

HIGHLY MIGRATORY SPECIES ESSENTIAL FISH HABITAT AMENDMENT - PRELIMINARY

Introduction

The highly migratory species (HMS) fisheries in the Exclusive Economic Zone (EEZ) off the West Coast of the United States are managed under the Pacific Fishery Management Council's (Council) HMS Fishery Management Plan (FMP). The FMP was prepared by the Council and approved and implemented by the National Marine Fisheries Service (NMFS) under the Magnuson-Stevens Fishery Conservation and Management Act (MSA) (18 U.S.C. 1801 et seq.). The HMS FMP includes five species of tunas, three species of pelagic shark, striped marlin, swordfish, and dorado (dolphinfish) in the U.S. West Coast EEZ in the Fishery Management Unit (FMU). HMS are harvested commercially and recreationally using a range of gear types. This document describes potential modifications to HMS essential fish habitat (EFH) resulting from the current EFH periodic review. EFH requirements and the process for periodic EFH reviews are described in the EFH regulations at 50 CFR 600.815(a)(10).

The MSA mandates that each FMP describe and identify EFH for the fishery (16 U.S.C. 1853(7)). EFH is defined as "those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity" (16 U.S.C. 1802(10)). Under this authority, NMFS and the Council have developed a comprehensive strategy to conserve EFH. This includes incorporating EFH into each of the Council's FMPs, identifying fishing and non-fishing impacts and associated conservation recommendations, and other required EFH elements. In addition to the EFH regulations, further guidance was issued from the NMFS Office of Habitat Conservation on conducting EFH reviews (NMFS 2000).

[Council Operating Procedure 22](#) (PFMC 2023) describes the Council's EFH review process, which consists of a two-phase process. The HMS EFH review is now in the second phase, which concludes in presenting proposed EFH modifications for Council consideration (final action is tentatively scheduled for November 2023).

This document describes the timeline and process of the EFH review, summarizes proposed EFH modifications, and provides information to support Council decision making in the context of HMS EFH. Appendix F to the HMS FMP contains the detailed identification and description, overall distribution, life history summaries, trophic interactions, and prey species information, on which proposed EFH modifications are based. The draft revised Appendix F is included in Briefing Book materials as Agenda Item I.5 Attachment 2. At the September meeting, the Council should consider Advisory Body input and public comment and adopt the proposed EFH modifications for public review.

History of HMS EFH

The HMS FMP was approved in 2004 and has been amended seven times. EFH components were included as Appendix A to the Final Environmental Impact Statement (EIS) and HMS EFH has not been reviewed since that time. There are currently 11 species in the HMS Fishery Management Unit (FMU), for which EFH must be described:

Sharks:

- common thresher shark (*Alopias vulpinus*)
- shortfin mako shark (*Isurus oxyrinchus*)
- blue shark (*Prionace glauca*)

Tunas:

- North Pacific albacore tuna (*Thunnus alalunga*)
- bigeye tuna (*Thunnus obesus*)
- Pacific bluefin tuna (*Thunnus orientalis*)
- skipjack tuna (*Katsuwonus pelamis*)
- yellowfin tuna (*Thunnus albacares*)

Billfish/Swordfish:

- striped marlin (*Tetrapturus audax*)
- swordfish (*Xiphias gladius*)

Other:

- dorado or dolphinfish (*Coryphaena hippurus*)

HMS EFH Review Timeline

At its March 2020 meeting, the Council initiated scoping for EFH revisions and adopted the Phase 1 Action Plan, in accordance with COP 22. In September 2020, the Council considered the Phase 1 report and agreed to move to Phase 2 of the EFH review. Other key dates and activities included the following:

Month/year	Activity
March 2020	The Council considered Scoping and adopted the Phase 1 Action Plan
June 2020	Call for data and information issued
September 2020	Council considered Phase 1 report , agreed to move to Phase 2
March 2021	Council adopted the Phase 2 action plan
May 1-2 2023	HMSMT meeting with emphasis on EFH
September 2023	Council considers preliminary HMS EFH modifications; adopt for public review
November 2023	Council considers final action on HMS EFH modifications (tentative)

Proposed modifications to HMS EFH

Summary of EFH Components

The EFH regulations describe mandatory contents (or ‘components’) to be included in FMPs. For HMS EFH, most of the EFH components are found in the main FMP text. Life history summaries, trophic interactions, and prey species are found in FMP Appendix F (see Table 1). The text descriptions of EFH are found in both the FMP as well as in Appendix F. Table 1 lists these components, where those components can be found (FMP vs Appendix F), and whether they are proposed for modification under this EFH review.

