare event bycatch is difficult to predict over a short time frame acknowledging that the probability and variability of rare events is difficult to predict in any one year. As a result, although the proxy data suggest that only one oceanic whitetip shark interaction would be expected to occur in any given year, we assume that an additional interaction could occur based on variable conditions and exposure during any given year. Consequently, we anticipate that as many as two oceanic whitetip shark interactions could occur during any year, that both could result in mortality given the relatively high mortality rate that might occur.

Therefore, the response of oceanic whitetip sharks to interactions with the longline gear deployed by the proposed EFP is the death of three oceanic whitetip sharks; two caught in the SSLL component and one caught in the DSLL component of the EFP, over a maximum of ten years. Consequently, we will assess the risk of removing three individuals from a population estimate of 516,809 sharks in the EPO population of oceanic whitetip sharks.

As described in section 1.3.4 *Adaptive Management Program under the Proposed Action*, and in section 2.5.1.2 *Leatherbacks* above*,* NMFS proposes to take increasingly protective measures in response to leatherback interactions, to limit the amount of them that may occur as a result of the Proposed Action. Some of those measures, such as those that might restrict large-scale operation effort, could also work to limit the risk of oceanic whitetip shark bycatch, and reduce the total number of oceanic whitetip sharks that may occur as result of the Proposed Action. However, we acknowledge that other potential measures that might be implemented under this adaptive management program could lead to effort distributions that might make oceanic whitetip shark interactions more likely. Given the level of uncertainty surrounding how frequently the adaptive management program may be implemented, and what measures may be implemented, we cannot generate clear expectations of what impacts this element should have on the number of oceanic whitetip shark interactions that may occur during the Proposed Action. On balance, we assume it does not change our expectations.

[25] In the most recent biological opinion for the authorization of the Hawaii-based DSLL fishery (NMFS 2023b), the total fishing mortality for oceanic whitetip sharks is also based on the post-release mortality by Hutchinson et al. (2021), which is considered as best estimate for post-release mortality in this fishery for oceanic whitetip sharks, and differences in individuals' post-release mortality due to the absence or presence of trailing gear when the shark is released in the water.

2.5.4. Aggregation of Effects Across the Proposed Action

As has been stated and reiterated in the BA, DEIS (NMFS 2024a), the FEIS (NMFS 2025a), and throughout the Biological Opinion, there is considerable uncertainty about how use of the proxy dataset applies to longline-type effort within the U.S. West Coast EEZ. In order to generate expected numbers and severity of interactions, we have used the assumptions associated with shallow-set and deep-set operations independently to generate estimates for each component, to then sum in total for the entire EFP. However, we recognize that there is potential for the risks of shallow-set and deep-set gear within the U.S. West Coast EEZ to be different from outside the EEZ, for numerous reasons including differential habitat usage and abundance/density of ESA-listed species. Another aspect that concerns us is that previous research has demonstrated that deep-set longline gear does not necessarily perform as theoretically predicted, under the practices that define deep-set gear. Results by Rice et al. (2007) suggest that hook depth predictions based on catenary geometry[26] can significantly overestimate the actual fishing depth during longline fishing gear deployments, and the authors found that the majority of the hook depth distributions for shallow and deep hook positions in the study achieved only 43% and 31%, respectively, of the depths predicted by catenary equations. Based on results by Rice et al. (2007), we assume that an unknown portion of the deep-set longline hooks/effort in the Proposed Action may inadvertently end up at depths shallower than expected by catenary geometry models, thus resulting in a higher chance for leatherback interactions with deep-set fishing gear in the Proposed Action than originally expected. While this may be inherently true in the Hawaii longline fisheries used as the proxy dataset for generation of risk, this element could be confounding to bycatch rates in different locations such as within the U.S. West Coast EEZ.

Based on these uncertainties, we consider there is effectively some level of overlapping risk between shallow-set and deep-set operations, and that some unpredicted events with either shallow-set or deep-set operations could occur. Therefore, we view the total impacts aggregated across the EFPs under the Proposed Action summed across all operations as our anticipated level of effects from the Proposed Action. As a specific example, while use of the proxy dataset does not lead us to predict any leatherback interactions to occur with deep-set operations, we consider that as possible and potentially within bounds of our expectations, within the total anticipated level of effects we have described above, including total interactions and the number of mortalities. There is inherently a risk of variance from expectations across all operations. Ultimately, the realized number of interactions and mortalities across all operations that occur will guide whether the effects of the Proposed Action are within what has been anticipated.

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[26] The depth of pelagic longlines is commonly estimated using mathematical models based on catenary geometry. Catenary geometry assumes that the fishing gear in the water orients in the vertical plane due to gravity and buoyancy as the only acting forces to the gear. According to this model, the "sagging" of the mainline is due to gravity pulling downward on the fishing gear while buoyancy caused by surface buoys pulls the gear upward near the surface. As the longline gear sinks, the horizontal distance between the floats decreases. Conversely, as the horizontal distance between floats increases due to oceanic currents or wind, "sagging" in the mainline decreases and shoaling of the gear occurs (Yoshihara 1954; Rice et al. 2007).

2.5.5. Effect on Bycatch in Other Fisheries

We acknowledge that the impacts of this Proposed Action may be the result of some EFP participants foregoing some opportunity to participate in other currently authorized HMS fisheries such as the Hawaii longline and DGN fishery (NMFS 2024a; BA). While that may affect the total risk of bycatch of ESA-listed in those fisheries, assuming other vessels in those fisheries do not change their effort levels, there is not clearly a 1-for-1 reduction in risk associated with units of effort established across all these different fisheries given the differences in gear and location of this Proposed Action, and the associated uncertainties in risk that have been discussed previously in this Biological Opinion. In addition, any effort that is forgone in other authorized fisheries by EFP participants does not necessarily preclude the anticipated levels of "rare event" bycatch that are associated with those fisheries from occurring as a result from the remaining participants in those fisheries. Therefore, we assume that the anticipated impacts of other authorized fisheries on ESA-listed species will continue to occur.

2.6. Cumulative Effects

"Cumulative effects" are those effects of future state or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation (50 CFR 402.02). Future Federal actions that are unrelated to the Proposed Action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Because the Proposed Action will take place over a 10-year period, we reviewed any information on future activities that might take place over the reasonable near-term. Some continuing non-Federal activities are reasonably certain to contribute to the overall environmental health and habitat quality within the action area. In section 2.4 *Environmental Baseline*, we described the current and ongoing impacts associated with other activities that affect ESA-listed species along the U.S. West Coast. We are reasonably certain that these activities and impacts will continue to occur while this Proposed Action occurs. Some continuing non-Federal activities are also reasonably certain to contribute to climate effects within the Proposed Action Area. However, it is difficult if not impossible to distinguish between the action area's future environmental conditions caused by global climate change that are properly part of the environmental baseline vs. cumulative effects. Therefore, all relevant future climate-related environmental conditions in the action area are described earlier in the discussion of environmental baseline (Section 2.4), or in the status of the species (Section 2.2).

Other than the existing baseline threats and the continuing effects of climate change on listed species covered in this Opinion, we did not identify additional state or private activities that are reasonably certain to occur within the action area, do not involve Federal activities (including permitting), and could result in cumulative effects to ESA-listed species and designated critical habitat within the Action Area. During the consultation, we worked with SFD to review available information in their possession about such activities, including information in their FEIS on this Proposed Action. We also reviewed and considered other recently issued biological opinions by

WCR PRD in the Action Area. Activities that may occur in the Action Area, including some areas that are in relatively distant areas offshore the U.S. West Coast, will likely consist in actions related to ocean use policy and management of public resources, such as commercial and recreational fishing, aquaculture, energy development that includes offshore wind, and other spatial planning/management projects. Changes in ocean use policies as a result of non-Federal government action are highly uncertain and may be subject to sudden changes as political and financial situations develop. Examples of actions that may occur include changes to state fisheries which may alter fishing patterns or influence the bycatch of ESA-listed species; installation of wind/wave energy projects or aquaculture projects near areas where ESA-listed species are known to migrate through or congregate; designation or modification of marine protected areas that include habitat or resources that are known to affect ESA-listed species; and coastal development which may alter patterns of shipping or boating traffic. However, none of these potential state, local, or private actions, can be anticipated with any reasonable certainty in the Proposed Action Area at this time, and most all actions in federal waters of the EEZ of those described as examples would likely involve federal involvement (e.g., permitting) of some type that require future ESA consultation.

2.7. Integration and Synthesis

The Integration and Synthesis section is the final step in assessing the risk that the Proposed Action poses to species and critical habitat. In this section, we add the effects of the action (Section 2.5) to the environmental baseline (Section 2.4) and the cumulative effects (Section 2.6), taking into account the status of the species and critical habitat (Section 2.2), to formulate the agency's biological opinion as to whether the Proposed Action is likely to: (1) reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing its numbers, reproduction, or distribution; or (2) appreciably diminish the value of designated or proposed critical habitat as a whole for the conservation of the species. Within the boundaries of the Proposed Action Area, there is critical habitat for leatherback sea turtles, both the Central America and Mexico DPS of humpback whales, and Southern Resident DPS killer whales. However, this Biological Opinion does not perform an analysis of destruction or adverse modification of critical habitat because NMFS has determined that the Proposed Action is not likely to adversely affect these designated critical habitats (section 2.12 "*Not Likely to Adversely Affect" Determinations*).

Because we lack any longline-type fishery-related data in the action area, we rely primarily on the observer data and interaction rates from the much larger Hawaii-based longline fishery, both shallow-set and deep-set components, to evaluate risks to ESA-listed species considered in this Opinion. Based on: (1) the interaction rates associated with the Hawaii-based longline fisheries east of the 140ºW meridian (2004-2019); (2) the immediate and post-hooking mortality rates for sea turtles interacting with the Hawaii-based longline fisheries and Ryder et al. (2006); (3) proposed adaptive management program and programmatic responses to instances of take or observed mortality for leatherback under the adaptive management program; and (4) assumed post-interaction mortality rates for Guadalupe fur seals, giant manta rays, and oceanic whitetip sharks, we anticipate the following captures and mortalities each year and over the 10-year period of the Proposed Action:

- Up to four loggerheads may be captured, with up to two mortalities in any year; and up to 30 may be captured over 10 years, with 7 mortalities or serious injuries
- Up to three leatherbacks may be captured in one year, and up to two in all other years, and up to 17 may be captured over ten years, with up to four mortalities or serious injuries
- Up to two olive ridley may be captured and killed in any year; and up to six may be captured over 10 years, with five mortalities or serious injuries
- Up to two green sea turtle may be captured and killed in any year; and up to four captured, all resulting in mortalities or serious injuries over 10 years
- Up to two Guadalupe fur seal may be captured and killed in any year; and up to six captured over 10 years, with three resulting in mortalities or serious injuries
- Up to two giant manta ray may be captured and killed in any year; and up to two captured, all resulting in mortalities or serious injuries over 10 years
- Up to two oceanic whitetip sharks may be captured and killed in any year; and up to four captured over 10 years, with three resulting in mortalities or serious injuries

We next consider the risk these deaths pose to the sea turtle, Guadalupe fur seal, giant manta ray, and oceanic whitetip shark populations. We considered those losses over the next ten years and when added to the environmental baseline for these species, whether the impacts appreciably reduce the likelihood of survival and recovery of these species, as currently listed under the ESA.

As described in Section 2.5.5 Effect on Bycatch in Other Fisheries, we conclude that the Proposed Action does not necessarily preclude the anticipated levels of "rare event" bycatch that are associated with other fisheries associated with the Status of the Species (Section 2.2) or Environmental Baseline (Section 2.4) from occurring. Therefore, we assume that the anticipated impacts of other authorized fisheries on ESA-listed species will continue to occur as part of our Integration and Synthesis. However, we recognize that the DGN fishery is going to sunset at the end of 2027; a little less than three years from the completion of this Opinion. As such, we will factor in that anticipated effects from the DGN fishery will no longer occur into our Integration and Synthesis.

The description of the Proposed Action's effects includes any influence of current environmental conditions and their associated variability. While climate change is expected to continue over the relatively short duration of the action's direct and indirect effects, we cannot distinguish changes in temperature, precipitation, or other factors attributable to climate change, including changes in predator-prey relationships, from annual and decadal climate variability over this 10-year time period (NMFS-WCR 2016). Within the Proposed Action Area and over the next several decades, several species (e.g., leatherback sea turtles, but also swordfish) are expected to shift their distributions poleward and offshore, primarily in waters off OR and WA, most likely due to a combination of more favorable thermal conditions and distributional shifts of their prey (Lezama-Ochoa et al. 2024). However, as described in the *Rangewide Status of the Species*

(Section 2.2) and *Environmental Baseline* (Section 2.4), analyses of these climate-driven distributional shifts of species or responses to threats are almost exclusively based on ~50-100 timeframes, which precludes a clear identification of forthcoming changes in marine environmental conditions and associated influence on species and the Proposed Action's effects over the next decade. The *Status of the Species* and *Environmental Baseline* have generally captured the impacts that are happening to these ESA-listed species as the conditions in the Pacific Ocean change over the last decade, as part of the underlying climate change that is occuring. For these reasons, although climate change is expected to continue to affect species distribution, and present or exacerbate threats over the long term, it is not expected to amplify the effects of the Proposed Action (10-year time period) in ways not already described in the Effects section, or any other components of the Integration and Synthesis.

2.7.1. Sea Turtles

As described in the *Status of the Species* for leatherback sea turtles, there have been recent efforts to derive a quantitative approach for establishing turtle bycatch management frameworks for U.S. and international fisheries (Curtis et al. 2015). However, the implications of applying such a framework into the ESA management and policy decision making process have not been fully evaluated. It is clear that there will have to be reconciliation between the mandates of the ESA along with any further development of a bycatch management program for sea turtles before NMFS can implement any such framework. In the future, it does seem possible that such approaches could yield insight into appropriate short and long-term limits for sea turtle bycatch based on variable population status or conditions. Until then, NMFS will continue to rely on the best available information relating impacts to ESA-listed sea turtles and other species under the existing ESA standards.

2.7.1.1. Loggerhead – North Pacific DPS

The North Pacific Ocean DPS of loggerhead sea turtles is listed as endangered under the ESA. This DPS nests nearly exclusively on the mainland and offshore islands of Japan. There was a documented decline in the number of nesting turtles comprising this DPS between 50 and 90 percent since the 1950s (Kamezaki et al. 2003). However, since 2003/2004, an increasing trend of approximately 9% annual growth in the number of nests has been documented for the entire nesting assemblage, through 2015 (i.e., all nesting beaches combined) (Y. Matsuzawa, S, personal communication, 2017). This positive trend can likely be attributed to a complete ban on egg harvest in the mid-1970s, bycatch reduction implementation measures in pelagic longline fisheries in the North Pacific (e.g., circle hooks; TurtleWatch), increases in survival through safe handling, and sea turtle bycatch resolutions in regional fishery management organizations, among other conservation efforts.

