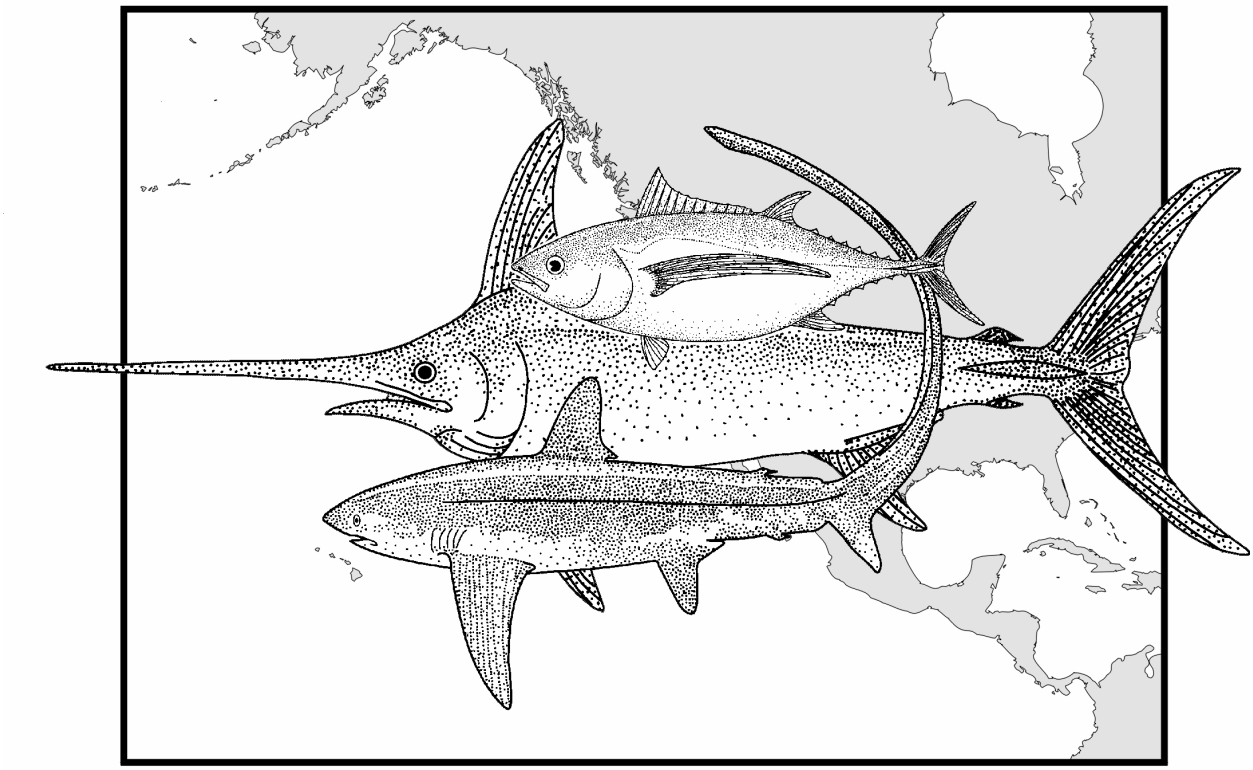
Attachment 1: Proposed HMS FMP Amendment 8 text in underline/ strikethrough

FISHERY MANAGEMENT PLAN FOR U.S. WEST COAST FISHERIES FOR HIGHLY MIGRATORY SPECIES



AMENDED THROUGH AMENDMENT ~~7~~8

PACIFIC FISHERY MANAGEMENT COUNCIL
7700 NE AMBASSADOR PLACE, SUITE 101
PORTLAND, OREGON 97220
WWW.PCOUNCIL.ORG

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Cover illustration by Roy Allen, Southwest Fisheries Science Center, National Marine Fisheries Service, La Jolla, California.

Note: FMP text not proposed for modification is not included here and omitted text is indicated by ***.

- Underline = new proposed text; underline
- Strikethrough = text proposed for deletion; ~~strikethrough~~

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Acronyms

ABC	~~allowable~~ acceptable biological catch
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DSBG	Deep-Set Buoy Gear
***	
SCB	Southern California Bight
***	

1.0 Introduction

1.1 Purpose of This Document

This Fishery Management Plan (FMP) includes important species of tunas, billfish, and sharks which are harvested by West Coast highly migratory species (HMS) fisheries. A complete list of species in the management unit is provided in Chapter 3. The FMP is intended to ensure conservation and promote the achievement of optimum yield of HMS throughout their ranges, both within and beyond the U.S. Exclusive Economic Zone (EEZ), to the extent practicable. Effective conservation and management in most cases will require concerted U.S. and international action. The FMP may serve as a vehicle for fulfilling the West Coast portion of U.S. obligations under international conservation agreements, if domestic U.S. implementing legislation authorizes its use.

Currently, stocks covered under the HMS FMP fall under the National Standard 1 Guidelines (50 CFR 600.310(h)(1)(ii)) as internationally managed and therefore are exempt from MSA 303(a)(15), which requires specification of acceptable biological catch (ABC), annual catch limits (ACLs), annual catch targets (ACTs), and accountability measures (AMs) (see Chapter 4 for more information). The Council has a long-standing practice of advising the U.S. delegations to regional fishery management organizations (RFMOs) and implementing the recommendations and resolutions of the RFMOs. The Council will not normally set ABCs and ACLs for HMS Management Unit Species (MUS) stocks the Council has determined meet this criterion. However, application of this exception does not preclude the Council from setting an ACL (and identifying an associated ABC to facilitate setting the ACL) if circumstances warrant.

The FMP has been amended ~~five~~ eight times. Amendment 1, approved in 2007, addresses overfishing of bigeye tuna, an MUS. Amendment 1 also reorganized the FMP, which in its prior form was combined with the Final Environmental Impact Statement evaluating the effects of its implementation. The reorganized FMP is a more concise document containing those elements required by the Magnuson-Stevens Fishery Conservation and Management Act (MSA) describing the management program. Amendment 2, approved in 2011, made FMP provisions (principally in Chapters 3-5) consistent with the revised National Standard 1 Guidelines (50 CFR 600.310) adopted pursuant to the Magnuson- Stevens Fishery Conservation and Management Reauthorization Act of 2006. Amendment 3, adopted in 2015, added a suite of lower trophic level species to the FMP's list of ecosystem component (EC) species. Consistent with the objectives of the Council's FMPs and its Fishery Ecosystem Plan, Amendment 3 prohibits future development of directed commercial fisheries for the suite of EC species shared among all four FMPs ("Shared EC Species") until and unless the Council has had an adequate opportunity to both assess the scientific information relating to

any proposed directed fishery and consider potential impacts to existing fisheries, fishing communities, and the greater marine ecosystem. Amendment 4, adopted in 2017, updated and streamlined portions of the FMP. Amendment 5, adopted in 2017, added a description of the Federal limited entry for the large mesh drift gillnet fishery operating off the coast of California. Amendment 6, adopted in 2023, authorized DSBG and created a limited entry program for the Southern California Bight (SCB). Amendment 7, also adopted in 2023, updated the description of the standardized Bycatch Reporting Methodology in the HMS FMP. Amendment 8, approved by the Council in 2023, updated EFH descriptions, fishing and non-fishing impacts, research and information needs, and other material related to the periodic EFH review completed in 2023.

This FMP is a "framework" plan, which includes some fixed elements and a process for implementing or changing regulations without amending the plan (flexible measures). Ongoing management of HMS ~~highly migratory species~~, and the need to address new issues that arise, make it impossible to foresee and address all regulatory issues in the initial plan. Some framework adjustments can be implemented more quickly than plan amendments, allowing for more timely management response. Changes to any of the fixed elements in the plan require a plan amendment. The framework procedures are described in Chapter 5.

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7.0 Essential Fish Habitat (EFH)

7.1 Background

The MSA ~~Section 303(a)(7) of the MSA, 16 U.S.C. 1801 et seq~~, as amended by the Sustainable Fisheries Act in 1996, requires that fishery management plans (FMPs):

"Describe and identify essential fish habitat…,minimize to the extent practicable adverse effects on such habitat caused by fishing and identify other actions to encourage the conservation and enhancement of such habitat." (§303(a)(7)).

The MSA provides the following definition:

The term 'essential fish habitat' means those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity. (16 U.S.C. 1802 (10)).

The EFH regulations (at 50 C.F.R. 600 Subpart J) provide additional interpretation of the definition of ~~essential fish habitat~~ EFH:

'Waters' include aquatic areas and their associated physical, chemical, and biological properties that are used by fish, and may include aquatic areas historically used by fish where appropriate; 'substrate' includes sediment, hard bottom, structures underlying the waters, and associated biological communities; 'necessary' means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and 'spawning, breeding, feeding, or growth to maturity' covers a species' full life cycle.

The ~~NMFS guidelines intended to assist councils in~~ regulations provide guidance for implementing the EFH provision of the MSA and set forth the following four broad tasks:

- Identify and describe EFH for all species managed under an FMP;
- Describe adverse impacts to EFH from fishing activities;

- Describe adverse impacts to EFH from non-fishing activities; and
- Recommend conservation and enhancement measures to minimize and mitigate the adverse impacts to EFH resulting from fishing and non-fishing related activities.