Recent abundance estimates suggest that there are approximately 342,000 North Pacific loggerheads, given nesting female abundance estimates, as well as adult male/juvenile abundance estimates (T. Jones, NMFS-PIFSC personal communication, 2019; Martin et al. 2020a). A recent PVA by Martin et al. (2020a) indicates that the Yakushima subpopulation of

4,541 adult females is increasing at a rate of approximately 2.3%/year. Assuming that the index beaches represent 52% of all nesting in this DPS, there are an estimated 8,733 adult females in this DPS.

Off southern California, aerial surveys conducted during 2015, when anomalous warming of the North Pacific and El Niño conditions occurred, resulted in an estimated 70,000 loggerheads foraging in the area (Eguchi et al. 2018). A similarly designed aerial survey was conducted during a non-El Niño year (2011) that yielded zero observed loggerheads in southern California. This indicates that, while most of the loggerheads observed taken in the DGN fishery occurred during anomalously warm ocean conditions, there may be high variability of loggerhead density in the area where the majority of the effort of this proposed action may occur.

As described in the *Status of the Species* (section 2.2.1.1), North Pacific loggerheads nesting in Japan are threatened by coastal development as well as coastal fisheries, which likely threaten the later life stages, such as large juveniles and adults. Fisheries bycatch from pelagic longlining are the greatest threat to this DPS throughout the North Pacific, with hundreds (if not thousands, depending on the source) of loggerheads killed each year. In the WCPO, participating countries reporting to the Western and Central Fisheries Commission, given observed interactions from 2013 to 2020, produced an estimate of approximately 2,387 interactions per year, with an estimated 390 loggerhead mortalities per year. With low observer coverage in these international fleets (~3%), confidence in these estimates are low (i.e., only 69 loggerheads were observed during that time period). Nonetheless, we have more confidence in data from our domestic longline fishery, given 100% observer coverage in the Hawaii-based SSLL fishery and approximately 20% observer coverage in the Hawaii-based DSLL fishery, along with variable coverage in the ASLL fishery where zero loggerheads interactions have been observed. The most recent biological opinions indicate that, up to approximately 36 loggerheads are expected to be incidentally captured each year in these two fisheries combined (up to 27 in the SSLL and approximately 9 in the DSLL component, respectively), with up to nearly 10 anticipated mortalities each year assuming historical mortality rates from the injuries that have occurred in the past (approximately 5 mortalities estimated in SSLL and approximately 5 mortalities estimated in DSLL). Given that most of these turtles are taken in their oceanic phase, most loggerheads taken in the pelagic longline fisheries are likely juveniles/subadults. Thus, if we consider high 95% CI from the WCPFC estimates (452 loggerheads) (WCPFC 2021), we can assume that around 462 loggerheads may be removed from the population each year in the North Pacific Ocean by pelagic longline fisheries. These could be an underestimate, considering the estimated number of loggerheads taken by 16 countries in this same area from 1989 to 2015 (10,980 animals = 610 loggerheads/year), but we do not know the variability of captures over decades, and with loggerheads showing an increasing trend, there may be more animals in the North Pacific Ocean interacting with longline gear.

The mitigation proposed for this action requires fishermen to use circle hooks and fish-type bait, which recent studies have shown reduced interactions in the Hawaii-based SSLL fishery by 95% following the 2004 regulations (Swimmer et al. 2017). In addition, given the Proposed Action Area, including an exclusion of portions of the SCB area, we anticipate that the risk of interactions with the North Pacific loggerhead DPS to be minimized. Nevertheless, we anticipate that up to 30 loggerhead sea turtles could be entangled or hooked in longline-type gear over the 10-year period associated with the Proposed Action (up to 4 loggerhead in any year), four of which may end up as a mortality or serious injury of a juvenile female that could have survived to adulthood. All of these animals are likely to be juveniles, given the age class observed of loggerheads that have been documented taken in Hawaii-based longline fisheries and the CA DGN fishery, and seen in ship-board and aerial-based surveys of loggerheads off southern California and aerial-based surveys off Baja California.

The removal of four adult females (equivalent) over the next ten years constitutes less than 0.1 (0.045) percent of the estimated adult female population (8,733). The removal of up to 30 juvenile turtles over the next ten years within a total estimated population of loggerheads foraging off southern California when conditions are optimal for them given anomalously warm sea surface temperatures (70,000,) is 0.04% of the local population. This is a very small proportion of the total population. This level of impact is essentially undetectable within the total population compared to the variations in nesting patterns that have been seen in the last two decades. With respect to the local juvenile population that may be present off the southern California coast numbering in the tens of thousands primarily during anomalously warm ocean conditions, which may occur during the next ten years, the potential removal of up to 30 juveniles over the next ten years is also a relatively small impact (<0.01%). As described earlier, there is a high probability that this level of effects will not be reached during this Proposed Action, given that the effects of the conservative additional measures and the adaptive management program cannot be fully quantified.

Currently, the dynamics in place are suggesting that recruitment is outpacing removals, despite the fact that known sources of mortality are quite large, particularly from bycatch in fisheries. While accurate or reliable totals of bycatch interactions or mortality for loggerheads across the Pacific are not available, based on what is known about threats off Baja California, Mexico and Japan, it seems likely that annual loggerhead bycatch totals can be measured in at least the hundreds, if not thousands. Other impacts associated with threats to nesting beach activity and nesting habitat in Japan are not easily quantified, but it appears that conditions at some primary and secondary beaches are improving.

The 2023 biological opinion on the DGN fishery also concluded that the loss of one adult female for the last five years from the DGN fishery presented negligible additional risk to survival and recovery of the North Pacific DPS loggerhead population (NMFS 2023c). Considering an equivalent level of impact anticipated from this Proposed Action, though, from a different fishing type gear, these results are consistent with other modeling results (e.g., Martin et al. 2020a, which assessed the removal of loggerheads in the Hawaii-based SSLL fishery, given PVA projections) that have yet to quantitatively conclude discernible changes in the risk of extinction to loggerheads in the North Pacific to the low level of impact anticipated under this Proposed Action. We note that the limited risk to the population from the DGN will be eliminated during this Proposed Action, starting in 2028.

At this time, there seems to be little change in the outcome of analyses using the tools or approaches available to quantitatively assess the impact of removing very small numbers of juvenile loggerheads from the North Pacific DPS. The most current information suggests that North Pacific loggerheads are increasing at around 2.3%/year (Martin et al. 2020a). In comparison, expected impacts to this loggerhead population from the longline fishery currently estimated in this Biological Opinion are less (in some cases substantially) than what was analyzed in the models and analyses presented above. As a result, the resultant impact of repeating any of these modeling exercises with a smaller level of adult female removal would be expected to be even less. These results are consistent in that none of the modeling or analytical results have yet to quantitatively describe changes in extinction risks to North Pacific DPS attributed to the type of low level of impact anticipated under this Proposed Action.

In addition to the risk of extinction for loggerhead populations, NMFS must also consider the impact of the Proposed Action on the prospects for recovery of ESA-listed species under the jeopardy standard. NMFS has been actively engaged in research and conservation efforts that are directed towards facilitating recovery, with recovery tasks and goals identified by NMFS and USFWS (1998a) for loggerheads in the U.S. Pacific. It seems likely that any abundance goals for populations, including the North Pacific DPS, rest on factors of productivity and mortality throughout their range that are not likely to be affected by the limited removal of no more than a few juveniles, including four adult females equivalent with eventual reproductive potential over the next ten years. As a result, the limited mortality of 4 adult females equivalent over the next ten years would present negligible additional risk to this DPS of loggerheads. This would not be expected to prohibit this nesting population from increasing or maintaining a stable population in perpetuity, nor would it substantially impair or prohibit increases to the foraging population at key foraging grounds, especially considering the effects of the action will cease within the next ten years. As a result, it seems unlikely that this anticipated effect from this Proposed Action will appreciably affect the chances of survival or recovery of this population.

Given the best available information, we conclude that the anticipated occasional incidental take and resulting mortality of North Pacific DPS loggerhead sea turtles associated with the Proposed Action is not likely to appreciably reduce the likelihood of survival or recovery of this species.

2.7.1.2. Leatherbacks

As discussed in the *Status of the Species* (section 2.2.1.2), leatherback sea turtles are globally listed as endangered. The species is composed of seven populations, and the Proposed Action may adversely affect the WPO and the EPO populations, although we have assumed that the potential risk to the EPO population to be extremely low. In addition, as described, critical habitat was revised in 2012 (77 FR 4170) to include additional areas within the U.S. West Coast, which provide added protection of their principal biological feature, primarily scyphomedusae.

In the WPO, the primary nesting beaches are located in Papua Barat, Indonesia and have provided us with long-term monitoring surveys in order to understand the abundance of nesting females, trends, hatchling success, and threats due to coastal inundation, predation, harvest of eggs and sea turtles, and other factors that may be impeding its recovery. A recent discovery of a previously undocumented nesting area on Buru Island, Indonesia and relatively new sites on the Solomon Islands suggest that additional undocumented nesting habitats may exist on other remote or infrequently monitored islands of the WPO (NMFS and USFWS 2020b). In the EPO, researchers have been surveying primary leatherback nesting sites for decades, particularly in Costa Rica, so we have more confidence in abundance estimates, trends, and threats to that subpopulation. However, we acknowledge there are secondary beaches that may not be surveyed as regularly, and thus the abundance and trends are uncertain.

As summarized in the *Status of the Species* (section 2.2.1.2), the most recent estimated number of nesting females at Jamursba Medi and Wermon beaches, where 50%-75% of nesting believed to occur in the WPO, is 790 nesting females (Martin et al. 2020a). Applying the conservative estimate of 75% to the Martin et al. (2020a) estimate yields 1,054 nesting females in this subpopulation, as of 2017. Assuming a 73% female sex ratio yields an estimated 1,443 adult leatherbacks in the WPO subpopulation. Using assumptions in Jones et al. (2012) and life history parameters, survival rates, etc. in Martin et al. (2020a), NMFS estimates the juvenile and adult population size of the WPO subpopulation to be 100,000 leatherbacks (NMFS 2023b).

Recent preliminary data from the two index beaches indicates that the nest numbers were relatively stable from 2017 to 2021 (Lontoh et al. in prep); however, the data are not available in sufficient detail to update the Martin et al. (2020a) model. Hence, we acknowledge that there is uncertainty associated with the current status of WPO leatherbacks, as represented by the two index beaches. Using the median trend in annual nest counts from Jamursba Medi (2001-2017) and Wermon (2006-2017), Martin et al. (2020a) estimated the combined trends for the two index beaches to be -6% annually. Until we receive the detailed raw monthly data from the nesting beaches, the growth trend analysis of Martin et al. (2020a) through 2017 cannot be updated.

Notably, however, we are seeing a positive growth trend using a newly established monitoring program (since 2017) on Buru Island, Indonesia which estimates approximately 103 adult female nesters. This would constitute an addition to the modeled estimate of 790 adult females nesting at the two index beaches on Papua Barat. Over the six years of data collected by this monitoring program (which may span two remigration intervals for leatherbacks), Buru Island is showing an increasing trend of 10.1% per year, which is a positive sign for this subpopulation.

Using the best available data to assess the status of the EPO population, NMFS and USFWS (2020b) estimated that there are approximately 1,007 nesting females, given what is known through monitoring the index beaches, which comprise approximately 75% of the total nesting in the population. Assuming a sex ratio of 79% females (Santidrian-Tomillo et al. 2014), suggests a total of 1,274 adults (males and females). Based on data from Jones et al. (2012), we expected that adults comprise a mean of 2.1% of the total population size, which would suggest an estimated 60,611 individuals in the subpopulation. The trend at the nesting beaches in Mexico and Costa Rica show a decline of -4.3%/year for Mexico (given the worst-case scenario) and a decline of -15.5% per year for Costa Rica (Las Baulas; NMFS and USFWS 2020b).

Given the Proposed Action and associated fishing effort over a 10-year period, including the programmatic responses to interactions or observed mortality included in the adaptive management program for the Proposed Action, we anticipate that up to 17 leatherback sea turtles could be entangled in the Proposed Action over ten years (up to 3 leatherbacks in one year, and up to 2 in any other year), with four of these interactions that could result in mortalities. Based on the fact that approximately 67% of leatherbacks captured off central California were females (Benson et al. 2007b), we also assume that three of these four anticipated mortalities could involve adult females. Based on genetic analyses of leatherbacks taken in the DGN fishery and captured for research in central California, all of these turtles originated from the WPO population. Therefore, we shall focus the majority of our integration and synthesis on this population, considering the effects of the Proposed Action and status and environmental baseline. The prospect of removing up to three adult females over the next ten years represents less than 0.3% (0.28%) of the total WPO adult female population (1,054). Given an estimated 100,000 adults and juveniles in the WPO population, the loss of four individuals over ten years represents 0.004% of the population.

We add the EFP effects to the status and environmental baseline of interactions and mortalities from other fisheries, including international and domestic fisheries occurring primarily outside of the U.S. West Coast EEZ. These fisheries and their effects are likely to continue and may increase over time due to the effects of increased human population and consumption of fish products, although the Proposed Action will continue for ten years. However, we note that resolutions implementing sea turtle bycatch reductions (e.g., use of circle hooks and/or fish bait) throughout the western central Pacific Ocean have likely significantly reduced leatherback bycatch, depending on which countries are implementing the measures. Swimmer et al. (2017) found that the mean bycatch rates of leatherbacks in the Hawaii-based SSLL fishery declined by 84% for the post-regulation period, which has required large circle hooks and the use of mackerel-type bait since 2004. Therefore, the proposed mitigation measures required for this Proposed Action to use circle hooks and fish-type bait in both shallow-set and deep-set components would further help minimize the risk of interactions with leatherbacks. In addition, the adaptive management program and tiger team process is specifically tailored to respond to leatherback interactions, and implement additional measures to reduce risk through revised EFP terms and conditions. Ultimately, there is a high probability that this level of effects will not be reached during this Proposed Action, given that the effects of the conservative additional measures and the adaptive management program cannot be fully quantified.

Fisheries bycatch from pelagic longlining are the greatest known threat to Pacific leatherbacks, with hundreds of leatherbacks killed each year, but these estimates are uncertain. In the WCPO, participating countries reporting to the Western and Central Fisheries Commission, given observed interactions from 2013 to 2020, produced an estimate of approximately 722 interactions per year, with an estimated 76 leatherback mortalities per year (this included a small portion of Hawaii reports from the DSLL fishery described below). With low observer coverage in these international fleets (~3%), confidence in these estimates are low (i.e., only 18 leatherbacks were observed during that time period). Nonetheless, we have more confidence in data from our domestic longline fishery, given 100% observer coverage in the Hawaii-based SSLL fishery and approximately 20% observer coverage in the Hawaii-based DSLL fishery and variable coverage in the ASLL fishery. The most recent biological opinions indicate that, on average, approximately 27 leatherbacks are expected to be incidentally captured each year in the Hawaii-based longline fisheries combined (mean of 11 in the SSLL and mean of 17 in the DSLL component, respectively), with around four anticipated mortalities each year assuming historical mortality rates from the injuries that have occurred in the past (2 mortality estimates for the mean in SSLL and 2 mortality estimates for the mean in DSLL). Thus, if we consider high 95% CI from the WCPFC estimates (mortality of 136 individuals per year), we can assume that around 150 leatherbacks may be removed from the population each year by pelagic longline fisheries.

In the South China and Sulu-Suluwesi Seas, less is known of leatherback interactions with coastal and artisanal fisheries. Traditional harvest of adult and subadult leatherbacks in the Kei Islands have been significantly reduced. In addition, conservation efforts at the two major nesting beaches in Papua Barat have increased nest success rates and hatchling production, due in part to increased efforts to protect nests from predation, tidal inundation, erosion and high sand temperatures. Similar protections at Buru Island have reduced poaching and predation of nests and killing of nesting females. By 2022, less than 1% of nests were poached, and no nesting females were taken. Conservation efforts to address many of these threats have been significant, although measurable increases in nesting females may not be realized for some years, given the long-lived slow-to-mature nature of sea turtles.

Using satellite tracking of post-nesting females and foraging males and females as well as genetic and stable isotope analyses indicate that leatherback found off the U.S. West Coast are from the Western Pacific nesting populations, specifically boreal summer nesters. Approximately 38-57 percent of summer-nesting females from Papua Barat migrate to distant foraging grounds off the U.S. West Coast, including the neritic waters off Central California. Using 28 years of aerial survey data, Benson et al. (2020) estimate that leatherback abundance off the U.S. West Coast has declined at an annual rate of 5.6%. Within the Proposed Action Area, leatherbacks have been documented interacting with coastal pot/trap fisheries and the DGN fishery (albeit rarely), have been killed by vessel strikes, entrained in power plants (rarely), and taken through scientific research (i.e., pelagic trawls, hand captures, etc.). Off the U.S. West Coast, Pacific leatherbacks face fewer threats than they do outside the Proposed Action Area.

Based on studies involving large-scale movements of leatherbacks into the CCE, fewer turtles would be found in the Proposed Action Area where fishing effort is likely to occur under the Proposed Action, since leatherbacks have been documented typically arriving in the SCB in the spring time, traveling in the nearshore area as they approach the central/northern California areas (Benson et al. 2011). As described, the loss of three adult females (equivalent), represents a very small proportion of the total population. Locally, the potential mortality of individuals from a group of less than 200 individuals during a single year that may be foraging off the U.S. West Coast would be more significant.

In this Biological Opinion, we consider that the Proposed Action is expected to occur each year for the next ten years. Over this time period, we expect that the WPO leatherback population may lose up to three adult females over the next ten years as a result of this Proposed Action.

The major index beaches of the WPO population have been declining through 2017, at around 6%, indicating reproductive females were not being replaced as nesting counts continued to decline. The major threats identified to leatherbacks in this region are related to activities on nesting beaches (e.g., coastal erosion, feral pigs, environmental perturbations in the marine environment), directed take, and bycatch in fisheries. Conservation actions to address many of these threats have been significant, and there is optimism that some of the efforts may be beginning to show measurable increases in productivity on the nesting beaches, as suggested by recent nesting counts described above in the leatherback *Status of the Species* (Section 2.2.1.2). This type of recovery, allowing for the lag in population dynamics for long-lived and slow-maturing species, has been shown by leatherback populations on other beaches such as St. Croix, USVI, where nesting females increased at 13% per year, following approximately 10 years after protection of nesting beaches (Dutton et al. 2005).

In 2015, NMFS identified Pacific leatherbacks as a "Species in the Spotlight," which resulted in the development of a five-year priority action plan. The top five priority actions for recovery included: 1) reduction of fisheries interactions; 2) improvement of nesting beach protection and increased reproductive output; 3) international cooperation; 4) monitoring and research; and 5) public engagement. While NMFS (and USFWS) are already engaged in these activities throughout the Pacific through its work with non-governmental organizations, other government agencies, regional fishery management organizations, bilateral collaborations and interaction with the general public, increased engagement and resources will certainly help the situation and hopefully reverse the trend seen on the nesting beaches. Subadult and adult leatherbacks have high reproductive value and conservation efforts on other nesting beaches have been seen within relatively short periods of time. The conversion of hundreds of longline vessels operating in the Pacific to large circle hooks and/or fish-type bait could result in a more stable and potentially increasing trend in the nesting population. Continued or increased protection efforts on the nesting beaches should increase the reproductive output as has occurred on other leatherback nesting beaches such as in the Caribbean.

Previous consultations on the DGN fishery or similar actions that affect Western Pacific leatherbacks have considered the impact of small numbers of leatherback mortality. The 2023 biological opinion concluded that up to 1 death of leatherbacks per year was likely below a level that would appreciably affect survival and recovery (NMFS 2023c). Other actions looking at the effect of losing one female considered the prospect that conservation actions in recent years were likely to facilitate the chance that increases in young turtles would act as a buffer to provide more recruits into the adult population, in context with the very small level of impact expected. In the NMFS (2012b) biological opinion on the Hawaii-based SSLL longline fishery, two different modeling approaches considered the impact of annually removing four adult females from the population per year using analyses by Van Houtan (2011), and neither of these models offered evidence that an appreciable difference of relative extinction risk was detectable from the removal of four adult females. The 2023 biological opinion on the DGN fishery also concluded that the loss of one adult female per year from the DGN fishery presented negligible additional risk to survival and recovery of the Western Pacific leatherback sea turtle population. We note that the limited risk to the population from the DGN will be eliminated during this Proposed Action, starting in 2028. Recent PVAs that have assessed the removal of leatherbacks in the Hawaii and American Samoa-based longline fisheries (Martin et al. 2020a, 2020b; Siders et al. 2023; NMFS 2023b, 2023d) have yet to quantitatively conclude discernible changes in the risk of extinction to leatherbacks in the Western Pacific as a result of the levels of impact considered in those longline fisheries.

In comparison, expected impacts to this leatherback population from the longline fishery in this proposed EFP currently estimated in this Biological Opinion are less (in some cases substantially) than what has been quantitatively analyzed in the models and analyses described above. As a result, we conclude that the resultant impact of repeating any of these modeling exercises considering the removal of only 3 more females over the next ten years would predictably also conclude that no discernable risk of extinction would be evident from analysis of the impact of the Proposed Action over the next ten years. These results are consistent in that none of the modeling or analytical results have yet to quantitatively describe changes in extinction risks to leatherback in the Pacific attributed to the type of low level of impact anticipated under this Proposed Action. While questions have been raised regarding the impacts of climate change on leatherback sea turtles, uncertainty remains related to future nesting beach forecasts and correlations with climate indices such as the PDO, and we do not expect climate change to amplify the condition of leatherback populations in the Pacific Ocean over a 10-year period.

In order for the WPO population of leatherback sea turtles to remain viable, it is reasonable to expect that the dominant factors currently (and historically for such a long-lived species) affecting survival must improve. As mentioned previously, leatherbacks are vulnerable to international fisheries across the Pacific, which are likely responsible for the mortalities of hundreds of juveniles, sub-adults, and adults. In addition, there have been threats documented on the nesting beaches, including the directed harvest of adults and eggs, as well as other major threats to egg and hatchling survival from predators and coastal erosion. As described in the *Status of the Species* (section 2.2.1.2), significant conservation actions have been taken throughout the range of WPO leatherbacks to address and reduce these threats from historical levels that were driving the significant population declines that have been documented. Recent data from the nesting beaches may be pointing to early signs that conservation actions are having some positive influence as survival rates appear to be improving.

In addition to the risk of extinction for leatherback populations, NMFS must also consider the impact of proposed actions on the prospects for recovery of ESA-listed species under the jeopardy standard. The NMFS and USFWS (1998b) recovery plan for leatherback sea turtles in the U.S. Pacific Ocean contains a number of goals and criteria that should be met to achieve recovery for this species. A number of these goals are being addressed through the research efforts determining stock structure of populations and monitoring their status, at least for populations that range into U.S. waters. It seems likely that any abundance goals for leatherback populations, including the WPO, rest on the productivity of nesting beaches in concert with increased survival rates of individuals throughout their range and life-cycle.

We conclude that the small effect on the population from the removal of four adult leatherbacks over ten years, when considered together with the environmental baseline and the cumulative effects, will not be detectable or appreciable with respect to the population's trajectory for the foreseeable future. The leatherback population has not declined to the level where the additional loss of this number of turtles would have a significant influence on the survival and/or recovery of this population and the leatherback species as a whole.

The optimal chance of leatherback sea turtle recovery in the Pacific rests in the reproductive capability and the relatively high fecundity of sea turtles. Each female leatherback produces around 400 eggs each season they reproduce (Tapilatu and Tiwari 2007; Hitipuew et al. 2007; Dutton et al. 2007). Regardless of how many times a female does reproduce, only one out of all these offspring hatchlings needs to survive as an adult female to achieve replacement, although we should not discount the importance of male survival to ensure reproductive capacity into the future. The current sex ratio of this population has been estimated at 73% female. While skewed sex ratio could be a problem in general, it may also underlie the potential for relatively high productivity and population growth rates should other factors affecting survival across their life-cycle become more favorable. The mating system of sea turtles is both polyandrous (1 female fertilized by more than 1 male) and polygynous (1 male mates with more than 1 female), and occurs in areas where turtles congregate near natal home ranges (see Bell et al. 2010 review). Males from some sea turtle species have been found to return to waters adjacent to some nesting beaches more often than females, but it is unclear whether potentially reduced males due to climate change variability (hotter sand temperatures produce more female hatchlings) may impact the maintenance of breeding rates (Hays et al. 2010). It seems possible that fewer males than females may be needed for adequate mating, with the added benefit that increased percentage of females could lead to more nesting activity and egg production.

Studies have concluded that there was no evidence for depensation (reduced fertility due to small population size) for various green and loggerhead sea turtle populations that were examined, even for very small turtle populations (Bell et al. 2010). These factors suggest that recovery potential exists for small turtle populations that are much smaller than the current WPO leatherback population, and a number of small populations of turtles have shown signs of recovering fairly quickly after conservation efforts have been implemented (see Bell et al. 2010 for review). It has also been documented that much smaller populations of much less productive species have rebounded quickly given the right conditions (e.g., Mediterranean monk seals; Martinez-Jauregui et al. 2012).

The limited mortality of three adult females (equivalent) over the next ten years would present negligible additional risk to the chances of survival and recovery of the WPO leatherback sea turtle population. Consequently, we would not expect the Proposed Activity to prohibit leatherback nesting populations from increasing or maintaining a stable population in perpetuity, nor would it substantially impair or prohibit increases to leatherback foraging populations at key foraging grounds. As a result, it seems unlikely that the effects of the Proposed Action on the survival and recovery of this population would be detected.

Given the best available information, we conclude that the limited incidental take and resulting mortality of up to four leatherback sea turtles, three of which are estimated to be adult females (equivalent), associated with the Proposed Action is not reasonably expected to cause an appreciable reduction in the likelihood of survival or recovery of this species.

2.7.1.3. Olive ridleys

Olive ridley turtles are the most abundant sea turtle species in the world, with millions estimated nesting in the EPO and at-sea in the Eastern Tropical Pacific Ocean, where animals found in the action area assumed to originate. Nevertheless, the breeding population along the Pacific coast of Mexico are listed as endangered; all other populations are listed as threatened under the ESA. The most recent status review (NMFS and USFWS 2014) characterized populations and trends by both ESA status and by *arribada* and non-*arribada* nesting populations. Given that animals found in the Proposed Action Area originate from the EPO, the Proposed Action may affect olive ridleys originating from the endangered Pacific Mexican nesting beaches or from the threatened non-Pacific Mexican nesting beach. Recent estimates indicate that over one million olive ridley females nest in the EPO, with indication of stable or increasing populations.

The available nesting data from Mexican breeding populations suggest the population is increasing substantially, presumably in response to the significant efforts to reduce nesting beach harvest across the region. Annual nesting in Mexico alone is estimated to be more than one million nests, with well over one million individual olive ridleys estimated to inhabit eastern tropical Pacific waters. Olive ridleys are generally a tropical species, and based on stranding records, they are likely more occasional visitors to the offshore water of the U.S. West Coast EEZ, and seem to only be very rarely encountered by most activities, including the rare, chance entanglement with DGN gear. Only one adult female olive ridley turtle was documented interacting with commercial or recreational fishing gear within the U.S. West Coast from 2017-2021. There are two state gillnet fisheries in California that may interact with sea turtles: the set gillnet fishery targeting halibut and white seabass; and the small mesh drift gillnet fishery targeting yellowtail, barracuda, and white seabass. No other olive ridley sea turtle interactions have been documented recently, although observer coverage of these fisheries has been limited and irregular.

Throughout the Pacific Ocean, olive ridleys face a myriad of threats, from coastal and pelagic bycatch in fisheries, particularly longline, trawl, and gillnet fisheries, legal and illegal harvest of eggs and turtles, marine debris, habitat loss due to human encroachment and expanding populations, predation, etc. Because there are millions of olive ridleys estimated in the eastern tropical Pacific Ocean, thousands of animals are likely impacted by human-caused activities, especially pelagic fisheries. Nonetheless, most *arribada* and non-*arribada* nesting beaches are stable or increasing, so these activities do not appear to impede the recovery of olive ridleys. The

Pacific olive ridley recovery plan (NMFS and USFWS 1998c) states that (along with 4 other criteria) all females estimated to nest annually at "source beaches" must be stable or increasing for over 10 years in order to be considered for delisting. The latest status review indicated that the endangered Pacific Mexico breeding population may need to be reclassified due to increasing or stabilizing trends at most of the nesting beaches, as well as the decreased threats to both nesting and foraging/migrating olive ridleys. For the globally listed threatened population of olive ridleys, the latest status review concluded that olive ridleys should remain threatened. NMFS and USFWS (2014) also recommended that olive ridleys should be reviewed globally for consideration of DPSs.