The EFH regulations require that EFH be described and identified within the waters of the U.S. and the U.S. EEZ for all life stages of each species in a fishery management unit (FMU) if they occur within that ~~zone~~geographic scope. FMPs must describe EFH in text and ~~/or tables~~ maps, and should use tables and figures ~~which~~ as appropriate, to provide information on the biological requirements for each life history stage of the species. ~~According to the EFH regulations, a~~ An initial inventory of available environmental and fisheries data sources should be taken to compile information necessary to describe and identify EFH and to identify major species-specific habitat data gaps. The EFH regulations also ~~suggest~~ state that ~~where possible,~~ FMPs should identify habitat areas of particular concern (HAPCs), which are subsets of EFH that can be useful to focus conservation efforts. ~~within EFH for habitats which satisfy the criteria of being 1) sensitive or vulnerable to environmental stress, 2) are rara, or are 3) particularly important ecologically.~~

Conservation and enhancement measures may be recommended by NMFS during consultation with Federal agencies, as required by section 305(b) of the MSA, on projects which may potentially impact HMS EFH. Specific conservation measures, however, will be developed on a case-by-case basis. NMFS' authority includes the direct management of activities associated with fishing for marine, estuarine, and anadromous resources; NMFS' role in Federal interagency consultations with regard to non-fishing threats is, more often than not, advisory. This document does not assume any new authority or regulatory role for NMFS in the control of non-fishing activities beyond the statutory requirements to recommend measures to conserve living marine resources, including their habitats.

This chapter identifies and describes EFH for ~~management unit species~~ MUS. Improved descriptions of EFH may be possible with more basic research on life history, habitat use, behavior, and distribution of life stages. Research also is needed to identify HAPCs. This FMP authorizes changes to the identification and description of EFH, and of HAPCs, as new information is collected.

The FMP also authorizes the adoption of management measures to prevent, mitigate, or minimize adverse effects on EFH from fishing when there is evidence for such effects. These management measures may include, but are not limited to, fishing gear restrictions, time/area closures, and harvest limits. Presently, however, there is no clear evidence of adverse impacts from any fisheries' practices or gear on HMS EFH. ~~Management measures to prevent, mitigate, or minimize adverse effects from fishing activities include, but are not limited to:~~

~~Fishing gear restrictions: Seasonal and areal restrictions on the use of specified gear; gear modifications to allow escapement of particular species or particular life stages (e.g., juveniles); prohibitions on the use of explosives and chemicals; prohibitions on anchoring or setting gear in sensitive localities; and prohibitions on fishing activities that cause significant physical damage in EFH.~~

~~Time/area closures: Closing areas to all fishing or specific gear types during spawning, migration, foraging, and nursery activities; and designating zones for use as marine protected areas to limit adverse effects of fishing practices on certain vulnerable or rare areas/species/life history stages.~~

~~Harvest limits: Limits on the take of species that provide structural habitat for other species assemblages or communities, and limits on the take of prey species.~~

This FMP adopts species and stage-specific EFH designations for individual MUS as described in Section 7.2 and Appendix F. Designating EFH according to the best understanding of species' requirements enables informed assessments of the impacts of habitat alterations or disturbances. The EFH regulations require a

description of a process to periodically review and revise EFH. The Council adopted a two-phase EFH review process. Phase 1 consists of a literature review and summary of new and newly available information and data. If the information warrants consideration of updated EFH information, the review process moves to Phase 2, which consists of developing proposed EFH modifications for Council consideration. The Council's EFH review process is described in Council Operating Procedure 22.

7.2 Description of Designated EFH by Species

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7.2.1 Common Thresher Shark

Common thresher shark EFH is defined using a combination of data sources described in Appendix F as well as expert opinion. While common thresher sharks may occur in shallow water <12 m, they occur primarily in deeper waters, seaward of 12 m, and these shallow regions including enclosed bays and estuaries are not considered essential. Including all age classes, common thresher shark EFH includes the U.S. West Coast EEZ from the U.S.-Mexico border to the U.S.-Canada border, to approximately 100 nautical miles offshore, seaward of the 12 m depth contour. While small schooling fish appear to be their preferred prey, diets vary temporally and spatially and include squid and crustaceans. The high productivity and presence of diverse small schooling fish, squid and crustacean species and relatively warm shallow shelf waters make the California Current, out to approximately 100 nautical miles, a suitable habitat for feeding and growth to maturity for common thresher sharks.

- Neonate and Early Juveniles (<102 cm FL): In shallow neritic water over the continental shelf, with a geographic range extending from the U.S.-Mexico border north to Morro Bay, California (35° N), but found most frequently in the SCB. Little is known of the food of early juveniles; they presumably feed on small northern anchovy and other small, schooling fishes and invertebrates. The broad continental shelf and relatively warmer waters in the SCB make this region a suitable nursery habitat for common thresher sharks.

- Late Juveniles and Subadults (males > 102 cm FL and < 188 cm FL; females >1 cm FL and < 216 cm FL): Epipelagic, neritic and oceanic. Habitat of subadults extends northward up the coast, as far north as 48° N. They are found most frequently in nearshore areas over the continental shelf, especially within the SCB. Known to feed primarily on northern anchovy, Pacific sardine, Pacific hake, Pacific mackerel, and market squid; secondarily on a variety of other fishes, squid and pelagic red crab (in warm water years). Northern anchovy was a more important prey component for juvenile fish < 160 cm FL.

- Adults (males > 181 cm FL; females > 216 cm FL): Epipelagic, neritic and oceanic waters along the West Coast of North America, seasonally distributed in coastal water from the U.S.-Mexico border to the U.S.-Canada border. Known to feed primarily on northern anchovy, Pacific sardine, Pacific hake, Pacific mackerel, and market squid; secondarily on a variety of other fishes, squid, and pelagic red crab (warm water years).

~~Based on California drift gill net logbook (1981-1991); drift net observer data (1990-1999); Oregon driftnet logbook data 1991-2001. Food habit information from Stick and Hreha (1989), Bedford and Haugen (1992) Preti et al. (2001).~~

- ~~Neonate/early juveniles (< 102 cm fork length [FL]): Epipelagic, neritic and oceanic waters off beaches, in shallow bays, in near surface waters from the U.S. Mexico EEZ border north to off Santa Cruz (37° N. latitude) over bottom depths of 6 to 400 fm, particularly in water less than 100~~

~~fm deep and to a lesser extent further offshore between 200-300 fm. Little known of the food of early juveniles; presumably feeds on small northern anchovy and other small, schooling fishes and invertebrates.~~

- ~~Late juveniles/subadults (> 101 cm FL and < 167 cm FL): Epipelagic, neritic and oceanic waters off beaches and open coast bays and offshore, in near-surface waters from the U.S. Mexico EEZ border north to off Pigeon Point, California (37° 10' N. latitude) from the 6 fm to 1400 fm isobaths. Known to feed primarily on northern anchovy, Pacific hake, Pacific mackerel and sardine; secondarily on a variety of other fishes, squid and pelagic red crab (warm water years). Northern anchovy especially important for juvenile fish < 160 cm FL.~~
- ~~Adults (> 166 cm FL): Epipelagic, neritic and oceanic waters off beaches and open coast bays, in near surface waters from the U.S. Mexico EEZ border north seasonally to Cape Flattery, WA from the 40 fm isobath westward to about 127° 30' W. longitude north of the Mendocino Escarpment and from the 40 to 1900 fm isobath south of the Mendocino Escarpment. Known to feed primarily on northern anchovy, Pacific hake, Pacific mackerel and sardine; secondarily on a variety of other fishes, squid and pelagic red crab (warm water years).~~

7.2.2 Shortfin Mako Shark

Shortfin mako shark EFH is defined using the combination of data sources described in Appendix F as well as expert opinion. Combining all age classes, mako shark EFH includes the entire U.S. West Coast EEZ seaward of the 12 m depth contour. While mako sharks may occur in shallow water <12 m, they occur primarily in deeper waters, and these shallow regions including bays and estuaries are not considered essential. Studies have shown that mako sharks of all sizes can feed opportunistically on a high diversity of prey. The high productivity and presence of diverse fish, squid and crustacean species and relatively warm and shallow shelf waters make the California Current a suitable habitat for feeding and growth to maturity for shortfin mako sharks.

- Neonate and Early Juveniles (< 100 cm FL): The SCB ecoregion has long been considered a pupping and nursery area for mako sharks based primarily on the prevalence of juveniles in this region. Current data show that the mako shark nursery extends along the continental margins of the SCB ecoregion, south to the U.S.-Mexico border. The broad continental shelf and relatively warmer waters in the SCB make this region a suitable nursery habitat. A range of coastal pelagic fish species are important prey for small mako sharks. Pacific saury was the most important prey item for juvenile sharks (FL < 110 cm), followed by Pacific sardine, Pacific mackerel, and jumbo squid with diets varying over time.

- Late Juveniles and Subadults (males > 100 cm FL to < 180 cm FL; females >1 cm FL to < 249 cm FL): Epipelagic, neritic, and oceanic waters from the U.S.-Mexico border to the U.S.-Canada border offshore to the 200 nautical mile EEZ boundary. Mako sharks of this size feed opportunistically on a high diversity of prey.

- Adults (males > 180 cm FL; females > 249 cm FL): Epipelagic, neritic, and oceanic waters from U.S.-Mexico border to the U.S.-Canada border offshore to the 200 nautical mile EEZ boundary. Studies have shown that adult mako sharks feed opportunistically on a high diversity of prey including larger and faster prey, such as marine mammals and small sharks.

~~Based on California drift gill net logbook (1981-1991); drift net observer data (1990-1999); Oregon driftnet logbook data 1991-2001; longline and gillnet catch data from Nakano (1994); California Department of~~

~~Fish and Game tagging data; Holts and Bedford (1993); and Casey and Kohler (1992). Food habits information from Hanan et al. (1993); Eschmeyer et al. (1983); D. Holts (NMFS, SWFSC La Jolla, pers. comm. 10/16/2000).~~

- ~~Neonate/early juveniles (< 101 cm FL): Oceanic and epipelagic waters of the U.S. West Coast from the 100 fm isobath out to the 2000 fm isobath (and possibly beyond) from the Mexico border to Point Pinos, CA, especially the Southern California Bight, from the 1000 fm isobath out to 2000 fm isobath from Monterey Bay north to Cape Mendocino; and from the 1000 fm isobath out to the EEZ boundary north of Cape Mendocino to latitude 46° 30' N. latitude. Occupies northerly habitat during warm water years. Nothing documented on food of neonates; presumably feeds on small pelagic fishes.~~
- ~~Late juveniles/subadults (> 100 cm FL and < 180 cm FL males and < 249 cm FL females): Oceanic and epipelagic waters from the U.S. Mexico EEZ border north to 46° 30' N. latitude from the 100 fm isobath out to the EEZ boundary north to San Francisco (38° N. latitude), and from 1000 fm out to the EEZ boundary north to San Francisco (38° N. latitude) and from 1000 fm out to the EEZ boundary north of San Francisco. Shortfin mako off the West Coast reportedly feed on mackerel, sardine, bonito, anchovy, tuna, other sharks, swordfish and squid. Since the large majority of makos within the EEZ are juveniles, presumably this diet refers to primarily to juveniles and subadults.~~
- ~~Adults (> 179 cm FL males and > 248 cm FL females Most adults within the U.S. West Coast EEZ are males.): Epipelagic oceanic waters from the U.S. Mexico EEZ border north to 46° 30' N. latitude extending from the 400 fm isobath out to the EEZ boundary south of Point Conception, from 1000 fm isobath out to the EEZ boundary and beyond north of Point Conception, and from the 1000 fm isobath out to the EEZ boundary and beyond, North of Point Conception, CA. Little is known of diet of large adults. Two adult shortfin mako over 250 cm FL were found to contain remains of a harbor seal, common dolphin, small sharks, and marlin (D. Holts, NMFS, SWFSC La Jolla, pers. comm. 10/16/2000). As with juveniles, presumably mackerel, sardine, bonito, anchovy, tunas, squid and swordfish may also be taken by adults, but existing published information on diet in our region is not broken down by mako size.~~

7.2.3 Blue Shark

Blue shark EFH is defined using a combination of data sources described in Appendix F as well as expert opinion. Combining sexes and age classes, blue shark EFH includes the entire U.S. West Coast EEZ seaward of the 12 m depth contour. While blue sharks may occur in shallow water <12 m, they occur primarily in deeper waters and these shallow regions including bays and estuaries are not considered essential. The high productivity and presence of diverse fish, squid and crustacean species and habitat along the continental margins make the California Current a suitable habitat for feeding and growth to maturity for blue sharks.

- Neonate and Early Juveniles (< 83 cm FL): YOY blue sharks spend most of their time over the continental margin, but off the continental shelf. Blue shark nursery areas extend along the continental margins of the SCB ecoregion, north through Oregon (approximately 32−46.2° N). Young blue sharks off California have been found to feed heavily on pelagic cephalopods, with Gonatus spp. and paper nautiluses (Argonauta spp.) being the most important.

- Late Juveniles and Subadults (males > 82 cm FL and < 175 cm FL; females > 82 cm FL and < 170 cm FL): Epipelagic, oceanic waters from the U.S.-Canada border to the U.S.–Mexico border. Within the U.S. West Coast EEZ they are known to feed on northern anchovy, Pacific hake, squid, spiny dogfish, Pacific herring, flatfishes, and opportunistically on surface-swarms of euphausiids,

and inshore spawning aggregations of market squid. A study showed Gonatus spp. ranked first in importance followed by jumbo squid and Argonauta spp.

- Adults (males > 175 cm FL; females > 170 cm FL): Epipelagic, oceanic waters in the region from northern California to the U.S.–Mexico border. A study showed jumbo squid ranked first in importance followed by Gonatus spp. and Octopoteuthis spp. Larger specimens may feed on marine mammals, including pinnipeds and cetaceans. The relatively warmer and productive waters off California make this a suitable feeding habitat for adult blue sharks.

~~Based on California drift gill net logbook (1981-1991); drift net observer data (1990-1999); Nakano and Nagasawa (1996); and Nakano (1994). Diet information based on Tricas (1979); Harvey (1989); and Brodeur et al. (1987).~~

- ~~Neonate/early juveniles (< 83 cm FL): Epipelagic, oceanic waters from the U.S. Mexico border north to the U.S. Canada border from the 1000 fm isobath seaward to the outer boundary of the EEZ and beyond; extending inshore to the 100 fm isobath south of 34° N. latitude. Size-specific information on diet of neonates is not available for our region.~~
- ~~Late juveniles/subadults (> 82 cm FL and < 167 cm FL males and < 153 cm FL females): Epipelagic, oceanic waters from the U.S. Mexico border north to 37° N. latitude (off Santa Cruz, CA) from the 100 fm isobath seaward to the outer boundary of the EEZ and beyond; and north to the U.S. Canada border from the 1000 fm isobath seaward to the EEZ outer boundary. Within the U.S. West Coast EEZ known to feed on northern anchovy, Pacific hake, squid, spiny dogfish, Pacific herring, flatfishes, and opportunistically on surface swarms of the euphausiid, *Thysanoessa spinifera*, and inshore spawning aggregations of market squid, *Loligo opalescens*.~~
- ~~Adults (> 166 cm FL males and > 152 cm FL females): Epipelagic, oceanic waters from the U.S. Mexico border north to the U.S. Canada border from the 1000 fm isobath seaward to the outer boundary of the EEZ and beyond; extending inshore to the 200 fm isobath south of 37° N. latitude off Santa Cruz, CA. Although diet information is lacking for fish of this specific size group, blue sharks in coastal waters off the U.S. West Coast reportedly feed on northern anchovy, Pacific hake, squid, spiny dogfish, herring, flatfishes, and opportunistically on surface swarms of the euphausiid, *Thysanoessa spinifera*, and inshore spawning aggregations of market squid, *Loligo opalescens*.~~

7.2.4 Albacore Tuna

Albacore tuna EFH is defined using a combination of data sources described in Appendix F as well as expert opinion. Combining all age classes, albacore tuna EFH includes the entire U.S. West Coast EEZ seaward of the 12 m depth contour. While albacore tuna may occur in shallow water <12 m, they occur primarily in deeper waters and these shallow regions including bays and estuaries are not considered essential. The high productivity and presence of diverse fish, squid, and crustacean species make the California Current a suitable habitat for feeding and growth to maturity for juvenile albacore tuna.

- Eggs and Larvae: No habitat within the U.S. West Coast EEZ.

- Juvenile (~50 to < 85 cm FL): Oceanic, epipelagic waters from the U.S.-Mexico border north to the U.S.-Canada border. Albacore feed on small fishes (northern anchovy, rockfish species, boreal clubhook squid, and crustaceans (amphipods, euphausiids).

- Adult (>85 cm FL): Adulthood is defined by the ability to reproduce rather than size. Thus, while

some fish >85 cm are landed in the EEZ these fish are not reproductively mature and thus, not adults. Following this logic, adult albacore are not found in the EEZ and consequently adult albacore EFH is not found within the U.S. West Coast EEZ.

~~Based on drift net observer data (1990-1999); California Commercial Passenger Fishing Vessel data; and Saito (1973); Laurs et al. (1974); Laurs and Lynn (1991); Bartoo and Forman (1994); and Hanan et al. (1993). Diet information from Iverson (1962) and Pinkas et al. (1971).~~

- ~~Eggs and Larvae - No habitat within the U.S. West Coast EEZ.~~
- ~~Juvenile < 85 cm FL. Oceanic, epipelagic waters generally beyond the 100 fm isobath from the U.S. Mexico EEZ border north to U.S. Canada border, and westward to the outer edge of the EEZ boundary. Habitat concentrations off southern and central California and the area of the Columbia River Plume area. Reported to feed opportunistically, predominantly on fishes (e.g., Pacific saury) and squids. Associated with sea surface temperatures (SSTs) between 10°C and 20°C in waters of the North Pacific Transition Zone in dissolved oxygen saturation levels greater than 60%. Smaller (younger) fish are known to have a higher proportion of squid in their diet. In our region, may aggregate in the vicinity of upwelling fronts to feed on small fishes (northern anchovy, saury, rockfish spp., Myctophids, barracudina), squids (e.g., *Loligo*, *Gonatus* and *Onychoteuthis* sp.) and crustaceans (Sergestid shrimp, pelagic red crab, *Phronima* amphipods, euphausiids).~~
- ~~Adult > 84 cm FL. Oceanic, epipelagic waters generally beyond the 100 fm isobath from the U.S. Mexico EEZ border north to U.S. Canada border, and westward to the outer edge of the EEZ boundary. Associated with SSTs between 14°C and 25°C in waters of the North Pacific Transition Zone in dissolved oxygen saturation levels greater than 60%. Reported to feed opportunistically, predominantly on fish (e.g., Pacific saury) and squid. Large fish tend to prey increasing more on fish and less on squid.~~

7.2.5 Bigeye Tuna

Bigeye tuna EFH is defined using a combination of data sources described in Appendix F as well as expert opinion. The occurrence of bigeye tuna in the U.S. West Coast EEZ is not common, and typically occurs in warm water years. Bigeye tuna EFH includes oceanic, epipelagic, and mesopelagic waters of the U.S. West Coast EEZ from the U.S.-Mexico border to just north of Point Conception, California (34° 34' N), seaward of the 12 m depth contour. Habitat is concentrated in the SCB primarily south of 34° N latitude. While bigeye tuna may occur in shallow water <12 m, they occur primarily in deeper waters and these shallow regions including bays and estuaries are not considered essential. The high productivity and presence of diverse fish, squid, and crustacean species make the California Current a suitable feeding habitat for juvenile and adult bigeye tuna.