In the action area, olive ridleys are rarely encountered by U.S. West Coast-based fisheries, and are rarely found entrained in power plants, entangled in marine debris, etc. In fact, most of the documented strandings of olive ridleys along California and the Pacific Northwest are animals found "ill," and presumed cold-stunned, or out of habitat.

In this Biological Opinion, we have identified that olive ridley sea turtles from the eastern Pacific nesting population are most likely to be affected by the Proposed Action occurring off the U.S. West Coast. We anticipate that up to six olive ridleys may become entangled or captured in longline-type gear associated with the Proposed Action over ten years (up to 2 olive ridleys in any year), with an estimated total number of five individuals killed. It is possible this may result in a mortality or serious injury of five adult females, so we will consider the conservative scenario that this would lead to a removal of five adult females from the population (approximately 1,000,000). In a population that numbers over one million at a minimum, the loss of five individuals, male or female, over ten years would not result in a detectable impact to the total population. Ultimately, there is a high probability that this level of effects will not be reached during this Proposed Action, given that the conservative additional measures and the adaptive management program cannot be fully quantified.

In addition to the risk of extinction, we must also consider the impact of proposed actions on the prospects for recovery of ESA-listed species under the jeopardy standard. The recovery tasks and goals identified by NMFS and USFWS (1998c) for U.S Pacific populations of olive ridley sea turtles are focused on the research and conservation activities that NMFS has been actively engaged in. As with other ESA-listed sea turtle species in the Pacific it seems likely that any abundance goals for populations, including the populations in the EPO, rest on factors of productivity and mortality throughout their range that are not likely to be affected by the removal of five adult females in the next ten years. This small impact will be insignificant to the future recovery potential of the species.

Given the best available information, we conclude that the anticipated occasional incidental take and resulting mortality of five olive ridley sea turtles associated with the Proposed Action is not likely to appreciably reduce the likelihood of survival or recovery of this species.

2.7.1.4. Green sea turtles – Eastern Pacific DPS

The East Pacific DPS green sea turtle is listed as threatened under the ESA. The IUCN (2021) assessed the East Pacific green sea turtles as "vulnerable," resulting in the downlisting of their endangered status (IUCN 2021). Seminoff et al. (2015) ranked the DPS as having a low risk of extinction based on the abundance of nesting females. On July 19, 2023, NMFS and the USFWS proposed designating critical habitat for the East Pacific green sea turtle DPS as well as several other (five) DPSs within U.S. jurisdiction (88 FR 46572).

Given the abundance of nesting females in Mexico (13,664 nesters), Ecuador (3,603 females in the Galapagos and 15 on the mainland) and Costa Rica (2,826 females), Seminoff et al. (2015) estimated the adult female population to be 20,062 females. NMFS recently estimated over 3,500,000 individuals over one year old are in this population that is likely increasing owing in part to the significant conservation efforts around the region (NMFS 2023b).

In this Biological Opinion, we have identified that green sea turtles from the East Pacific DPS are most likely to be affected by the Proposed Action occurring off the U.S. West Coast. We anticipate that up to four green sea turtles may become entangled or captured in longline-type gear associated with the Proposed Action over ten years (up to 2 green sea turtles in any year). It is likely that all interactions may result in a mortality or serious injury, so we will consider conservatively that this would lead to the removal of four adult females from the population. Ultimately, there is a high probability that this level of effects will not be reached during this Proposed Action, given that the conservative additional measures and the adaptive management program that cannot be fully quantified.

Although the significance of the northern foraging aggregations off southern California is not fully understood, it is possible that healthy and robust groups of green sea turtles living at the relative edge of their home range is indicative of a population showing some signs of recovery as opposed to being on the verge of extinction. Threats to green sea turtles within the U.S. West Coast EEZ include occasional bycatch in some coastal fisheries and exposure to boating and vessel traffic, especially in dense population centers such as southern California. With the exception of occasional boat strikes and entrainment in power plants historically (section 2.2.1.4), we have not identified any other serious threat to the population of green turtles in the Proposed Action Area.

The potential bycatch and loss of four adult females in the Proposed Action during ten years from a population of over 20,000 adult females in the East Pacific DPS equates to 0.02% of the population. We believe the effect on the population would be undetectable, particularly considering the natural variation in factors such as environmental productivity and survival rates for all sea turtles, including green sea turtles, in addition to the evidence of an increasing trend.

In addition to the risk of extinction, we must also consider the impact of the Proposed Action on the prospects for recovery of ESA-listed species under the jeopardy standard. The recovery tasks and goals identified by NMFS and USFWS (1998d) for eastern Pacific green sea turtles are focused on the research and conservation activities that NMFS has been actively engaged in. As with other ESA-listed sea turtle species in the Pacific it seems likely that any abundance goals for populations, including the populations in the eastern Pacific, rest on factors of productivity and mortality throughout their range that are not likely to be affected by the occasional removal of four adult females over ten years. This small impact will be insignificant to the future recovery potential of the species.

Given the best available information, we conclude that the limited anticipated incidental take and resulting mortality of four East Pacific DPS green sea turtles associated with the Proposed Action is not likely to appreciably reduce the likelihood of survival or recovery of this species.

2.7.2. Marine Mammals

When assessing the impact of proposed or ongoing projects on marine mammals under the MMPA, NMFS relies upon the concept of PBR level to assist or guide decision-making about acceptable or appropriate levels of impact. As described in the MMPA, PBR is defined as "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 (OSP; 16 U.S.C. 1362 (20)." In addition, the MMPA states that PBR is calculated as the product of three elements: the minimum population estimate (Nmin) of the stock; half the maximum net productivity rate (0.5R max) of the stock at a small population size; and a recovery factor (Fr) between 0.1 and 1.0. PBR is an approach developed to assess incidental take of marine mammals under the MMPA. It uses conservative minimum population estimates and a Fr based on the population status and is also comprehensive because it calculates take (total take) per stock. The underlying analysis supporting the PBR concept examined the impact of population removals for a period of 100 years in terms of the time delay in populations reaching carrying capacity. These simulations evaluated the robustness of each case over a range of bias or uncertainty in productivity rates, abundance estimation, and mortality estimation (Wade 1998). Given this long-term simulation approach used to support this concept, the levels established under the PBR are most appropriate for examining the impact of annual average removals over a long period of time, and are not an indicator of some point beyond which the stock could not reach OSP at all, over shorter time periods, or within a given year.

It is important to note that while PBR serves as a useful metric for gauging the relative level of impact on marine mammal stocks as defined in the MMPA, PBR by itself does not equate to a species or population level assessment under the ESA where analyses are conducted at the level of the species as listed as threatened or endangered. The concept of managing impacts to marine mammal populations to levels that do not significantly affect recovery times shares the general intent of the jeopardy standard of the ESA in terms of looking at both the continued existence and recovery of a population. However, the ESA does not rely specifically on the same metrics or directly relate the likelihood of recovery to potential delay of recovery. Therefore, we use the PBR concept from the MMPA to help characterize the relative impact of the longline-type gear considered in the Proposed Action on the MMPA stocks of ESA-listed marine mammals likely to be adversely affected by EFP fishing (i.e., Guadalupe fur seals), and then relate those findings to the species as a whole under the jeopardy standard of the ESA.

2.7.2.1. Guadalupe fur seals

Guadalupe fur seals are listed globally as threatened under the ESA. Since 1985, when the species was first listed, the species has experienced positive growth, particularly since it was considered nearly extinct in the early 1900s. This growth can likely be attributed to a complete ban on harvest and trade of fur, protection of the rookeries and adjacent areas by Mexico, and the lack of threats to individuals and habitats.

The minimum population estimate is estimated to be 31,019 animals, with an annual growth rate over the period 1955-1993 of ~14%. The maximum annual human-caused mortality/serious injury rate that can be allowed while not impairing the growth rate and recovery of this species (potential biological removal) is 1,062 animals per year (Carretta et al. 2024).

While little is known of the threats to Guadalupe fur seals outside of the Proposed Action Area, researchers from Mexico note that population estimates continue to increase and few animals strand. In addition, Guadalupe fur seals appear to be expanding their range, with births documented on San Miguel Island, California since 2008. Off the U.S. West Coast, there have been two "unusual mortality events" declared for Guadalupe fur seals, one in the Pacific Northwest in 2007 and one declared in 2015 off California, which ended in September 2021 and resulted in a total of 715 stranded Guadalupe fur seals between 2015-2021.[27] Most of the animals that were documented stranded were young weaned animals, malnourished and emaciated, likely due to a lack of resources, particularly their preferred prey, squid. Some fur seals were also found entangled in fishing gear, including marine debris, and others were found injured potentially due to their depredation on actively fished gear/bait.

We anticipate that, given recent interactions of Guadalupe fur seals and unidentified pinnipeds with the Hawaii-based longline fishery and the increasing population of Guadalupe fur seals in the action area, up to six Guadalupe fur seals may be entangled or hooked in longline-type gear associated with the Proposed Action over ten years (up to 2 Guadalupe fur seal in any year), with three of the animal dying from the interaction (likely post-interaction mortality). With a PBR level of 1,062 animals per year, the loss of three animals as a result of the Proposed Action represents less than 1% of the PBR. Ultimately, there is a high probability that this level of effects will not be reached during this Proposed Action, given that the conservative additional measures and the adaptive management program cannot be fully quantified.

Considering the current abundance, distribution, positive population trend, and the PBR level considered for this population, as well as the threats and conservation efforts (including blanket protection from harvest throughout its range), and cumulative effects, NMFS finds it unlikely that the loss of up to three Guadalupe fur seals in ten years will have a detectable effect on the numbers, reproduction, or distribution of the population. Therefore, NMFS does not expect the Proposed Action to reduce appreciably the likelihood of both survival and recovery of Guadalupe fur seals, as globally listed.

2.7.3. Marine Fish

2.7.3.1. Giant manta ray

In this Biological Opinion, we have identified that giant manta rays are likely to be affected by this Proposed Action occurring off the U.S. West Coast EEZ. We anticipate that up to two giant manta rays may become entangled or captured by the Proposed Action over ten years (both could

[27] https://www.fisheries.noaa.gov/national/marine-life-distress/2015-2021-guadalupe-fur-seal-and-2015-northern-fur-seal-unusual

occur in any given year). It is possible this may result in a mortality or serious injury, so we will consider conservatively that this take of two individuals would lead to a removal from the population. Ultimately, there is a high probability that this level of effects will not be reached during this Proposed Action, given the conservative additional measures and the adaptive management program that cannot be fully quantified.

The abundance of the global population of giant mays, or of the regional population that may be exposed and vulnerable to bycatch in the Proposed Action, is unknown. Manta rays are listed as threatened under the ESA, with a regional population size estimated between 500 and 1,500 individuals. However, ongoing research including mark-recapture analyses suggests that typical subpopulation abundances are more likely in the low thousands (e.g., Beale et al. 2019) and in rare cases may exceed 22,000 in areas with extremely high productivity, such as in coastal Ecuador (Harty et al. 2022). Assuming the population that may be impacted by the Proposed Action over the next ten years may have around 1,000 individuals at least, this results in the potential removal of up to 0.2% of the total population, which is a very small impact on the population. We believe the effect on the population would be undetectable, particularly considering the natural variation in factors such as environmental productivity and survival rates.

Since the range of giant manta rays in the Pacific Ocean includes equatorial tropical and sub-tropical water, it does extend north to southern California and overlaps with the action area (Miller and Klimovich 2017). Due to their fragmented populations, low fecundity, and primary threat from commercial fishing, their likelihood of recovery is low.[28] Due to the lack of historical observer data from pelagic longlines in the Proposed Action Area, we consider observer data from the California DGN fishery, where manta ray bycatch has been documented, though in low numbers and only during El Niño events (Miller and Klimovich 2017). Since 2000, only one giant manta ray has been observed caught in the California DGN fishery (NMFS observer program data). We understand that those caught incidentally to the fishery may have been misidentified to other *Mobula* species that look similar (NMFS observer program). We consider the possibility that changes in the DGN fishery since the 1990s, that included large reductions in fishing effort, implementation of minimum extender lengths, and seasonal closures during El Nino conditions for loggerhead sea turtle protection, have also worked to minimize the risk of giant manta ray bycatch. Given all this, we proceed with a qualitative assessment of the bycatch risk for this species may occur over the next ten years due to the uncertainty around the specifics whether any or all of these three preceding factors may have contributed to their reduced bycatch in the DGN over the past two decades. The 2023 biological opinion on the DGN fishery also concluded that the loss of one giant manta ray during the last five years from the DGN fishery presented negligible additional risk to survival and recovery of the giant manta ray population (NMFS 2023c). We note that the limited risk to the population from the DGN will be eliminated during this Proposed Action, starting in 2028.

[28] https://www.fisheries.noaa.gov/species/giant-manta-ray

Given the best available information, we conclude that the limited incidental take and resulting mortality of two giant manta rays associated with the Proposed Action is not likely to appreciably reduce the likelihood of survival or recovery of this species.

2.7.3.2. Oceanic whitetip shark

In this Biological Opinion, we have identified that oceanic whitetip sharks are most likely to be affected by the longline-type fisheries under this Proposed Action occurring off the U.S. West Coast EEZ. We anticipate that up to four oceanic whitetip sharks may become entangled or hooked by longline-type gear associated with the Proposed Action over ten years (up to 2 oceanic whitetip sharks in any year). It is possible this may result in mortality or serious injury for up to three oceanic whitetip sharks, so we will conservatively consider this will lead to the removal of three individuals from the population. Ultimately, there is a high probability that this level of effects will not be reached during this Proposed Action, given the conservative additional measures and the adaptive management program that cannot be fully quantified.

As described in the *Rangewide Status of the Species* (section 2.2.3.2) of this Biological Opinion, the best available information suggests that oceanic whitetip sharks in the Pacific Ocean are likely a single population, as there is currently no scientific evidence indicating a lack of connectivity between the WPO and EPO populations. Based on the results of Tremblay-Boyer et al. (2019), we consider that the portion of the population represented by the EPO stock is composed of approximately 516,809 oceanic whitetip sharks. Given that this estimate represents only part of the Pacific population, we analyzed the species under two scenarios: the EPO stock estimate is a reasonable *minimum* population size for the species in the Pacific Ocean (N= ~516,809); and the EPO stock estimate represents about 40% of the total number of oceanic whitetip sharks that comprise the total Pacific Ocean population (N= ~1.2M). Oceanic whitetip sharks have low fecundities (between 0 and 15 pups) and a biennial reproductive cycle.

Oceanic whitetip sharks are listed as threatened throughout their geographic range, including in the Proposed Action Area, and are classified as overfished and have experienced substantial declines in abundance, total biomass, spawning biomass, and recruitment levels (Futerman 2018). Also, the potential impacts from climate change on oceanic whitetip sharks and their habitat are highly uncertain. Modeling results from Hazen et al. (2012) suggests that the shark guild as a whole may have the greatest risk of pelagic habitat loss in the Eastern North Pacific region compared with other large pelagic species. While effects from climate change have the potential to pose a threat to sharks in general, including habitat changes such as changes in currents and ocean circulation and potential impacts to prey species, species-specific impacts to oceanic whitetip sharks and their habitat are currently unknown. Young et al. (2018) believe they are likely to be minimal, though results by Andrzejaczek et al. (2018) from oceanic whitetip sharks in the Northwest Atlantic indicates that this species may have a higher risk of metabolic challenges as their habitat may approach upper thermal limits for the species in the future due to ocean warming, with also possible habitat mismatches between oceanic whitetip sharks and their prey, further reducing the overall habitat in which they can feed (Andrzejaczek et al. 2018). However, oceanic whitetip sharks may be able to move to areas that suit their biological and ecological needs, as they would be able to expand their future horizontal distribution and shift their distribution to deeper waters as a strategy to remain in a habitat within optimal physiological requirements (Dell'Apa et al. 2023). Ultimately, we do not expect climate change to amplify the condition of ocean whitetip populations in the Pacific Ocean over a 10-year period.

While the primary threat to the oceanic whitetip shark's survival and recovery in the Pacific Ocean is fishing, particularly their capture and mortality occurring in longline and purse seine fisheries, we recognize that the Proposed Action, and similar to the current Hawaii-based longline fishery and other WCPO longline and purse seine fisheries in the Pacific Ocean, proposes a number of measures to help reduce capture and mortality from capture and implement safe release practices in the proposed longline-type fisheries. For instance, the use of monofilament rather than wire leaders can help sharks to bite through the leaders and facilitate a quicker release from the gear, which is a measure that may have helped the increasing WCPO oceanic whitetip shark population in recent years (Bigelow et al. 2022).

We anticipate that, given recent interactions of oceanic whitetip sharks with the Hawaii-based longline fishery (primarily in the SSLL fishery), up to four oceanic whitetip sharks may be captured by the Proposed Action over ten years, with three of these animals dying from the interaction (likely post-interaction mortality). The loss of three animals as a result of the Proposed Action represents less than 1% (0.0006%) of the estimated EPO population and less than 1% (0.0003%) of the whole Pacific Ocean population. Therefore, we conclude that the number of oceanic whitetip sharks that would likely interact with this Proposed Action would not be expected to appreciably reduce the oceanic whitetip sharks's likelihood of survival and recovery.

Given the best available information, we conclude that the incidental take and resulting mortality of oceanic whitetip sharks associated with the direct and indirect effects of the Proposed Action is not likely to reduce the viability of the oceanic whitetip shark population in the Pacific Ocean.

2.8. Conclusion

After reviewing and analyzing the current status of the listed species that may be affected by the Proposed Action, the environmental baseline within the action area, the effects of the Proposed Action, and cumulative effects, it is NMFS' Biological Opinion that the Proposed Action is not likely to jeopardize the continued existence of the following ESA-listed species: North Pacific Ocean DPS loggerhead sea turtles, leatherback sea turtles, olive ridley sea turtles, East Pacific DPS green sea turtles, Guadalupe fur seals, giant manta rays, and oceanic whitetip sharks.

2.9. Incidental Take Statement

Section 9 of the ESA and Federal regulations pursuant to section 4(d) of the ESA prohibits the take of endangered and threatened species, respectively, without a special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. “Harm” is further defined by regulation to include significant habitat modification or degradation that actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, spawning, rearing, migrating, feeding, or sheltering (50 CFR 222.102). “Harass” is further defined by guidance as to “create the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering.” “Incidental take” is defined by regulation as takings that result from, but are not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or applicant (50 CFR 402.02). Section 7(b)(4) and section 7(o)(2) provide that taking that is incidental to an otherwise lawful agency action is not considered to be prohibited taking under the ESA if that action is performed in compliance with the terms and conditions of this ITS.

The measures described below are nondiscretionary, and must be undertaken by NMFS for the exemption in section 7(o)(2) to apply. NMFS has a continuing duty to regulate the activity covered by this incidental take statement. If NMFS fails to assume and implement the terms and conditions the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, NMFS must monitor the progress of the action and its impact on the species as specified in the incidental take statement. (50 CFR § 402.14(i)(3)).

Section 7(b)(4) of the ESA requires that when a proposed Federal agency action is found to be consistent with section 7(a)(2) of the ESA and the proposed action may incidentally take individuals of listed species, NMFS will issue a statement that specifies the impact of any incidental taking of endangered or threatened species. The ESA also states that reasonable and prudent measures, and terms and conditions to implement the measures, be provided that are necessary to minimize such impacts. Only incidental take in compliance with terms and conditions identified in the incidental take statement is exempt from ESA taking prohibitions pursuant to section 7(o) of the ESA.

A marine mammal species or stock which is listed as threatened or endangered under the ESA is, by definition, also considered a strategic stock and depleted under the MMPA. Section 7(b)(4) of the ESA provides for an incidental take statement for threatened and endangered marine mammals if authorized pursuant to section 101(a)(5) of the MMPA. The Guadalupe fur seal portion of this ITS is a preliminary statement. It will become final and effective upon authorization under section 101(a)(5) of the MMPA and NMFS’ written confirmation for the duration of the authorization and with relevant revisions per the final authorization. Additionally, any taking of a Guadalupe fur seal must be reported as required under section 118(e) of the MMPA.

2.9.1. Amount or Extent of Take

NMFS anticipates the following incidental takes may occur as a result of the Proposed Action. Throughout the Opinion, NMFS has used the term “interaction(s)” to represent incidents of unintentional bycatch of ESA-listed in the gear used during the Proposed Action, that may include entanglement or hooking, or some combination of them leading to incidental capture.

Each of these interactions is expected to result in a form of harm/capture that constitutes take as defined under the ESA, with a subset of those interactions expected to lead to mortality. The anticipated numbers of interactions, and resultant mortalities expected, along with the life stages exposed, resulting from the Proposed Action are shown in Table 7 per year, and for a 10-year period. We have aggregated the anticipated effects across the Proposed Action, given the uncertainty associated with application of predictions from the proxy dataset. As described in the adaptive management program, scenarios regarding leatherback sea turtle interactions and/or mortalities could have a significant influence on how components of the Proposed Action proceed, which could also impact the actual interactions/mortalities of other ESA-listed species, given that anticipated levels of interactions are based on effort levels proposed before implementation of the adaptive management program. Finally, the actual level of mortality for sea turtles that occurs will be based upon application of the Ryder et. al (2006) criteria to interactions by NMFS through the tiger team (for leatherbacks) or PRD, as appropriate. For marine mammals, NMFS will rely upon criteria established by NMFS 2023f (or as updated by NMFS in the future) to evaluate whether any interactions are deemed “serious injuries”.

In this Biological Opinion, NMFS determined that incidental take is reasonably certain to occur as follows:

Table 7. Number of anticipated ESA-listed species interactions (take), mortalities, and associated life stages, as a result of the Proposed Action annually and over a 10-year period (both components combined), beginning from the issuance of the EFP.

ESA-listed Species/Stock/DPS	**Anticipated interactions (take) per year**	**Anticipated interactions (take) over ten years**	**Anticipated mortalities (or serious injuries) over ten years***	**Life stage**
North Pacific DPS loggerhead	Up to 4	Up to 30	Up to 7	Subadult
Leatherback	Up to 3 once; up to 2 otherwise	Up to 17	Up to 4	Subadult/Adult
Olive ridley	Up to 2	Up to 6	Up to 5	Subadult/Adult
Eastern Pacific DPS green sea turtles	Up to 2	Up to 4	Up to 4	Subadult/Adult
Guadalupe fur seal	Up to 2	Up to 6	Up to 3	Yearling/Subadult/Adult
Giant manta ray	Up to 2	Up to 2	Up to 2	Adult
Oceanic whitetip shark	Up to 2	Up to 4	Up to 3	Adult

*Mortalities/serious injuries are a subset of interactions

2.9.2. Effect of the take

In the Biological Opinion, NMFS determined that the amount or extent of anticipated take, coupled with other effects of the Proposed Action, is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat.

2.9.3. Reasonable and Prudent Measures

"Reasonable and prudent measures" (RPMs) are those actions NMFS PRD considers as necessary or appropriate to minimize the impact of incidental take on the species (50 CFR 402.02). NMFS has determined that the following RPMs, as implemented by the terms and conditions (identified in section 2.9.4), are necessary and appropriate to minimize the impacts as described in the Proposed Action, on four species of sea turtles, Guadalupe fur seals, giant manta rays, and oceanic whitetip sharks. The following RPMs are identified for the Proposed Action along the U.S. West Coast EEZ.[29]

1. NMFS shall monitor the Proposed Action to ensure compliance with conservation measures, terms and conditions, and the adaptive management program, which are developed to help minimize the extent of take of ESA-listed species throughout the duration of the Proposed Action.

2. NMFS shall implement best management practices into the Proposed Action aimed at avoiding or minimizing impacts to ESA-listed species.

3. NMFS shall collect information and data on ESA-listed species caught, including but not limited to collection and evaluation of data on the capture, injury, and mortality of ESA-listed and other protected species caused by the shallow-set and deep-set longline-type gears covered under the EFP, and disseminate this information as needed.

4. NMFS shall use data collected during the Proposed Action to revise EFP terms and conditions, including programmatic terms and conditions (see *Adaptive Management Program under the Proposed Action*, Section 1.3.4), as a measure to help further limit the take of ESA-listed species included in this Opinion and throughout the duration of the Proposed Action.

2.9.4. Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the ESA, NMFS must comply with the following terms and conditions in order to implement the RPMs (50 CFR 402.14). NMFS has a continuing duty to monitor the impacts of incidental take and must report the progress of the action and its impact on the species as specified in this ITS (50 CFR 402.14). If NMFS does not comply with the following terms and conditions, protective coverage for the Proposed Action would likely lapse.

1) The following terms and conditions implement reasonable and prudent measure No. 1.

[29] The reasonable and prudent measures and associated terms and conditions in this Opinion are applicable only to effort under the Proposed Action. The other HMS fisheries remain subject to the reasonable and prudent measures and associated terms and conditions of the 2004 biological opinion on the HMS FMP and the 2016 biological opinion on the deep-set longline fishery that remain in effect for all the other fisheries covered under the HMS FMP.

1A. NMFS shall account, in near real-time, for the cumulative number of hooks set in both the shallow-set and the deep-set components of the Proposed Action and ensure that the limit of the number of hooks is not exceeded. WCR SFD shall provide annual updates to WCR PRD on the level of effort conducted for each component of the Proposed Action.

1B. In response to the occurrence of an interaction with leatherback sea turtles during the fishing activities under the Proposed Action, NMFS shall initiate the tiger team process with the aim of generating recommendations for implementation through the adaptive management program to help minimize future interactions and injuries of leatherback sea turtles within 72 hours of initial receipt of a report of leatherback interactions. The tiger team process will not conclude with generation of a recommendation(s) until after all information has been provided to tiger team members, and they have indicated their input has been given.

1C. NMFS shall monitor incidental takes of all ESA-listed species included in this Opinion in as near-real time as practicable through direct communication with fishery observers, and maintain direct lines of communications with EFP vessels to ensure that fishing activities cease as soon as practicable, but in no case later than 72 hours after the occurrence of a relevant take of leatherback sea turtles, and/or vessels are notified about revisions in their EFP terms and conditions, as appropriate and described in the adaptive management program under the Proposed Action, for implementation effective as soon as possible.

1D. As needed to monitor and ensure compliance with EFP terms and conditions, including any time/area closures such as the PLCA, NMFS shall coordinate with the NMFS Office of Law Enforcement, to review and evaluate incoming VMS data from EFP participants.

2) The following terms and conditions implement reasonable and prudent measure No. 2.

2A. Similar to requirement outlined in 50 CFR 660.712(b) for sea turtles, NMFS shall require that Guadalupe fur seals, giant manta rays, and oceanic whitetip sharks incidentally caught alive be released from fishing gear in a manner that minimizes injury and the likelihood of further gear entanglement or entrapment to increase post-release survivorship, as practicable and in consideration of best practices for safe vessel and fishing operations. As for oceanic whitetip sharks, and to comply with requirements outlined in the recently finalized a current proposed U.S. regulation for longline fisheries (89 FR 54724, August 1, 2024), NMFS shall require all EFP vessels to release incidentally caught sharks by leaving them in the water and cutting the branchline so that less than 1 meter remains on each animal.

2B. NMFS shall require sea turtles, Guadalupe fur seals, giant manta rays, or oceanic whitetip sharks that are dead when brought onboard a vessel or that do not resuscitate be disposed of at sea unless NMFS requests retention of the carcass for research, as practicable and in consideration of best practices for safe vessel and fishing operations.

2C. Similar to requirement outlined in 50 CFR 660.712(b) for sea turtles, as soon as practicable upon capture, vessel operators or observers shall disengage any hooked or entangled live Guadalupe fur seals, giant manta rays, or oceanic whitetip sharks with the least harm possible to the animals. If a hook cannot be removed (e.g., the hook is deeply ingested or the animal is too large to bring aboard), the line should be cut as close to the hook as possible.

2D. Similar to requirement outlined in 50 CFR 660.712(b) for sea turtles, NMFS shall require that any live Guadalupe fur seals, giant manta rays, and oceanic whitetip sharks brought on board will be released over the stern of the vessel, released only when fishing gear is not in use, when engine gears are in neutral, and in an area where they are unlikely to be recaptured or injured by the vessel.

3) The following terms and conditions implement reasonable and prudent measure No. 3.

3A. NMFS shall maintain an observer program to collect and disseminate data on the incidental take of marine mammals, sea turtles, and other protected species. Reports summarizing protected species bycatch data collected for the Proposed Action shall be prepared and disseminated to WCR PRD by WCR SFD as soon as possible after verification of report. This information should include species, condition, date of interaction, and location. A copy of the observer report shall be provided to both offices, following review by WCR SFD staff.

3B. As described in the Proposed Action, EFPs are expected to operate under a 100% observer coverage for monitoring and data collection, although NMFS may explore removal of the mandatory requirement under future conditions during this Proposed Action, at which time SFD will engage with PRD for further technical assistance. Before modification of the 100% observer coverage requirement for any EFPs issued as part of this Proposed Action, NMFS shall establish a plan for bycatch estimation methodology that can be applied to the monitoring of take of this Proposed Action relative to the ITS, and for implementation of the adaptive management framework in light of partial observer coverage.