- Eggs and Larvae: No habitat within the U.S. West Coast EEZ.
- Juvenile (< 108 cm FL): Oceanic, epipelagic, and mesopelagic waters from the U.S.-Mexico border to just north of Point Conception, California (34° 34' N). Feeding appears to be opportunistic at all life stages, with prey items consisting primarily of crustaceans, cephalopods, and fishes. Sternoptychids, gempylids, paralepidids, and myctophids are important prey items.
- Adult (>108 cm FL): Oceanic, epipelagic, and mesopelagic waters from the U.S.-Mexico border to just north of Point Conception, California (34° 34' N). Feeding appears to be opportunistic at all life stages, with prey items consisting primarily of crustaceans, cephalopods, and fishes.

Sternoptychids, gempylids, paralepidids, and myctophids are important prey items.

~~Based on California drift gill net observer data (1990-1999); California Commercial Passenger Fishing Vessel data; Kikawa (1961; 1957); and Alverson and Peterson (1963).~~

- ~~Eggs and Larvae - No habitat within the U.S. West Coast EEZ.~~
- ~~Juvenile – < 100 cm FL. Oceanic, epipelagic, and mesopelagic waters beyond the 200 fm isobath out to the EEZ boundary from the U.S.-Mexico EEZ border north to Point Conception, CA, some years extending northward to Monterey Bay (37° N. latitude). Associated with SSTs between 13°C and 29°C with optimum between 17°C and 22°C. Habitat concentrated in the Southern California Bight primarily south of 34° N. latitude from the 100 fm isobath out to the 1000 fm isobath. Nothing is known of the diet of juvenile bigeye in the U.S. West Coast EEZ.~~
- ~~Adult – > 100 cm FL. Oceanic, epipelagic, and mesopelagic waters beyond the 200 fm isobath out to the EEZ boundary from the U.S.-Mexico EEZ border north to Point Conception, CA, some years extending northward to Monterey Bay (37° N. latitude). Associated with SSTs between 13°C and 29°C with optimum between 17°C and 22°C. Habitat concentrated in the Southern California Bight primarily south of 34° N. latitude from the 100 fm isobath out to the 1000 fm isobath. Nothing is known of diet of adult bigeye in the U.S. West Coast EEZ.~~

7.2.6 Pacific Bluefin Tuna

Pacific bluefin tuna EFH is defined using a combination of data sources described in Appendix F as well as expert opinion. Pacific bluefin tuna EFH includes the entire U.S. West Coast EEZ seaward of the 12 m depth contour. While Pacific bluefin tuna may occur in shallow water <12 m, they occur primarily in deeper waters and these shallow regions including bays and estuaries are not considered essential. The high productivity and presence of diverse fish, squid and crustacean species make the California Current a suitable habitat for feeding and growth to maturity for juvenile Pacific bluefin tuna.

- Eggs and Larvae: No habitat within the U.S. West Coast EEZ.

- Juvenile and Adult (>50 cm FL): Oceanic, epipelagic waters from the U.S.-Mexico border north to the U.S.-Canada border, and westward to the 200 nm EEZ boundary. Major prey of Pacific bluefin across sizes in our region are the northern anchovy, Pacific sardine, Pacific mackerel, jumbo squid, midwater eelpout, Pacific saury, squid, and pelagic red crab. Overall, this is a highly opportunistic predator that can exploit a broad range of available prey species across habitats. In a study in the eastern Pacific Ocean using gonad histology none of the females were mature although a few males were considered mature (Dewar, *et al.* 2022). Thus, males would be considered adults whereas the females of the same size would not. Regardless, from the perspective of EFH, they share the same habitat, and separation by life history stage is not useful.

~~Based on California drift gill net observer data (1990-1999); Oregon driftnet logbook data, 1992-2001; Uosaki and Bayliff (1999); Bayliff (1994); Harada (1980). Food habits based on Pinkas et al. (1971) and Bayliff (1994).~~

- ~~Eggs and Larvae - No habitat within the U.S. West Coast EEZ.~~
- ~~Juvenile – < 150 cm FL and 60 kg, Bayliff (1994); Harada (1980). Oceanic, epipelagic waters~~

~~beyond the 100 fm isobath from the U.S. Mexico EEZ border north to U.S. Canada border, and westward to the outer edge of the EEZ boundary. Associated with SST between 14°C and 23°C. Northerly migratory extension appears dependent on position of the North Pacific Subarctic Boundary. A major prey item of juvenile bluefin in our region is the northern anchovy; other food items reported from off southern California include saury, market squid, (up to 80% of stomach contents by volume), saury, squid, and hake. May feed on pelagic red crab when this species occurs in the EEZ, since it is a significant component of the diet off Mexico.~~

- ~~Adult - (≥ 150 cm FL and 60 kg, Bayliff (1994); Harada (1980). No regular habitat within the U.S. West Coast EEZ, although large fish are occasionally caught in the vicinity of the Channel Islands off Southern California and rarely off the central California coast. Adult prey items are squids and a variety of fishes including anchovies, herring, pompanos, mackerel, and other tunas.~~

7.2.7 Skipjack Tuna

Skipjack tuna EFH is defined using a combination of data sources described in Appendix F as well as expert opinion. Skipjack tuna EFH includes the oceanic, epipelagic waters of the U.S. West Coast EEZ from the U.S.-Mexico border to just north of Point Conception, California (34° 34' N), seaward of the 12 m depth contour. While skipjack tuna may occur in shallow water <12 m, they occur primarily in deeper waters and these shallow regions including bays and estuaries are not considered essential. The high productivity and presence of diverse fish, squid, and crustacean species make the SCB during warm years a suitable feeding habitat for adult skipjack tuna.

- Eggs and Larvae: No habitat within the U.S. West Coast EEZ.
- Juvenile: No habitat within the U.S. West Coast EEZ.
- Adult (~56 cm FL): Oceanic, epipelagic waters from the U.S.-Mexico border to just north of Point Conception, California (34° 34' N) to the 200 nm U.S. EEZ boundary. Pelagic red crab, northern anchovy, Euphausiids, Pacific saury, and squid are important components of their diets.

~~Based on California drift gill drift net observer data (1990-1999); California Commercial Passenger Fishing Vessel data; Matsumoto et al. (1984) and IATTC (2001). Diet information based largely on Alverson (1963).~~

- ~~Eggs and Larvae - No habitat within the U.S. West Coast EEZ.~~
- ~~Juvenile - No habitat within the U.S. West Coast EEZ.~~
- ~~Adult - Oceanic, epipelagic waters beyond the 400 fm isobath out to the EEZ boundary from the U.S.-Mexico EEZ border northward to Point Conception, CA, and northward beyond the 1000 fm isobath north to about 40° N latitude. Associated with SSTs between 18°C and 20°C and dissolved oxygen level ≥ 3.5 ppm. Habitat concentrated, esp. in warm years, in the Southern California Bight primarily south of 33° N latitude. Off Baja California, Mexico and southern California, pelagic red crab and northern anchovy are important constituents of the diet. Euphausiids, Pacific saury, and squid are also taken.~~

7.2.8 Yellowfin Tuna

Yellowfin tuna EFH is defined using a combination of data sources described in Appendix F as well as

expert opinion. Based on landings data and information on size at maturity for Baja California, Mexico, the majority of fish occurring in the U.S. West Coast EEZ are immature although a small percentage may be adults. Yellowfin tuna EFH includes oceanic, epipelagic waters of the U.S. West Coast EEZ from the U.S.-Mexico border to just north of Point Conception, California (34° 34' N), seaward of the 12 m depth contour. While yellowfin tuna may occur in shallow water <12 m, they occur primarily in deeper waters and these shallow regions including bays and estuaries are not considered essential. The high productivity and presence of diverse fish, squid, and crustacean species make the SCB a suitable feeding habitat for yellowfin tuna.

- Eggs and Larvae: No habitat within the U.S. West Coast EEZ.

- Juvenile and Adults (>35 cm): Oceanic, epipelagic waters from the U.S.-Mexico border to just north of Point Conception, CA (34° 34' N) to the 200 nm U.S. EEZ. Pelagic red crab is an important constituent of the diet in southern California (warm water years), as well as northern anchovy, Pacific jack, sardine, and squid species.