3C. As practicable and in consideration of best practices for safe vessel and fishing operations, NMFS's observers shall collect standardized information regarding the incidental capture, injury, or mortality of ESA-listed and other protected species for each interaction, including species identification, gear and set information, measurements, condition, skin biopsy samples, and the presence or absence of tags. Observers shall also collect life history on any of these species incidentally taken as a result of this action (including direct measurement or visual observation of tail length of sea turtles), condition, and estimated length and type of gear left on the turtle at release.

3D. To the maximum extent practicable, observers shall identify the hooking location for every interaction, and estimate the length of any trailing gear left on ESA-listed species at release when those species cannot be boarded. These data are intended to allow NMFS to improve estimates of harm, injury, and mortalities over the duration of the Proposed Action.

4) The following terms and conditions implement reasonable and prudent measure No. 4.

4A. NMFS shall monitor incidental takes and mortalities of all ESA-listed species. NMFS shall use temporal, spatial, and other data from interactions that occur as a result of the Proposed Action, along with available scientific and commercial data on sea turtles, Guadalupe fur seals, oceanic whitetip sharks, and giant manta rays, to inform decision making on revised EFP terms and conditions under the adaptive management program, and shall modify fishing practices to minimize the respective incidental capture and mortality of these ESA-listed species to the maximum extent possible, based on this information.

4B. The tiger team, convened in the occurrence of leatherback interactions, shall use information included in records pertaining to the take and integrate it with the most updated criteria (e.g., those identified in Ryder et al. (2006) for sea turtles) to estimate post-release mortality and make recommendations to help revise EFP terms and conditions for EFPs under the Proposed Action. In addition, the tiger team shall review EcoCast predictions and evaluations provided by EFP participants that relate to instances of leatherback take, as available, as part of their recommendation process.

4C. Following five years of issuance of EFPs, WCR SFD and PRD will meet to review data collected on the Proposed Action to determine if expectations or assumptions regarding operations, including the tiger team process, and implementation of the adaptive management program, remain valid. This meeting shall occur in a timely manner that would allow for adjustment of EFP terms and conditions under the Proposed Action before the 7th year of fishing under the Proposed Action, based on the results of this collective evaluation and any recommendations for improvements produced as a result.

2.10. Conservation Recommendations

Section 7(a)(1) of the ESA directs Federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of the threatened and endangered species. Specifically, conservation recommendations are suggestions regarding discretionary measures to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information (50 CFR 402.02).

The following conservation recommendations are provided pursuant to section 7(a)(1) of the ESA for developing management policies and regulations, and to ensure multilateral research efforts which would help in reducing adverse impacts to listed species in the Pacific Ocean.

1. NMFS should continue to research modifications to existing gear that: (1) reduce the likelihood of interactions between sea turtles, Guadalupe fur seals, elasmobranchs and longline fishing gear; and (2) reduce the immediate or delayed mortality rates of captured sea turtles, Guadalupe fur seals, and elasmobranchs. The goal of any research should be to develop a technology or method, through robust, experimental designs, that would achieve these goals while remaining economically and technically feasible for fishermen to implement.

2. NMFS should continue to promote the reduction of sea turtle and other ESA-listed species bycatch in Pacific longline fisheries by supporting:

    a. The Inter-American Convention for the Protection and Consideration of Sea Turtles.

    b. Any binding regional fishery management organizations' sea turtle and elasmobranch conservation and management measures for commercial vessels operating in the Pacific Ocean.

    c. The wide dissemination and implementation of NMFS ESA-listed marine species handling guidelines that increase post-hooking survivorship.

    d. Studies on ecology, habitat use, genetics, and post-interaction survivability of leatherback and loggerhead sea turtles and other ESA-listed marine species.

3. NMFS should continue to encourage, support, and work with regional partners to implement long-term sea turtle conservation and recovery programs at critical nesting, foraging, and migratory habitats.

2.11. Reinitiation of Consultation

This concludes formal consultation for the Consideration of a set of EFPs to test longline-type fishing practices in a portion of the U.S. West Coast EEZ.

Under 50 CFR 402.16(a): "Reinitiation of consultation is required and shall be requested by the Federal agency where discretionary Federal agency involvement or control over the action has been retained or is authorized by law and: (1) If the amount or extent of taking specified in the incidental take statement is exceeded; (2) If new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (3) If the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the biological opinion or written concurrence; or (4) If a new species is listed or critical habitat designated that may be affected by the identified action."

In instances where the amount or extent of incidental take is determined to be exceeded, the WCR SFD should, as soon as practicable, request reinitiation of formal consultation. WCR PRD assumes that, with 100% observer coverage of activity occurring under the Proposed Action, NMFS will be notified of any take of a listed species as soon as practicable, and information surrounding the interaction including the extent of potential injury will be made available at that time. In the absence of 100% monitoring of EFP activities, NMFS must be prepared to process in-coming reports of incidental take of ESA-listed species from partial observer coverage and generate reasonable estimates of the take levels that may have occurred, including relevant application of criteria for mortality and serious injury. Such estimates could lead to the conclusion that incidental take has been exceeded. Before proceeding with less than 100%

monitoring, SFD will coordinate with PRD and other NMFS scientists as appropriate to establish an appropriate estimation procedure to account for partial coverage.

In addition to the limits regarding the extent of take of ESA-listed species specified in the incidental take statement of this Biological Opinion, there may be a need to reinitiate consultation based on any information related to the structure or conduct of the Proposed Action that raises concern or has implications regarding possible impacts to ESA-listed species and/or our ability to detect them that have not been evaluated in this Biological Opinion. This may include, but is not limited to, the amount and distribution of fishing effort that occurs under the Proposed Action, issues with monitoring of EFPs including deployment of fisheries observers or other monitoring techniques, or the development and/or implementation of measures through the adaptive management program. While reinitiation is not necessarily required after any adjustment of EFP terms and conditions implemented through the adaptive management program or any other process by NMFS, issues with successful or uncertain implementation of them could lead to reinitiation of consultation. In addition, revision of EFP terms and conditions through the adaptive management program or any other process may not necessarily relieve NMFS of the obligation for reinitiation based on results of the Proposed Action up to that point.

The anticipated amount and extent of take has largely been derived from use of proxy data, with an understanding of some of the uncertainties of how that proxy data might relate to this Proposed Action. Notably, interaction rates and mortality/injury were estimated from data gathered from specific components of Hawaii longline fisheries, and applied to the most relatable specific components of the Proposed Action. Our analysis and jeopardy determination has recognized that there is a possibility of some unpredicted events (according to the proxy data) happening within the bounds of the total level of effects anticipated, such as the unpredicted interaction of a leatherback in deep-set longline gear, and the adaptive management program and monitoring of the ITS is expected to be robust to a small number of these events. However, serial occurrences of unpredicted events (according to the proxy data), including interactions within specific components or fishing practices of the Proposed Action that were not anticipated, or the level of resulting injuries sustained from interactions being inconsistent with expectations, could lead to reinitiation of consultation on the entire Proposed Action before the ITS is exceeded, given the clear signal that there are effects of the agency action that may affect listed species in a manner or to an extent not previously considered.

2.12. "Not Likely to Adversely Affect" Determinations

The following ESA-listed species and designated critical habitats are not expected to be adversely affected by the Proposed Action. We describe the reasoning behind our determination for each species below.

2.12.1. Western North Pacific Gray Whale

Gray whales are presently recognized as two populations in the North Pacific Ocean, and recent genetic studies using both mtDNA and nuclear markers have demonstrated significant differentiation between the western North Pacific (WNP) and eastern North Pacific (ENP) populations (LeDuc et al. 2002; Lang et al. 2011; Weller et al. 2013). The WNP gray whales are listed as endangered under the ESA. ENP and WNP gray whales were once considered geographically separated along either side of the ocean basin, but recent photo-identification, genetic, and satellite tracking data indicate WNP gray whales may be accompanying ENP gray whales along their U.S. West Coast migrations. Information from tagging, photo-identification and genetic studies show that some whales identified in the WNP off Russia have been observed in the ENP, including coastal waters of Canada, the U.S., and Mexico (Lang 2010; Weller et al. 2012; Mate et al. 2015; Urbán et al. 2019). Photographs of 379 individuals identified on summer feeding grounds off Russia (316 off Sakhalin; 150 off Kamchatka) were compared to 10,685 individuals identified in Mexico breeding lagoons, with a total of 43 matches found (Urbán et al. 2019). The number of whales documented moving between the WNP and ENP represents 14% of gray whales identified off Sakhalin Island and Kamchatka according to Urbán et al. (2019). Cooke et al. (2018) note that the fraction of the WNP population that migrates to the ENP is estimated to be 45-80%.

In the fall, gray whales migrate from their summer feeding grounds, heading south along the coast of North America to spend the winter in their breeding and calving areas off the coast of Baja California, Mexico. Calves are born in shallow lagoons and bays from early January to mid-February. From mid-February to June, gray whales can be seen migrating northward with newborn calves along the West Coast of the U.S. The timing of fishing effort under the Proposed Action, which could occur at any time, although more effort may occur during the summer and fall, could overlap with the gray whale southbound migration along the U.S. West Coast (November to February), but there are a number of fishing restrictions during this time that may limit the overlap between migrating gray whales and proposed longline fishing. From August 15 to November 15, fishing may occur outside of the PLCA, typically south of Point Conception; from December 15 to January 31, effort is restricted to areas outside of 30 nm from the coastline; and the large-scale modified longline fishery is restricted to outside of 50 nm from the coastline. Northbound gray whales, which include all age classes, migrate from February to June; therefore, the overlap with any EFP effort under the Proposed Action should be minimal. Southbound gray whales typically migrate within 10 kilometers from shore during the southbound migration, but some individuals have been observed farther offshore, usually less than 50 kilometers from the coastline. In the SCB, gray whales do travel around and through the Channel Islands, in addition to a migratory route in between the mainland and the Channel Islands. In 2024, four gray whale entanglements were reported in the U.S. West Coast (two in the Dungeness crab pot fishery, one in unidentified gillnet fishery, and one in unknown fishery), mainly in CA nearshore waters.[30]

Calambokidis et al. (2015, 2024) have designated biologically important areas (BIAs) for ENP gray whales along the U.S. West Coast, including during the different phases of their migratory route along the coast. Although there is documentation of two satellite tagged WNP gray whales using part of the migratory corridor described by the BIAs (Mate et al. 2015) there is limited

[30] https://www.fisheries.noaa.gov/s3//2025-04/2024-whale-entanglements-report.pdf

evidence to fully extend these BIAs to the WNP gray whale population (Calambokidis et al. 2024).

Based on tagging data, we assume that when WNP gray whales migrate along the coast of North America to Baja California, they are likely slightly delayed from the ENP's "start date" by at least a couple of weeks based on distance and average swim speed (i.e., they have to swim from Sakhalin Island, Russia before joining the ENP route). The first migratory ENP gray whales can be observed in California as early as October, depending on the year, but mid-to late November is typical, and approximately 10% of the population is expected to have made the migration by the end of December. Thus, it is possible that a WNP gray whale's migratory route could overlap with the proposed EFP fishing area, particularly from November to January during the southbound migration and most likely in the SCB region. However, there is no evidence indicating that WNP gray whales behave differently than an ENP whale and are more susceptible to interaction with longline-type gear.

The estimated population size from photo-ID data for Sakhalin and Kamchatka in 2016 was 290 whales (90% percentile intervals = 271 – 311; Cooke et al. 2018). Systematic counts of gray whales migrating south along the central California coast have been conducted by shore-based observers at Granite Canyon most years since 1967. The current minimum population estimate for non-ESA-listed ENP gray whales is 25,849 (Carretta et al. 2024). The most recent minimum estimate of endangered WNP gray whale abundance is 271 individuals (Carretta et al. 2024). At any given time during the migration, WNP gray whales could be part of the approximately 27,000 gray whales migrating through the CCE. However, the probability that any gray whale observed along the U.S. West Coast would be a WNP gray whale is extremely small, i.e., less than 1%, even if the entire population of WNP gray whales were part of the annual gray whale migration in the ENP. In addition, the Proposed Action will last for ten years, and the chance that gray whales that might be entangled in longline-type gear during this period (which is very unlikely to occur) belong to the WNP gray whale population is extremely small. As a result, we conclude the risk of WNP bycatch is discountable, and that WNP gray whales are not likely to be adversely affected by the Proposed Action.

2.12.2. Blue Whale

Blue whales have a worldwide distribution in circumpolar and temperate waters. Seasonal migrations of blue whales are driven by food requirements. Pole-ward movements in spring allow the whales to take advantage of high zooplankton production in summer, while movement toward the subtropics in the fall allows blue whales to reduce their energy expenditure while fasting and to avoid ice entrapment. The ENP stock of blue whales ranges from the northern Gulf of Alaska to the eastern tropical Pacific (Carretta et al. 2022). Calambokidis et al. (2015) identified nine BIAs for blue whales feeding off California, with six of those areas located in the SCB. The authors identified an area along the shelf edge from Point Arena north to Fort Bragg, California as an area of high density, as well as the Monterey Bay area north to Pescadero Point. All nine BIAs represent 2% of U.S. waters off the west coast but encompass 87% of the documented sightings of blue whales. The boundary delineation for the feeding BIA was recently refined and expanded by Calambokidis et al. (2024), with data used to support the existence of "core" areas of use, or areas used notably more intensely, and identified these within a much larger "parent" areas. Parent BIAs for blue whales covered 173,000 km^2 or 21% of the U.S. West Coast EEZ, and encompassed portions of coastal waters, shelf edge, and some offshore habitats. Most of this stock is believed to migrate south to spend the winter and spring in high productivity areas off Baja California, in the Gulf of California, and on the Costa Rica Dome. Blue whales occur primarily in offshore deep waters (but sometimes near shore, e.g. the deep waters in Monterey Canyon, CA) and feed almost exclusively on euphausiids.

Abundance estimates for the ENP 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. 2024). 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. 2023a), while from 2017 to 2021 is calculated to be 0.61 blue whales annually (Carretta et al. 2024).

There have been no reported blue whale mortalities associated with any longline fisheries, and the total fishery mortality and serious injury rate is currently approaching zero (Carretta et al. 2024). Recent large whale entanglement reports have documented blue whale entanglement in commercial fisheries, with one confirmed entanglement in 2015, three confirmed entanglements in 2016, and three confirmed entanglements in 2017 (NMFS-WCR "2023 Whale Entanglement Summary"[31]). Blue whales feed nearly exclusively on krill, and would therefore not be actively depredating the fish bait required in both the shallow-set and deep-set components of the Proposed Action. As described above, biologically important areas identified for blue whales are generally outside where effort is likely to occur under the Proposed Action, thereby reducing any overlap between fishing activity associated with the EFP and blue whales. Therefore, and with the lack of historic known interactions between blue whales and longline-type gear, the effects of the Proposed Action are extremely unlikely to occur, and therefore are discountable.