~~Based on California Commercial Passenger Fishing Vessel data; drift gill net observer data (1990-1999); Uosaki and Bayliff (1999); Block et al. (1997); IATTC (1990; 2000); Schaefer (1998); N. Bartoo (SWFSC, NMFS, La Jolla, CA pers. comm.). Diet information based largely on Alverson (1963).~~

- ~~Eggs and Larvae - No habitat within the U.S. West Coast EEZ.~~
- ~~Juvenile - females: < 92 cm FL; males: < 69 cm FL. Oceanic, epipelagic waters from the U.S.-Mexico EEZ border north to Point Conception, CA, some years extending northward to Monterey Bay (37° N. latitude). South of Pt Conception from the 100 fm isobath out to the EEZ boundary; north of Point Conception from 300 fm isobath out to the EEZ boundary. Associated with SSTs between 18° to 31°C. Pelagic red crab is an important constituent of the diet off the west coast of Baja California, Mexico, and southern California (warm water years), and, secondarily, northern anchovy. Cephalopods also occur in the diet less frequently.~~
- ~~Adult - ≥ females: 92cm FL; males: ≥ 69 cm FL. Adult yellowfin tuna do not regularly occupy habitat within the U.S. West Coast EEZ.~~

7.2.9 Striped Marlin

Striped marlin EFH is defined using a combination of data sources described in Appendix F as well as expert opinion. Based on catch data the majority of fish landed in the U.S. EEZ are adults. Striped marlin EFH includes oceanic, epipelagic waters of the U.S. West Coast EEZ from the U.S.-Mexico border to just north of Point Conception, California (34° 34' N), seaward of the 12 m depth contour. While striped marlin may occur in shallow water <12 m, they occur primarily in deeper waters and these shallow regions including bays and estuaries are not considered essential. The relatively warmer temperature, high productivity and presence of diverse fish, squid and crustacean species make the SCB a suitable foraging habitat for adult striped marlin.

- Eggs, Larvae and Juveniles: No EFH within the U.S. West Coast EEZ.

- Subadult (males < 144 cm EFL; females <160 cm EFL): No EFH is identified in the U.S. West Coast EEZ. Based on landings data and the size at first reproduction few subadult striped marlin are expected in the U.S. EEZ.

- Adult (males > 144 cm EFL; females >160 cm EFL): Oceanic, epipelagic waters of the SCB, from the U.S.-Mexico border to just north of Point Conception California (34° 34' N) and to the 200 nm

U.S. EEZ. Diets off California include a range of fish, squid and crustaceans including Pacific saury, northern anchovy, Pacific sardine, jack mackerel, squid, and pelagic red crab.

~~Based on Uosaki and Bayliff (1999); California drift net observer data (1990-1999 and angler tag-release data (D. Holts and D. Prescott, pers. comm. NMFS, SWFSC, La Jolla, CA), and diet information from Hubbs and Wisner (1953), Nakamura (1985), Ueyanagi and Wares (1975), and Holts (2001).~~

- ~~Eggs and Larvae - No habitat within the U.S. West Coast EEZ.~~
- ~~Juvenile - No regular habitat within the U.S. West Coast EEZ.~~
- ~~Adult - > 150 cm EFL or 171 JFL. Oceanic, epipelagic waters of the Southern California Bight, above the thermocline, from the 200 fm isobath from the U.S.-Mexico EEZ border to about 34° 09' N. latitude (Pt. Hueneme, CA), east of the Santa Rosa-Cortes Ridge (a line from South Point, Santa Rosa Island, southeast to the EEZ boundary at approx. 31° 36' N. latitude and 118° 45' W. longitude). Preferred water temperature bounded by 68° to 78°F (20-25°C). Food species off California include Pacific saury, northern anchovy, Pacific sardine, jack mackerel, squid, and pelagic red crab.~~

7.2.10 Swordfish

Swordfish EFH is defined using a combination of data sources described in Appendix F as well as expert opinion. Swordfish EFH, including adults and juveniles, includes the entire U.S. West Coast EEZ seaward of the 12 m depth contour. While swordfish may occur in shallow water <12 m, they occur primarily in deeper waters and these shallow regions including bays and estuaries are not considered essential. The high productivity and presence of diverse fish, squid, and crustacean species make the California Current a suitable habitat for feeding and growth to maturity for swordfish.

- Eggs and Larvae: No habitat within the U.S. West Coast EEZ.

- Juvenile (males <102 EFL or 118 cm LJFL; females <144 cm EFL or <163 LJFL): Oceanic, epipelagic, and mesopelagic waters from the U.S.-Mexico border north to 41° N latitude and to the 200 nm U.S. West Coast EEZ. Diet is thought to be largely opportunistic on suitable-sized prey. In the SCB, swordfish feed on jumbo squid, *Boreopacific gonate*, Barracudinas, market squid, Pacific hake, northern anchovy, and myctophids.

- Adult (males > 102 cm EFL or 117 LJFL; females > 144 cm EFL or 162 LJFL): Oceanic, epipelagic and mesopelagic waters from the U.S.-Mexico border to the U.S.-Canada border and to the 200 nm U.S. West Coast EEZ. Large swordfish feed on similar prey as the smaller size group but jumbo squid, Gonatus spp., Luvar and Pacific hake are significantly more important.

~~Based on California drift gill net observer data (1990-1999); Oregon driftnet logbook data , 1991-2001; and DeMartini et al. (2000); diet information from Fitch and Lavenberg (1971) Mearns et al. (1981) and Sosa-Nishizaki (1998).~~

- ~~Eggs and Larvae - No habitat within the U.S. West Coast EEZ.~~
- ~~Juvenile - (Males < 102 EFL or 118 cm JFL; females < 144 cm EFL or < 163 JFL). Oceanic, epipelagic, and mesopelagic waters from the U.S.-Mexico EEZ border north to 41° N. latitude. In~~

~~the Southern California Bight primarily south of the Santa Barbara Channel Islands from the 400 fm isobath out to the EEZ boundary. North of Point Conception from the 1000 fathom isobath westward to the EEZ outer boundary and northward to 41° N. latitude. Food species within the U.S. West Coast EEZ have not been documented for this size category. Diet is thought to be largely opportunistic on suitable-sized prey. Off southern California, swordfish of unspecified size are reported to feed on Pacific hake, northern anchovy, squid, Pacific hake, jack mackerel, and shortbelly rockfish; squids are also important prey off western Baja California, Mexico.~~

- ~~(Males > 102 cm EFL or 117 JFL; females > 144 cm EFL or 162 JFL): Oceanic, epipelagic, and mesopelagic waters out to the EEZ boundary inshore to the 400 fm isobath in southern and central California from the U.S. Mexico EEZ border north to 37° N. latitude; beyond the 1000 fm isobath northward to 46° 40' N. latitude. Food species within the U.S. West Coast EEZ have not been documented for this size category. Off southern California, swordfish of unspecified size are reported to feed on Pacific hake, northern anchovy, squid, Pacific hake, jack mackerel, and shortbelly rockfish; squids are also important prey off western Baja California, Mexico. Large swordfish are capable of foraging in deep water and may also feed on mesopelagic fishes.~~

7.2.11 Dorado or Dolphinfish

Dolphinfish EFH is defined using a combination of data sources described in Appendix F as well as expert opinion. Dolphinfish EFH includes the epipelagic and oceanic waters of the U.S. West Coast EEZ from the U.S.-Mexico border to just north of Point Conception, California (34° 34' N), seaward of the 12 m depth contour. While dolphinfish may occur in shallow water <12 m, they occur primarily in deeper waters and these shallow regions including bays and estuaries are not considered essential. The relatively warmer waters, high productivity, and presence of diverse fish, squid, and crustacean species make the SCB a suitable feeding habitat for adult dolphinfish.

- Eggs, Larvae and Small Juveniles (<13.7 cm FL): No EFH within the U.S. West Coast EEZ. Occurrence is rare.

- Juveniles and Subadults (> 13.6 cm FL and < 35 cm FL): No EFH within the U.S. West Coast EEZ. Based on the size composition of landings data, juveniles and subadults would be rare in the U.S. EEZ.

- Adults (>35 cm FL): Epipelagic and oceanic waters from the U.S.-Mexico border to just north of Point Conception, California (34° 34' N) and to the outer edge of the U.S. EEZ. Flying fishes, epipelagic cephalopods, tetraodontiform fishes, and several mesopelagic fishes are important prey species.