2.12.3. Fin Whale

Fin whales are distributed widely in the world's oceans and occur in both the Northern and Southern Hemispheres. In the northern hemisphere, they migrate from high Arctic feeding areas to low latitude breeding and calving areas. The North Pacific population summers from the Chukchi Sea to California, and winters from California southward. Fin whales occur year-round off California, Oregon, and Washington in the California Current, with aggregations in southern and central California (Carretta et al. 2024). The fin whales most likely to be observed within the Proposed Action Area are identified as part of the CA/OR/WA stock as defined under the

[31]https://www.fisheries.noaa.gov/resource/document/2023-west-coast-whale-entanglement-summary

MMPA. Association with the continental slope is common (Schorr et al. 2010). Fin whales feed on planktonic crustaceans, including *Thysanoessa* sp. euphausiids and *Calanus* sp. copepods, and schooling fish, including herring, capelin and mackerel (Aguilar 2009). Recently, researchers updated the BIAs for several species identified in Calambokidis et al. (2015) and added BIAs for fin whales, using habitat density models, satellite tag data, and sightings of feeding behavior from non-systematic effort mostly associated with small boat surveys conducting photo identification work, resulting in a parent BIA of 315,000 km^2, representing 38% of the area of the U.S. West Coast EEZ. The final parent BIA was the largest area of all of the BIA's identified in Calambokidis et al. (2024), which makes it more challenging to identify more precise and intensely used areas.

Fin whales in the entire North Pacific are estimated to be less than 38% of historic carrying capacity of the region (Mizroch et al. 1984). The best estimate of fin whale abundance in CA, OR, and WA waters out to 300 nautical miles is 11,065 (CV = 0.405) animals from 2018, with a minimum population estimate of 7,970 animals (Carretta et al. 2024). While this estimate is greater than previously posited by Nadeem et al. (2016) and Moore and Barlow (2011) who applied Bayesian trend analysis, it remains consistent with their conclusions of an increasing population for this stock. 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 (Caretta et al. 2023a). There is now evidence of recovery in California coastal waters. Evidence of their increased abundance came from line transect surveys off California and within the California Current (extending from CA, along OR, and WA) between 1991 and 2018 (Moore and Barlow 2011, Nadeem et al. 2016, Becker et al. 2020), with an estimated mean annual abundance increase of 7.5% from 1991 to 2014 off CA, OR, and WA (Nadeem et al. 2016). However, it remains unclear what to attribute the growth to: immigration or their birth and death rates (Carretta et al. 2024).

Similar to blue whales, fin whales have never been documented interacting in longline-type or hook and line fisheries in the U.S. West Coast, either through hooking, entanglement and/or depredation, although one fin whale was observed entangled in 2015 in the Hawaii-based SSLL in waters between the U.S. West Coast and Hawaiian EEZ (Carretta et al. 2024). Since the Hawaii SSLL fishery re-opened in 2004 with 100% observer coverage, there has been only one interaction with a fin whale, and NMFS has since concluded that the risk of future interactions between fin whales and pelagic longline fishing in Hawaii and American Samoa is extremely low and not expected to occur (NMFS 2019b, 2023b, 2023d). In 2024, one fin whale entanglement was reported in the Oregon Dungeness crab pot fishery,[32] and other reently reported entanglements have involved unidentified gear (Saez et al. 2021) although none of those appeared to involve gear similar to pelagic longline-type gear. Given the limited documentation of previous fin whale interactions with longline-like gear in the Pacific Ocean, the extent of effort anticipated as part of the Proposed Action (especially SS effort), and the lack of historical documented interactions with other hook and line gear of the U.S. West Coast, we do not

[32] https://www.fisheries.noaa.gov/s3//2025-04/2024-whale-entanglements-report.pdf

anticipate that either component of the longline fishery associated with the proposed EFP would interact with fin whales off the U.S. West Coast. As a result, NMFS concludes that effects of the Proposed Action are extremely unlikely to occur and therefore are discountable.

2.12.4. Central America and Mexico DPSs Humpback Whale

Humpback whales are found in all oceans of the world, migrating from high latitude feeding grounds to low latitude calving areas. They are typically found in coastal or shelf waters in summer and close to islands and reef systems in winter (Clapham 2009). Humpbacks primarily occur near the edge of the continental slope and deep submarine canyons, where upwelling concentrates zooplankton near the surface for feeding. They often feed in shipping lanes which make them susceptible to mortality or injury from large ship strikes (Douglas et al. 2008). Humpback whales feed on euphausiids and various schooling fishes, including herring, capelin, sand lance, and mackerel (Clapham 2009).

A status review of humpback whales was initiated in 2009 to determine whether an endangered listing for the entire species was still appropriate (74 FR 40568). Following public comment on the proposed rule to revise the ESA-listing determinations for 14 DPSs, NMFS finalized the revision to the proposed rule on September 8, 2016 (81 FR 62260). For the two DPSs that forage off CA and OR, the Central America DPS was listed as endangered, the Mexico DPS was listed as threatened. There is still some mixing between these populations although they are still considered distinct populations. 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 led NMFS to reevaluate stock structure 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. 2024). From these DIPs and units, NMFS designated five new humpback whale stocks in the North Pacific, two of which 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. 2024). These two stocks summer off the U.S. West Coast, but winter in Central America and Mexico waters.

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. 2024). 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 U.S. waters, the PBR allocation for U.S. waters is 3.5

humpback whales per year (Carretta et al. 2024). 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 U.S. waters, the PBR allocation for U.S. waters is 43 humpback whales per year (Carretta et al. 2024).

While both the Central America humpback DPS and the Mexico humpback DPS may be found in the Proposed Action Area, they both exhibit similar migratory behaviors, both migrating to feeding areas in lower latitudes and more coastal areas such as California (Calambokidis et al. 2008). Similar to the methodology used for blue whales (i.e., reviewing records of high concentration areas of feeding animals observed from small boat surveys, ship surveys and opportunistic sources), Calambokidis et al. (2015) identified seven BIAs for humpbacks off the U.S. West Coast, further updated and implemented by Calambokidis et al. (2024), representing 140,000 km^2, representing 20% of the area of the U.S. West Coast EEZ. Six of the BIAs are located off CA and OR and WA, including: (1) Stonewall and Heceta Bank (May-November); (2) Point St. George (July-November); (3) Fort Bragg to Point Arena (July-November); (4) Gulf of the Farallones-Monterey Bay (July-November); (5) Morro Bay to Point Sal (April-November); and (6) Santa Barbara Channel-San Miguel Island (March-September). The majority of the humpback whale BIAs are located in relatively shallow (<400 meters) waters, which is outside of the Proposed Action Area, north of the Northern Channel Islands. Therefore, with longline-type activity associated with the Proposed Action restricted to waters west of the 50 nm contour from the coast and offshore islands of California/Oregon, the risk of any overlap is reduced.

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). The 2024 whale entanglement summary for the U.S. West Coast shows that entanglement reports in 2024 were the highest since 2018, with 31 confirmed entanglement reports for humpback whales (11 in Dungeness crab pot fishery, 2 in the coonstripe shrimp pot fishery, one in the groundfish trawl fishery, one in unidentified gillnet fishery; and one unknown fishery), primarily along CA coastal waters.[33] It is worth noting that to the extent that NMFS is able to identify the origins of reported entanglements, these reports largely represent opportunistic data on entanglements that occurred in fixed gear fisheries that operate in more coastal nearshore waters. While there isn't a definitive explanation for the relative level of entanglements reported in 2024, previous research has explored and connected a link between observed habitat compression of coastal upwelling, changes in availability of forage species (krill and anchovy), and shoreward distribution shift of foraging whales, as a key factor driving entanglement risk in West Coast fixed gear fisheries and reported entanglements (Santora et al. 2020). With these factors in mind, we conclude that increases in reported entanglements in

[33] https://www.fisheries.noaa.gov/s3//2025-04/2024-whale-entanglements-report.pdf

coastal fixed gear fisheries are likely to be less representative of risks posed by offshore fisheries such as longline-type fishing operating in much different locations that is associated with this Proposed Action. Also, there have been some humpback whale entanglements reported along the U.S. West Coast that are confirmed or suspected to be associated with hook and line fisheries (longline-type fisheries are generally classified as hook and line, as our numerous other commercial and recreational fisheries) based on the observation of monofilament lines that were not associated with mesh/webbing. Since 2015, a total of five humpback whale entanglements have been reported that involved monofilament line, and presumably some hook and line gear. In one case, the entanglement was specifically confirmed to have occurred with recreational fishing off California. The specific origins of the other four cases are unknown (Saez et al. 2021; (NMFS WCR stranding data, unpublished).

Though humpbacks have not been documented entangled in longline-type gear off the U.S. West Coast, based on sightings and strandings data, they have historically been found documented entangled in Hawaii-based longline fisheries, although all west of the 140º W meridian. Since the Hawaii-based SSLL fishery re-opened in 2004, there were two interactions with humpback whales in nearly 11,000 sets, with an interaction rate of 0.00018 humpbacks per set; indicating that interactions are rare (NMFS 2012b). Because fishing effort for the Proposed Action in both components of the longline EFP is primarily in an area outside of much of the typical foraging area of the Central America DPS and the Mexico DPS, NMFS concludes that an interaction of ESA-listed humpback whales with effort under the Proposed Action is extremely unlikely to occur, and therefore is discountable.

2.12.5. North Pacific Right Whale

Right whales primarily occur in coastal or shelf waters, although movements over deep waters are known. Sightings have been reported as far south as central Baja California in the eastern North Pacific, as far south as Hawaii in the central North Pacific, and as far north as the sub-Arctic waters of the Bering Sea and sea of Okhotsk in the summer (Herman et al. 1980, Berzin and Doroshenko 1982, Brownell et al. 2001). However, most recent sightings have occurred in the southeast Bering Sea and in the Gulf of Alaska (Waite et al. 2003, Shelden et al. 2005, Wade et al. 2011a, 2011b). Migratory patterns of the North Pacific right whale are unknown, although it is thought the whales spend the summer on high-latitude feeding grounds and migrate to more temperate waters during the winter, possibly well offshore (Braham and Rice 1984, Scarff 1986, Clapham et al. 2004).

A distinct geographic distribution, different catch and recovery histories, and recent genetic analysis have led to the generally accepted belief that the North Pacific right whale comprises eastern and western populations that are largely or wholly discrete (Young et al. 2023). The best estimate of abundance for the ENP 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 ENP 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 (Young et al. 2023). No human-caused mortality or serious injury of the ENP 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 (Young et al. 2023).

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 (Young et al. 2023). Since 1955, there have been 18 sightings of North Pacific right whales off California[34], and there have been no reports of entanglements or strandings of this species off the U.S. West Coast (Young et al. 2023). Therefore, given their rarity in the Proposed Action Area, NMFS concludes that effects of the Proposed Action on North Pacific right whales are extremely unlikely to occur, and therefore are discountable.

2.12.6. Sperm Whales

Populations of sperm whales exist in waters of the CCE throughout the year. They are distributed across the entire North Pacific and into the southern Bering Sea in summer, but the majority are thought to be south of 40°N in winter. Sperm whales are found year-round in California waters, but they reach peak abundance from April through mid-June, and from the end of August through mid-November. Sperm whales consume numerous varieties of deep-water fish and cephalopods (Caretta et al. 2015).

The SARs divide sperm whales into three discrete groups for management purposes, including waters off CA/OR/WA, 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. The most recent estimates of sperm whale abundance in CA, OR, and WA 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), and habitat-based density models from 1991-2018 (Becker et al. 2020). Estimates from the two methods largely-overlap, though estimates from habitat models are, on average, higher. The best estimate of sperm whale abundance in the California Current, which is based on a 2018 survey and a habitat density model that is informed by 1991-2018 data, is 2,606 animals (CV = 0.135). The minimum population abundance estimate is 2,011 whales and the PBR for this stock is estimated to be 4 animals (Carretta et al. 2024).

[34] https://www.sfcelticmusic.com/js/RTWHALES/WestCoast_sightings.htm

The mean annual serious injury and mortality in commercial fisheries is less than 0.52 (CV = n.a.) sperm whales, based on data collected from 2017 to 2021. Fisheries documented to have taken sperm whales include the West Coast DGN fishery (average 2.9 per year over 5 years, based on estimated entanglements for the period 2013-2017) and "illegal, unreported and unregulated" (IUU) fisheries, based on stranded whales (Carretta et al. 2023a, 2024). While there has not been an observed entanglement of sperm whales in the West Coast DGN fishery since 2010, there is a positive estimate of sperm whale bycatch in the fishery for the most recent 5-year period of 2017-2021, based on a data model that uses 1990-2021 data. This estimate is 1.58 (CV = 2.8) whales, or 0.32 whales annually (Carretta et al. 2024).

Given their wide distribution off the U.S. West Coast, sperm whales may be found in the Proposed Action Area and in the area of longline-type activity associated with the Proposed Action. Sperm whales have been documented taken by the Hawaii-based swordfish fleet, but the incidents are extremely rare. Since 1994, there have been three observed interactions between sperm whales and the entire Hawaii longline fleet (mixed (swordfish target set), experimental, and a deep set). One interaction was documented by an observer (deep-set longline), where the mainline parted and the branchline, leader and hook remained attached to the animal after the mainland had parted. This was a documented serious injury due to the amount of gear left on the animal. In the experimental fishery, a sperm whale was entangled in the mainline but was freed without gear attached (NMFS 2014). Sperm whales have also been recorded depredating bait used in the sablefish/halibut longline gear (the fishery primarily squid bait) up in the Gulf of Alaska. However, no incidents of depredation have been recorded in the Hawaii-based longline fishery, perhaps due to the regulatory changes in that fishery since 2004, which required longline fishers to use fish as bait instead of squid, which is the preferred prey for sperm whales. Given the rarity of sperm whale take events documented in the Hawaii-based longline fishery over two decades, and the relatively short duration of the Proposed Action (5 years), the likelihood that a sperm whale would be hooked/entangled (or would interact through depredation) in longline-type gear associated with the Proposed Action, is extremely low, and therefore discountable.

2.12.7. Eastern Pacific DPS Scalloped Hammerhead Shark

The scalloped hammerhead shark is a circumglobal species that lives in coastal warm temperate and tropical seas, occurring over continental and insular shelves, as well as adjacent deep waters (Miller et al. 2014). This species is highly mobile and partly migratory, making migrations along continental margins as well as between oceanic islands in tropical waters (Miller et al. 2014). Globally, this species can be found from intertidal and surface to depths of up to 450–512 m (78 FR 20718; Klimley 1993), with occasional dives to deeper waters (Jorgensen et al. 2009). It has also been documented entering enclosed bays and estuaries (Compagno 1984).