~~Based on California Commercial Passenger Fishing Vessel catches; Norton (1999); and Ambrose (1996). Diet information based on Eschmeyer et al. (1983) and Palko at al. (1982).~~

- ~~Spawning, eggs and larvae - (< 13.7 cm FL): Primarily outside of the U.S. West Coast EEZ. Spawning restricted to water ≥ 24°C; off southern Baja California, Mexico, with peak larval production in August and September (Ambrose 1996).~~
- ~~Juveniles and subadults - (> 13.6 cm FL and < 35 cm FL): Epipelagic (# 30 m deep) and predominantly oceanic waters offshore the 6 fm isobath along coastal California from the U.S.-Mexico border generally as far north as Point Conception, CA (34° 34' N. latitude) and within the U.S. West Coast EEZ primarily east of the Santa Rosa-Cortes Ridge. (Line extends from Point~~

~~Conception south-southeast to a point on the EEZ boundary at 31° 36' N. latitude and 118° 45' W. longitude). Prefers sea surface temperatures 20°C and higher during warm water incursions. Nothing documented on the diet of juvenile dolphin within the EEZ; presumably feeds on other epipelagic fishes (e.g, small flying fish), crustaceans, and squids.~~

- ~~Adults - (> 34 cm FL): Epipelagic (30 m deep) and predominantly oceanic waters offshore the 6 fm isobath along coastal California from the U.S. Mexico border generally as far north as Point Conception, CA (34° 34' N. latitude) and within the U.S. West Coast EEZ primarily east of the Santa Rosa-Cortes Ridge. (Line extends from Point Conception south-southeast to a point on the EEZ boundary at 31° 36' N. latitude and 118° 45' W. longitude). Prefers sea surface temperatures 20°C and higher during warm water incursions. Nothing is known of the diet of adult dolphin within the U.S. EEZ, but in the Pacific, adult common dolphin are reportedly mainly piscivorous, with flying fish being the most important in volume and occurrence.~~

7.3 Habitat Areas of Particular Concern (HAPCs)

The EFH regulations state that FMPs should identify specific types or areas of habitat within EFH as HAPCs, based on one or more of the following considerations:

1. the importance of the ecological function provided by the habitat.
2. the extent to which the habitat is sensitive to human-induced environmental degradation.
3. whether, and to what extent, development activities are, or will be, stressing the habitat type.
4. the rarity of the habitat type.

The goal of identifying HAPCs is to provide additional focus for conservation efforts. While the HAPC designation does not add any specific regulatory process, it highlights certain habitat types that align with one or more of the considerations listed above. HAPCs should be spatially discrete, with clearly defined geographic boundaries. Councils may implement conservation actions such as time/area closures, gear restrictions, or other mechanisms to protect designated HAPCs, and a HAPC designation helps inform EFH consultations in which federally permitted projects with potential adverse impacts to HAPC are more carefully scrutinized during the consultation process on non-fishing activities.

HAPCs were considered but not adopted when the HMS FMP was originally approved. Habitats such as shark pupping grounds, nursery areas, and migratory routes were considered as potential HAPCs during the 2023 EFH review. However, no HAPCs were ultimately recommended for inclusion, based primarily on the lack of sufficient information to identify discrete areas with clearly defined geographic boundaries, or to provide a thorough qualitative description of the HAPC boundaries. There are no HAPCs designated at this time, but through this FMP, a framework is authorized to ensure review and updating of EFH based on new scientific evidence or other information as well as incorporation of new information on HMS HAPCs as it becomes available in the future.

~~Reviewing and identifying HAPCs would entail additional management costs and an increase in data needs to survey and determine HAPC (such as shark pupping grounds), and for periodically reviewing and updating EFH designations. But incorporating a framework should save costs in the long run by avoiding the necessity of having to go through the amendment process every time new data necessitated revision. There may be some inconsistency with the Western Pacific FMP, which has a different type of framework relating to EFH, but the WPFMC management area also has regional differences in habitat utilization and a different plan development design and history.~~

Research is needed to identify HAPCs, such as shark pupping grounds, key migratory routes, feeding areas, and areas of concentration of large adult females. ~~The Council recommends adoption of EFH designations~~

~~as presented without identification of HAPCs at this time, because of lack of information on specific habitat dependencies for species that may occupy critical habitat in the EEZ, such as the more coastal-occupying sharks.~~ Some of the more transitory MUS that invade the region only at the far fringes of their distributions (e.g., the tropical tunas and dorado), probably do not occupy habitats within the EEZ essential to the health and survival of their populations. If HAPCs of these species, and those of others that have more regional distributions, become identified in the future (such as shark pupping or nursery areas ~~of thresher and mako sharks~~), the Council should consider management actions to protect those habitats. ~~it is recommended that the Council make every effort to protect them, especially if found to be concentrated in localized definable areas.~~

7.4 Effects of Fishing Activities on Fish Habitat

Section 600.815(a)(2) of the ~~final rule~~ EFH regulations lists the mandatory contents of FMPs regarding fishing activities that may adversely affect EFH. The adverse effects from fishing activities may include physical, chemical, or biological alterations of the substrate, and loss of, or injury to, benthic organisms, prey species and their habitat, and other components of the ecosystem. FMPs must ~~include~~ identify management measures which minimize adverse effects on EFH from fishing, to the extent practicable, and identify conservation and enhancement measures. FMPs must also contain an assessment of the potential adverse effects of all fishing activities in waters described as EFH. In completing this assessment, councils should use the best scientific information available, as well as other appropriate information sources, as available. This assessment should consider the relative impacts of all fishing gears and practices used in EFH on different types of habitat found within EFH. The assessment should also consider the establishment of research closure areas and other measures to evaluate the impact of any fishing activity that alters EFH.

Councils must act to minimize, prevent, or mitigate any adverse effects from fishing activities, to the extent practicable, if there is evidence that a fishing activity ~~is having an identifiable adverse effect on EFH~~ adversely affects EFH in a manner that is more than minimal and not temporary in nature. In determining whether it is practicable to minimize an adverse effect from fishing, councils should consider ~~whether, and to what extent, the fishing activity is adversely impacting EFH, including the fishery;~~ the nature and extent of the adverse effect on EFH and whether the management measures are practicable, taking into consideration the long- and short-term costs and benefits to the fishery and EFH, along with other appropriate factors, consistent with National Standard 7 (conservation and management measures shall, where practicable, minimize costs and avoid unnecessary duplication).

In general, fishing gear deployed in the ocean water column is not known to directly affect or alter HMS water column habitat, and any adverse impacts to HMS EFH from the presence of deployed fishing gear would be considered minimal and temporary. This would apply to other lost gear (light sticks, buoys, etc.) as well. However, habitat can be affected by inadvertent loss of gear that is left to "ghost fish," or to create marine debris that can cause harm to other species. Other potential impacts to HMS EFH include discharge of processing waste (offal) and the removal of prey species, both of which could decrease the quality of HMS EFH. These are described further below.

~~In general, fishing gear is not known to directly alter HMS water column habitat, but habitat can be affected by inadvertent loss of gear that is left to "ghost fish," or to create marine debris that can cause harm to other species in the pelagic environment (e.g., light sticks from swordfish longlining are known to be mistaken for food by abatrosses). Also, fishing activities also affect the water column through discharge of offal from fish processed at sea. These discards may redistribute prey food or attract bycatch and protected species, which then become susceptible to capture or entanglement by the gear.~~

~~Fishing activity can also cause harm when it takes place in areas where HMS congregate and are thus highly susceptible to capture during a critical life history period, e.g., when they form spawning/pupping~~

~~aggregations, when adults are concentrated inshore during seasonal migration, or when young are concentrated in core nursery areas.~~

7.4.1 Impacts of Fishing Gear ~~Physical Impacts of Fishing Gears~~ on HMS EFH

HMS fisheries are associated with hydrographic structures of the water column (e.g., the marine pelagic and mesopelagic zone and convergence boundary areas between currents and major features such as the thermocline). Thus, the approved gears that are used in the HMS fisheries do not contact the bottom substrate; therefore, the only opportunity for damage to benthos or EFH for any species in fishing for HMS is from lost gear. The quality of HMS EFH in the water column could potentially be degraded due to the presence of derelict gear, although any impacts would not be expected to be more than minimal and temporary in nature. Although derelict gear could degrade the quality of benthic habitat, the benthos is not considered EFH for HMS species. If gear is lost, diligent efforts should be made to recover the lost gear to avoid further disturbance of the underwater habitat through "ghost fishing." Under Federal law, it is illegal for any vessel to discharge plastics or garbage containing plastics into any waters, but plastic buoys, light sticks, monofilament line and netting, and other plastic items have been known to enter the system from fishing operations, mostly as a result of damage to gear. The full extent of this problem in our HMS fisheries is not known but is unlikely to have more than a minimal ~~not thought to have a significant~~ impact on HMS EFH because of the agility of these large pelagic species in avoiding debris in the open ocean, and the tendency of at least some of this material to sink to the bottom, and the relatively inert nature of plastic. Non-HMS fisheries and non-MSA managed fisheries also operate in Pacific Coast waters but are similarly unlikely to have more than a minimal effect on HMS EFH. ~~These materials may have a far greater impact on benthic and intertidal environments, or on seabirds and turtles which may ingest floating plastics mistaking them for food. Intact sections of gillnets have the potential to continue fishing in the pelagic environment for some time. When high seas squid nets were operating in the Pacific, NMFS estimated in 1991 that 0.06% of driftnets were lost each time they were set (Davis 1991).~~

It has been reported that lost and discarded sections of driftnet ball up fairly quickly and cease to ghostfish in a short period of time (Mio, *et al.* 1990), but these loose balls may trail streaming sections of net that may continue to fish for extended periods (Ignell, *et al.* 1986; Von Brandt 1984). It is most likely, however, that HMS, particularly tunas and billfish, are less vulnerable to the ghost fishing effects of streaming sections of netting than are less mobile or scavenging species which may blunder into the net (e.g. *Mola mola*) or become entangled in attempts to feed on remains of the catch (e.g. seabirds and pinnipeds). Nonetheless, sharks may be more vulnerable, and blue shark and pelagic hammerhead shark have been reported as caught in four sections of derelict squid driftnet retrieved by U.S. observers in 1985 (Ignell, *et al.* 1986).

~~There are other fishery operations off the Pacific coast which may alter species complexity in the water column. There is a large mid-water trawl fishery for Pacific whiting, primarily occurring north of 39° N. latitude.~~ Discharge of offal and processing slurry may affect EFH for HMS. Prolonged offal discards from some large-scale fisheries have redistributed prey food away from mid-water and bottom-feeding organisms to surface-feeding organisms, such as tuna, usually resulting in scavenger and seabird population increases. Offal discards in low-current environments can collect and decompose on the ocean floor, creating anoxic bottom conditions which may affect HMS. Pacific coast marine habitat is generally characterized by strong current and tide conditions, but there may be either undersea canyons affected by at-sea discard, or bays and estuaries affected by discard from shoreside processing plants. As with bottom trawling off the Pacific coast, little is known about the environmental effects of mid-water trawling and processing discards on habitat conditions. The Environmental Protection Agency (EPA) prohibits seafood processor vessels from discharging seafood processing waste in nearly 3,770 square miles of Federal waters off Oregon and Washington because of the potential for high-volume, oxygen-consuming organic waste to exacerbate hypoxia in the region (EPA NPDES Permit No. WAG520000).

The presence of prey species can contribute to waters functioning as feeding habitat, and thus the removal of prey species could conceivably affect the quality of HMS EFH. HMS species feed on a broad range of prey including fish, squid and crustaceans (Preti 2020). Prey can include anchovy, jack mackerel, Pacific hake, flatfishes, spiny dogfish, rockfishes, squids and pelagic crustaceans including euphausiids (Tricas 1979; Harvey 1989; Brodeur et al. 1987, Preti 2020). The removal of prey species by HMS fishing, other MSA-managed fishing, and non-MSA managed fishing could conceivably reduce the quality of HMS EFH. Purse seine fisheries managed under the Council's CPS FMP capture Pacific sardine, northern anchovies, Pacific mackerel, squid, and other species that serve as HMS prey. Several species captured in the directed Pacific Coast groundfish fishery or as bycatch are included in the suite of HMS prey species. Fisheries not managed under the MSA (e.g., state-managed shrimp fisheries) also capture HMS prey species, in the directed fishery or as bycatch. However, the majority of HMS prey species are Ecosystem Component Species and therefore not subject to directed harvest, or they are not under Federal or state management and thus would not be subject to fishery management measures.

The EFH literature search and review completed in 2023 produced no information indicating that fishing adversely affects HMS EFH via removal of HMS prey species, and HMS in this FMU are known to be opportunistic feeders and switch prey. For instance, data on stomach content analysis for albacore tuna from the Pacific Northwest and swordfish from Central and Southern California demonstrate that principal prey species vary widely between years. Anchovy, Pacific saury, and rockfish were particularly important prey for albacore, while hake and market squid were important for swordfish. Both species consume a broad range of prey with significant shifts in diet composition over relatively short time periods (SWFSC 2022; Iglesias 2023). However, the energetic balance of HMS could be affected if they need to forage further afield to obtain adequate nutrition, or if they are forced to rely on prey species of lower nutritional benefit.

7.4.2 Mitigation Considerations for Fishing Effects

Fishery management options to prevent, mitigate, or minimize adverse effects from fishing activities may include, but are not limited to:

Fishing gear restrictions: Seasonal and areal restrictions on the use of specified gear; gear modifications to allow escapement of particular species or particular life stages (e.g., juveniles); prohibitions on the use of explosives and chemicals; prohibitions on anchoring or setting gear in sensitive areas; and prohibitions on fishing activities that cause significant physical damage in EFH.

Time/area closures: Closing areas to all fishing or specific gear types during spawning, migration, foraging, and nursery activities; and designating zones for use as marine protected areas to limit adverse effects of fishing practices on certain vulnerable or rare areas/species/life history stages.

Harvest limits: Limits on the take of species that provide structural habitat for other species assemblages or communities, and limits on the take of prey species. As noted previously, the majority of HMS prey species are not under Federal or state management and thus would not be subject to fishery management measures (SWFSC 2022). However, recognizing the importance of forage fish to Council-managed species and the broader ecosystem, the Council implemented a forage initiative in 2015 (i.e., Comprehensive Ecosystem-Based Amendment 1) to protect shared ecosystem component species identified under the four West Coast FMPs. The initiative, which resulted in amendments to all four FMPs, prohibits new directed commercial fishing of currently unmanaged and unfished forage fish until the Council can assess the relevant scientific information and consider impacts to existing fisheries, communities, and the marine ecosystem. The initiative protects a wide variety of important prey, including species of herring, mesopelagic fishes, smelts, pelagic squids, and others.

Compliance and Enforcement of Marine Pollution Laws: Fishers are required to save light sticks for disposal on land as required by the International Convention of the Prevention of Pollution from Ships, or MARPOL established in 1973. Annex V of the Protocol deals with plastics and garbage disposal from ships and prohibits dumping of all ship-generated plastics. The Coast Guard is in charge of enforcing MARPOL Annex V within the U.S. EEZ. All vessels, regardless of nationality, are bound by these MARPOL restrictions within the territorial waters of the treaty nations. In addition, vessels should ensure compliance with EPA National Pollution Discharge Elimination System (NPDES) permits for fish processing waste discharge.

~~Compliance and Enforcement of Seabird Mitigation Measures Related to Strategic Offal Discards: This includes, but is not limited to, strategic release of offal from vessels to distract seabirds and other protected species away from longline hooks during setting and retrieval.~~

~~There is an increasing amount of research to measure the effects of fishing activities on marine habitat, and some general conclusions about the effects of some gear types on marine habitat may be drawn from this research. However, as noted above, there has been little research on Pacific coast fisheries EFH and into the fishing effects on such habitat, especially HMS EFH, which is generally less associated with the sea bottom topography and inshore waters, as the habitats of most other species managed by the Council. Implementing measures to mitigate gear impacts on habitat may require research that specifically describes the effects of the fishing gear used in Pacific coast fisheries on marine habitat utilized by HMS. The Council may weigh the magnitude of this potential impact and develop appropriate recommendations for addressing them.~~

Globally, there is an increasing amount of research to measure the effects of fishing activities on marine habitat, and some general conclusions about the effects of some gear types on marine habitat have been drawn from this research. However, there has been little research on gear effects (including derelict gear) of Council-managed fisheries on HMS EFH. While HMS are generally not associated with the sea bottom topography and inshore waters, the SCB has long been considered to support pupping grounds and nursery habitat for some shark species, based largely on the prevalence of juveniles in this region. Identifying measures to mitigate HMS gear impacts on HMS EFH may require research that specifically describes and quantifies these effects as well as identifying spatially discrete nursery and pupping grounds along the west coast. At that point, the Council could evaluate the magnitude of any potential impacts and consider exploring management measures to protect these habitats.

~~In addition to suggesting measures to restrict fishing gears and/or methods, NMFS' regulatory guidance on EFH also suggests time/area closures as possible habitat protection measures. These measures might include, but would not be limited to: closing areas to all fishing or specific gear types during spawning, migration, foraging, and nursery activities; and designating zones for use as marine protected areas to limit adverse effects of fishing practices on certain vulnerable or rare areas/species/life history stages (e.g., to protect early life stages of sharks). Some of these closures may already exist, such as the exclusion of trawling within three miles of the California coastline and areas closed to commercial fishing (e.g., Santa Monica Bay). The Council may examine whether such opportunities exist for HMS and make appropriate recommendations for addressing them. The proposed action to require West Coast based high seas longliners to abide by the same regulations restricting the targeting of swordfish north of the equator west of 150° W. longitude will undoubtedly reduce significantly the number of lightsticks that may be inadvertently lost during fishing operations, since this gear is primarily used in swordfish longlining.~~

~~Beyond protecting natural reserves and areal closures for particular species, the Council may consider creating marine reserves closed to all fishing, should certain critical habitat areas be identified in the future, although it is recognized that most HMS move widely throughout and beyond the EEZ and reserves tend to be more practical for more sedentary species. Several no fishing zones have been created in the North~~

~~Pacific Fishery Management Council for the waters off Alaska, generally for the purposes of protecting either crab or marine mammal rookeries.~~

~~Additional research is recommended to identify adverse impacts and to quantify impacts currently occurring. Any inshore areas that are closed to fishing in order to conserve pupping and juvenile habitats would be ideal locations to study the effects of fishing gear impacts on EFH. Research in these areas is strongly advocated, and further evaluations of fishing impacts on HMS habitat will be undertaken as more research is conducted and information becomes available. Information will be reviewed annually to assess the state of knowledge in this field; the annual SAFE report (see section 3.4) will include any new information on the impacts of fishing activities on HMS EFH.~~

Research to identify and evaluate potential impacts to HMS EFH from fishing activities is recommended. This may be particularly important to protect life stage-specific EFH such as nursery and pupping grounds for sharks. In considering mitigation measures to minimize impacts to EFH, the Council should include potential impacts to EFH identified and described under other Council FMPs.