The Eastern Pacific DPS of scalloped hammerhead sharks was listed as endangered in 2014 (79 FR 38214). The primary habitat for scalloped hammerhead sharks is found in waters warmer than 22°C south and west of the U.S. EEZ, and throughout the Eastern Tropical Pacific region (78 FR 20718). The range of this DPS does extend up into southern California, although the species occurrence is uncommon in this area. A 262-cm female was reported caught in 1977 approximately 2 km offshore Santa Barbara, California, though the identity of this animal should be considered uncertain (Fusaro and Anderson 1980). Seigel (1985) reported a juvenile caught in early October, 1984 off Pacific Palisades, California, along with two other unpublished records of scalloped hammerhead sharks caught near Goleta Point, California. Additionally, Shane (2001) reported 19 records (presumably all juveniles) of scalloped hammerhead sharks caught in San Diego Bay before, during, and after the 1997-1998 El Nino Southern Oscillation (ENSO) event.

The bycatch of scalloped hammerhead sharks has never been documented in the DGN fishery by fishery observers. From 1990-2012, a total of 50 hammerhead sharks have been observed caught in the DGN fishery, but none have been identified as a scalloped hammerhead (78 FR 20718). More recently, 36 hammerhead sharks have been observed caught in the DGN fishery since 2012 (27 during the 2014/2015 fishing season) but all have been identified as smooth hammerhead sharks (NMFS observer program data[35]).

Scalloped hammerhead sharks can be affected by a potential pelagic exposure to EFP fishing operations in the Proposed Action Area. However, given the available information and lack of documented bycatch in other fisheries occurring in the Proposed Action Area (i.e., DGN fishery) for this DPS described above, we conclude that the risks of the Proposed Action for this DPS is discountable and that the Proposed Action is not likely to adversely affect the scalloped hammerhead shark.

2.12.8. Humpback Whale Critical Habitat: Central America and Mexico DPSs

Critical habitat for the endangered Western North Pacific DPS and Central America DPS, and the threatened Mexico DPS of humpback whales was proposed for specific marine areas located off the coasts of CA, OR, WA, and Alaska on October 9, 2019 (84 FR 54354). In April 21, 2021(86 FR 21082) a final rule was published, to establish their critical habitat that has been designated for three DPS including Western North Pacific DPS, Central America DPS, and Mexico DPS. Within the geographic areas occupied by these DPS of humpback whales, the critical habitat review team (CHRT) identified nine specific areas of marine habitat for the Western North Pacific DPS, nine specific areas of marine habitat for the Central America DPS, and 19 specific areas of marine habitat for the Mexico DPS - all of which contain the identified essential prey feature (NMFS 2020c).

Specific areas designated as critical habitat for the Central America DPS of humpback whales contain approximately 48,521 nmi^2 of marine habitat in the North Pacific Ocean within the portions of the CCE off the coasts of WA, OR, and CA. Specific areas designated as critical habitat for the Mexico DPS of humpback whales contain approximately 116,098 nmi^2 of marine

[35] https://www.fisheries.noaa.gov/west-coast/fisheries-observers/west-coast-region-observer-program

habitat in the North Pacific Ocean, including areas within portions of the eastern Bering Sea, Gulf of Alaska, and CCE.

The CHRT identified a prey biological feature that is essential to the conservation of the two humpback whale DPSs, defined as follows: “prey species, primarily euphausiids and small pelagic schooling fishes of sufficient quality, abundance, and accessibility within humpback whale feeding areas to support feeding and population growth.” Humpback whales that may be affected from the action and within the action area include both Central America and Mexico DPSs, who travel to U.S. coastal waters to access energy-rich feeding areas, and a high degree of fidelity to specific locations indicates the importance of these feeding areas. Although humpback whales are generalist predators and prey availability can vary seasonally and spatially, substantial data indicate that the humpback whales’ diet within the California Current marine ecosystem, which extends from British Columbia to southern Baja California Mexico, includes: Pacific sardine (*Sardinops sagax*); northern anchovy (*Engraulis mordax*); Pacific herring (*Clupea pallasii*); euphausiids (specifically Euphausia, Thysanoessa, Nyctiphanes, and Nematoscelis) and occasionally juvenile rockfish (Sebastes) (Appendix A of NMFS 2020c). Humpback whales are also known to switch between target prey depending on what is most abundant or of the highest quality in the system; thus, their diet composition may vary spatially and temporarily. Because humpback whales only rarely feed on breeding grounds and during migrations, humpback whales must have access to adequate prey resources within their feeding areas to build up their fat stores and meet the nutritional and energy demands associated with individual survival, growth, reproduction, lactation, seasonal migrations, and other life functions. Essentially, while on feeding grounds, the whales must finance the energetic costs associated with migration to breeding areas, reproductive activities, as well as the energetic costs associated with their return migration to high-latitude feeding areas (NMFS 2020c).

The longline-type gear used in the proposed EFP is not known to catch these prey species. In addition, significant portions of the designated critical habitat will be closed to effort under the terms and conditions adopted as part of the Proposed Action (see no fishing zone closure measures number 31, or 35). As a result, given the lack of measurable impact to prey species expected, designated critical habitat for the Central America DPS and the Mexico DPS of humpback whales is not likely to be adversely affected by the Proposed Action.

2.12.9. Leatherback Critical Habitat

Critical habitat was designated off the U.S. West Coast for leatherback sea turtles (77 FR 4170, January 26, 2012), which does include areas that may be open to some effort under the Proposed Action off the central coast of California. In the final rule, NMFS identified one primary constituent element essential for the conservation of leatherbacks in marine waters off the U.S. West Coast: the occurrence of prey species, primarily scyphomedusae of the order Semaeostomeae (e.g., *Chrysaora*, *Aurelia*, *Phacellophora*, and *Cyanea*), of sufficient condition, distribution, diversity, abundance and density necessary to support individual as well as population growth, reproduction, and development of leatherbacks. However, the critical habitat designation does not specifically define or develop standards or measurable criteria for any of these particular aspects of prey occurrence. Observers in the Hawaii-based longline fishery rarely report the bycatch of invertebrate species. The critical habitat designation emphasizes that the preferred prey of leatherbacks off the California coast is jellyfish, with other gelatinous prey, such as salps (a pelagic tunicate), considered of lesser importance (77 FR 4170), which are not caught with longline-type gear. In addition, significant portions of the designated critical habitat may be closed to fishing effort under the Proposed Action (see no fishing zone closure measures number31 and 35, and no-fishing in the leatherback sea turtle critical habitat measure number 5); furthermore, the enforcement of the PLCA is a term and condition for deep-setting large-scale modified longline EFPs, and may also be added as on optional measure (measure number 8 in Attachment 3 of the BA) under the adaptive management program which would prohibit EFP fishing inside the PLCA when leatherbacks would be expected to be foraging on prey (i.e., summer and early fall). Therefore, given the lack of measurable impact to prey species expected, we conclude designated critical habitat for leatherback sea turtles is not likely to be adversely affected by the Proposed Action.

2.12.10. Southern Resident DPS Killer Whale Critical Habitat

The critical habitat for the endangered SRKW under the ESA was established on November 29, 2006, (71 FR 69054). The designated critical habitat consists of three areas: (1) The Summer Core Area in Haro Strait and waters around the San Juan Islands, (2) Puget Sound Area, and (3) the Strait of Juan de Fuca Area. On August 2, 2021, (86 FR 41668) this was revised to include the designation of six additional coastal critical habitat areas along the U.S. West Coast to establish their critical habitat effective on September 1, 2021. These newly designated areas along the U.S. West Coast include 41,207 square kilometers (km^2) of marine waters between the 6.1-m depth contour and the 200-m depth contour from the U.S. international border with Canada south to Point Sur, California with the exclusion of the Quinault Range Site (including a 10-km buffer around a portion of the site), comprising 3,627 km^2, from the critical habitat designation because we have determined that the benefits of exclusion outweigh the benefits of inclusion, and exclusion will not result in extinction of the species.

NMFS' final Biological Report (2021e) identified the following physical and biological features essential to the conservation of SRKW: 1) Water quality to support growth and development; 2) Prey species of sufficient quantity, quality, and availability to support individual growth, reproduction, and development, as well as overall population growth; and, 3) Passage conditions to allow for migration, resting, and foraging. Although longline-type EFP fishing may occur in a portion of the designated critical habitat areas, it is not known to affect water quality and is not known to catch salmon, a primary prey species for SRKW. As a result, given the lack of measurable impact to water quality, prey species, and relative overlap with SRKW distributions expected, designated critical habitat for SRKWs is not likely to be adversely affected by the Proposed Action.

3. MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT ESSENTIAL FISH HABITAT RESPONSE

Section 305(b) of the MSA directs Federal agencies to consult with NMFS on all actions or proposed actions that may adversely affect EFH. Under the MSA, this consultation is intended to promote the conservation of EFH as necessary to support sustainable fisheries and the managed species' contribution to a healthy ecosystem. For the purposes of the MSA, EFH means "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity", and includes the physical, biological, and chemical properties that are used by fish (50 CFR 600.10). Adverse effect means any impact that reduces quality or quantity of EFH, and may include direct or indirect physical, chemical, or biological alteration of the waters or substrate and loss of (or injury to) benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality or quantity of EFH. Adverse effects on EFH may result from actions occurring within EFH or outside of it and may include site-specific or EFH-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810). Section 305(b) of the MSA also requires NMFS to recommend measures that can be taken by the action agency to conserve EFH. Such recommendations may include measures to avoid, minimize, mitigate, or otherwise offset the adverse effects of the action on EFH (CFR 600.905(b)).

This analysis is based, in part, on the BA provided by WCR-SFD and descriptions of EFH for HMS (PFMC 2023), Pacific Coast Groundfish (PCG) (PFMC 2005), and Coastal Pelagic Species (CPS) (PFMC 1998) contained in the fishery management plans developed by the PFMC and approved by the Secretary of Commerce.

3.1. Essential Fish Habitat Affected by the Project

The Proposed Action occurs within EFH for various federally managed fish species within the HMS, PCG, and CPS FMPs. In addition, the Action occurs in the vicinity of rocky reefs, canyons, seamounts, and banks which are designated as habitat areas of particular concern (HAPC) for various federally managed fish species within the PCG FMP. HAPC are described in the regulations as subsets of EFH which are rare, particularly susceptible to human-induced degradation, especially ecologically important, or located in an environmentally stressed area. Designated HAPC are not afforded any additional regulatory protection under MSA; however, federal projects with potential adverse impacts to HAPC will be more carefully scrutinized during the consultation process.

3.2. Adverse Effects on Essential Fish Habitat

Longline-type gear in the Proposed Action is deployed in open water from the surface to approximately 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, and buoys), the gear does not affect biophysical habitat. As a result, the BA concluded that EFH was not likely to be adversely affected by the Proposed Action. However, water column habitat, which is considered as EFH for HMS, can be adversely affected by inadvertent loss of fishing gear that is left to "ghost fish" and that can create marine debris that can represent risk for ingestion in species or their entanglement in the gear. As described above (Section 2.5. *Effects of the Action*), estimates of gear loss rates in the Western Pacific region lost per year in the Hawaii and America Samoa pelagic longline fisheries suggest that over the duration of the Proposed Action (10-year period), there is a risk for impacts of longline-type fishing gear entering EFH as as lost or derelict gear (NMFS 2024f), although the amount of this gear within the Proposed Action Area is much less than what occurs in those Pacific longline fisheries. While the potential loss of gear could adversely affect HMS EFH, it is not clear to what extent these potential impacts would be realized by EFH species as a result of the Proposed Action, beyond the minimal increase in debris in the environment. Given the inherent financial incentive for EFP participants to minimize the extent and costs of gear loss during EFP fishing, the limted extent of gear loss that may occur under the Proposed Action, and without a more complete understanding of how lost pelagic longline-type gear would result in specific impacts, we conclude that it is not likely that the gear would significantly adversely affect HMS, PCG, or CPS EFH or HAPC, and that any adverse effects to HMS EFH are expected to be minimal. Our anticipation is that the monitoring program associated with the Proposed Action will record information on the extent of gear loss that can be used to inform future assessments of potential impact and/or development of any minimization measures associated with longline-type fisheries, as appropriate. As a result, we do not have any additional EFH conservation recommendations to provide at this time.

3.3. Supplemental Consultation

The WCR SFD must reinitiate EFH consultation with WCR PRD if the Proposed Action is substantially revised in a way that may adversely affect EFH, or if new information becomes available that affects the basis for NMFS' EFH analysis (50 CFR 600.920(l)).

4. DATA QUALITY ACT DOCUMENTATION AND PRE-DISSEMINATION REVIEW

The Data Quality Act (DQA) specifies three components contributing to the quality of a document. They are utility, integrity, and objectivity. This section of the opinion addresses these DQA components, documents compliance with the DQA, and certifies that this opinion has undergone pre-dissemination review.

4.1. Utility

Utility principally refers to ensuring that the information contained in this consultation is helpful, serviceable, and beneficial to the intended users. The intended users of this opinion are NMFS-WCR SFD and PRD. Other interested users could include the Pacific Fishery Management Council, Pacific States Marine Fisheries Commission, California Department of Fish and Wildlife, Oregon Department of Fish and Wildlife, the California Coastal Commission, National Marine Sanctuaries (Farallon Island, Monterey Bay, Cordell Bank, and Channel Islands) commercial and recreational fishermen, fishery consultants, and conservation organizations. Individual copies of this opinion were provided to the NMFS WCR-SFD. This opinion will be posted on the Public Consultation Tracking System website (https://pcts.nmfs.noaa.gov/pcts-web/homepage.pcts). The format and naming adheres to conventional standards for style.

4.2. Integrity

This consultation was completed on a computer system managed by NMFS in accordance with relevant information technology security policies and standards set out in Appendix III, 'Security of Automated Information Resources,' Office of Management and Budget Circular A-130; the Computer Security Act; and the Government Information Security Reform Act.

4.3. Objectivity

Information Product Category: Natural Resource Plan

Standards: This consultation and supporting documents are clear, concise, complete, and unbiased; and were developed using commonly accepted scientific research methods. They adhere to published standards including the NMFS ESA Consultation Handbook, ESA regulations, 50 CFR 402.01 et seq., and the MSA implementing regulations regarding EFH, 50 CFR 600.

Best Available Information: This consultation and supporting documents use the best available information, as referenced in the References section. The analyses in this opinion contain more background on information sources and quality.

Referencing: All supporting materials, information, data and analyses are properly referenced, consistent with standard scientific referencing style.

Review Process: This consultation was drafted by NMFS staff with training in ESA, and reviewed in accordance with WCR ESA quality control and assurance processes.

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