7.4.3 Findings

The most recent review of HMS EFH, completed in 2023, produced ~~As of this writing (January 16, 2003), there is~~ no evidence that HMS fishing practices or gear adversely affect EFH in a manner that is more than minimal in nature. ~~are causing identifiable adverse impacts on HMS EFH, or that other FMP fishing practices are causing identifiable adverse effects on HMS EFH~~. Therefore, the West Coast HMS FMP meets the MSA requirement to minimize to the extent practicable, the adverse effects of fishing on EFH, and no minimization measures are warranted. ~~further action is recommended at this time.~~

7.5 Effects of Non-fishing Activities on Fish Habitat

Section 600.815(a)(4) of the EFH regulations pertains to identifying non-fishing related activities that may adversely affect EFH. The section states that FMPs must identify activities that have the potential to adversely affect, directly or cumulatively, EFH quantity or quality, or both. Broad categories of activities which can adversely affect EFH include, but are not limited to: dredging, filling, excavation, mining, impoundment, discharge, water diversions, thermal additions, actions that contribute to non-point source pollution and sedimentation, introduction of potentially hazardous materials, introduction of exotic species, and the conversion of aquatic habitat that may eliminate, diminish, or disrupt the functions of EFH. For example, Sheehan and Tasto (2001) provide a good summary of various sources of impairment of water quality and habitats in California waters, and Kiffney et al. (2002) includes comprehensive descriptions of non-fishing activities and potential conservation measures. FMPs should describe known and potential adverse impacts to EFH. These descriptions should explain the mechanisms or processes that may cause adverse effects and how these may affect habitat function. A Geographic Information System (GIS) or mapping system should be used to support analyses of data and to present these data in an FMP in order to geographically depict impacts identified in this paragraph.

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7.5.1 Description of Non-fishing Activities

This section describes several non-fishing activities that may adversely affect HMS EFH and provides conservation recommendations. A NMFS White Paper (Kiffney et al. 2022; NMFS-NWFSC-WP-2022-01) identifies a wide range of non-fishing activities and is incorporated by reference into the HMS FMP. Although not described in detail here, offshore wind (OSW) energy planning and development is a prominent renewable energy national initiative. Floating OSW is the most likely design for such facilities

on the U.S. West Coast. Potential adverse impacts include loss and alteration of habitat; sedimentation, siltation, and turbidity; direct impacts to marine biota; alteration of magnetic fields; and noise effects. In addition, energy extraction by turbines can reduce wind speeds at the sea surface, which could affect wind-driven upwelling processes (Raghukumar et al. 2023). OSW facilities require cables connecting individual turbines (inter-array cables) and transmission cables connected to the shore, both of which have potential impacts to benthic biogenic habitats. Numerous conservation measures should be considered related to OSW installation and operation. These include avoiding HAPCs or other sensitive habitats, burying cables at sufficient depths to minimize impacts, conducting pre-construction and operation monitoring for impacts to species, evaluating and addressing electromagnetic effects on aquatic organisms, and minimizing noise effects. These potential impacts and conservation measures are more fully described in Kiffney et al. (2022).

Dredging

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Dredged Material Disposal/Fills

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Fossil Fuel Production and Exploration

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Water Intake Structures

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Aquaculture

***

Wastewater Discharge

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Discharge of Oil or Release of Other Hazardous Substances

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In addition to uptake through the food chain, dissolved mercury is taken in by fish through their gills and dispersed by blood as it circulates through the body. ~~Environmental News Service 9/8/99 citing C. Rouleau, Environment Canada~~ (Rouleau, C. et al. 1999).

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Coastal Development Impacts

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7.5.2 Mitigation Considerations for Non-Fishing Effects

~~Section 600.815(a)(6) of the EFH regulations states~~ FMPs must describe options to avoid, minimize, or

compensate for the adverse effects and identify actions to encourage the conservation and enhancement of EFH. Generally, non-water-dependent actions should not be located in EFH if such actions may have adverse impacts on EFH. Activities which may result in significant adverse effects on EFH should be avoided where less environmentally harmful alternatives are available. If there are no alternatives, the impacts of these actions should be minimized. Environmentally sound engineering and management practices should be employed for all actions which may adversely affect EFH. Disposal or spillage of any material (dredge material, sludge, industrial waste, or other potentially harmful materials) which may destroy or degrade EFH should be avoided. If avoidance or minimization is not possible, or will not adequately protect EFH, compensatory mitigation to conserve and enhance EFH should be recommended. FMPs may recommend proactive measures to conserve or enhance EFH. When developing proactive measures, the Council may develop a priority ranking of the recommendations to assist Federal and state agencies undertaking such measures.

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Dredging

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Fills/Dredge Material Disposal

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Oil/Gas Exploration/Production

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Water Intake Structures

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Aquaculture Facilities

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Wastewater Discharge

***

Discharge of Oil or Release of Hazardous Substances

***

Coastal Development Impacts

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7.5.3 Findings

Federal action agencies must consult with ~~NOAA Fisheries~~ NMFS regarding any of their actions authorized, funded or undertaken, or proposed to be authorized, funded or undertaken, that may adversely

affect EFH (MSA 305(b)(2)). For actions that were completed prior to the approval of ~~these~~ EFH designations for HMS, consultation is not required.

7.6 Summary

- ~~The proposed action is to adopt species- and stage-specific EFH designations for the thirteen~~ This chapter includes updated EFH information based on a review completed in 2023, for the 11 individual management unit species as described ~~in~~ above and Appendix F. EFH designations are based primarily on Level 1 (presence/absence) fishery-dependent and fishery-independent data. ~~This FMP identifies and describes EFH for all MUS managed under this FMP based on available Level 1 and Level 2 data from the fisheries and from the literature on distribution and habitat preference. Some of these important habitat areas are already protected to some extent by regulatory season and area closures now in effect.~~
- No specific EFH impacts ~~problem areas~~ were identified at this time that could be addressed by fisheries management actions to protect and enhance EFH. After conducting a review ~~and analysis~~ of new and existing data on MUS' habitat and possible sources of impacts to ~~disturbance in~~ these habitats, the Council found no clear evidence of ~~significant~~ adverse impacts on HMS EFH that are more than minimal in nature. Thus, no new ~~EFH~~ fishery management measures~~, and therefore no~~ or regulations are proposed.
- ~~At this time, there is no evidence that HMS fishing practices or non-fishing activities are causing adverse impacts on HMS EFH, although~~ This chapter includes updated information on non-fishing impacts and associated ~~EFH~~ conservation recommendations ~~are included~~ to mitigate the possible effects of these practices. It incorporates by reference numerous additional non-fishing impacts and associated conservation measures described in Kiffney et al. 2022.
- Current fisheries management measures to protect EFH ~~fishery habitat~~ appear to be adequate, but should future research demonstrate a need, the Council will act accordingly to protect habitat necessary to maintain a sustainable and productive fishery in the eastern Pacific region.
- No HAPCs have been designated at this time, but the FMP provides a framework which will ensure review and updating of EFH based on new scientific evidence or other information as well as incorporation of new information on HMS HAPCs as it becomes available in the future. The Council is authorized to proceed with establishing such a framework procedure for reviewing EFH and identifying HAPCs, particularly critical areas such as shark pupping and core nursery areas.

7.7 ~~Recommendations for EFH~~ Research and Information Needs

~~Very little specific information is known about the migratory corridors and habitat dependency of these large mobile fishes, how they are distributed by season and age throughout the Pacific and within the West Coast EEZ, and how oceanographic changes in habitat affect production, recruitment, and migration. More research is needed in these areas to better define EFH and HAPCs. Also, research is needed to identify specific shark habitat areas of particular concern, such as pupping grounds, key migratory routes, feeding areas, and areas of concentration of large adult female sharks. Pupping grounds and core nursery areas have not yet been identified and need further study. These areas may not only concentrate pups, but also the highly valuable pregnant females at certain times of the year. Reproductive female sharks, having run and survived the gauntlet of many years of natural and fishing mortality, are extremely valuable to the continued growth of their populations, and if concentrated in certain areas at pupping times, would be highly vulnerable to habitat perturbations. Of special relevance are thresher and mako shark pupping areas, the locations of which are currently unknown but must occur somewhere within the southern portion of the U.S. West Coast EEZ, judging from the presence of post-partum pups in the area (NMFS Driftnet Observer data; Bedford and Haugen 1992).~~

The EFH regulations state that FMPs should identify research and information needs *"for research efforts that the Councils and NMFS view as necessary to improve upon the description and identification of EFH, the identification of threats to EFH from fishing and other activities, and the development of conservation and enhancement measures for EFH*." The following are based on research needs identified during the EFH review process and contained in the Council's Research and Data Needs database.

- Support efforts to better understand and describe the dynamic nature of HMS habitats, and the potential for shifts in both HMS and their prey in response to changing climate and oceanic conditions. Given that all HMS come to the U.S. EEZ to forage, understanding forage is critical to understanding HMS movements and distributions.

- Continue research that may help to identify important shark habitats such as pupping grounds, key migratory routes, feeding areas, prey species, and areas of concentration of large adult female sharks. Although the SCB has long been considered to support pupping grounds and nursery habitats, discrete areas have not yet been identified and further study is needed to identify those discrete areas. These areas may not only concentrate pups, but also pregnant females at certain times of the year. This information may help to identify future HMS HAPCs.

- Support efforts to better understand the migratory corridors and habitat dependency, including benthic habitats, of HMS fishes, how they are distributed by season and age throughout the Pacific and within the West Coast EEZ, and how oceanographic changes in habitat and prey species availability affect production, recruitment, and migration. More research is needed in these areas to better define EFH and potential HAPCs.

- Support efforts to better understand the importance of deep-water canyons, offshore banks and seamounts to the various life stages of HMS stocks.

- Continue efforts to identify and evaluate potential impacts to HMS EFH from fishing activities, including efforts to quantify derelict gear in the fishery and assess its impact on the marine environment and other species.

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8.0 References

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