Table 1. Summary of EFH Components

EFH component	Current location	Notes
EFH description & identification	Appendix F (and in FMP, pending)	Updated to reflect recent information on distribution per life stage
Maps	Appendix F (formerly in Appendix A to FEIS)	New maps reflecting overall distribution and EFH spatial extent
Life history summaries, including prey species	Appendix F	Updated to reflect recent information on life histories, prey, etc.
Fishing impacts (MSA & non-MSA)	FMP	Text updates; additional information on prey species
Non-fishing impacts	FMP	Minor updates; add Kiffney et al
Conservation & enhancement measures	FMP (with non-fishing impacts)	Minor updates; add Kiffney et al
HAPCs	FMP	Minor text updates; no proposed changes
Research and Information	FMP	Minor updates
Review/revision process	N/A	Reference added to COP 22

EFH Description and Identification, Maps, and Life History Summaries (In Appendix F)

FMPs are required to describe and identify EFH in text for each life stage of species in an FMU. This should include the physical, biological, and chemical characteristics; the geographic location of habitats described in the FMP; and must include maps of the geographic locations of EFH or the geographic boundaries within which EFH for each species and life stage is found. The regulatory guidance at 50 CFR Part 600 Subpart J provides details on the approach to data and information used to inform EFH, grouping species assemblages when scientifically justified, mapping requirements, and other information. EFH for the 11 HMS species is currently described on an individual basis.

The revised EFH description and identification and life history summaries are based on work completed by the Southwest Fisheries Science Center, supported by NMFS funding. This work included a literature review and summary, public input, and recommendations for modifying elements of HMS EFH, particularly related to species distribution. The revised HMS FMP Appendix F (Agenda Item I.5 Attachment 2) contains the descriptions of overall species distributions, life history summaries, trophic interactions, primary prey species, proposed EFH descriptions, and maps.

Minor modifications to the description and identification of EFH for HMS species are proposed, based on historic and recent information. The original description and identification were based primarily on fishery-dependent information where data are collected only when and where fishing occurs. Although current fishery-independent information is limited, it represents an incremental improvement over the fishery information used exclusively to identify HMS EFH previously.

Members of the HMS EFH Review Team initially attempted to apply a species distribution model (SDM) approach to generate new EFH and species distribution maps. Specifically, the Review Team evaluated AquaMaps, which generates model-based, large-scale predictions of marine species distributions, based on estimates of a species tolerance to various environmental parameters. The method was originally developed to predict global distributions of marine mammals (Kaschner et al. 2006). To take advantage of additional information available in FishBase and other databases and apply it to a wider variety of marine organisms, this modeling approach was modified in collaboration with FishBase. However, when the Review Team tried to utilize the FishBase modeling results for HMS species, it did not produce accurate distribution maps. For instance, the FishBase model output for bigeye tuna indicates moderately high probability of presence off the Pacific Northwest, although this species is known to be rare in EEZ waters off the Pacific Northwest. Consultation with experts confirmed the results were inaccurate and also revealed a lack of confidence in the underlying data (e.g., due to a lack of fisheries in certain areas). Instead, the Review Team decided to develop new maps for this EFH review based on species distribution data compiled from various data sources by the International Union for Conservation of Nature (IUCN). The IUCN maps provide more accurate approximations of species distributions, provide a consistent source across species, and also allowed for production of a shapefile. The HMS EFH Review Team concluded that the maps compiled by the IUCN represent the best available science for regional and worldwide distribution of species managed under the HMS FMP. The development of more robust SDMs is currently underway for HMS in the U.S. West Coast EEZ. The citations for each map are included in Appendix F.

In defining the geographic extent of EFH, guidance from NMFS states “The extent of the EFH should be based on the judgment of the Secretary and the appropriate Council(s) regarding the quantity and quality of habitat that are necessary to maintain a sustainable fishery and the managed species’ contribution to a healthy ecosystem.” The spatial extent should generally encompass all life stages for each species. For all the HMS species except the common thresher shark, the seaward extent of EFH is the EEZ boundary. The seaward extent of thresher shark EFH approximates 100 miles from shore and reflects the fact that this species’ global distribution is closer to shore than other HMS. For six species (bigeye, skipjack, yellowfin and bluefin tunas; striped marlin, and dorado), the northern extent of EFH is the latitude line at Point Conception, California. While these species are known to be present farther north, they are rarer in those waters

than the other species in the HMP FMP EFH. The broad distribution of HMS makes it difficult to use a quantifiable metric to define the spatial extent of EFH. Thus, the spatial extent described in Appendix F, though based on the best available information for each species and life stage, is largely qualitative.

Habitat Areas of Particular Concern

The following text would replace the existing FMP section 7.3:

The EFH regulations encourage the Councils to identify specific types or discrete 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 intended goal of identifying such habitats as 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 warrant special attention. This designation is manifested in EFH consultations where federally permitted projects with potential adverse impacts to HAPC are more carefully scrutinized during the consultation process. Councils may develop regulations to protect HAPCs from fishing activities, as with the Pacific Coast Groundfish FMP, which includes numerous areas closed to bottom trawl or all bottom contact fishing gear to protect particularly important groundfish habitats. 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.

The HMS FMP does not currently include any HAPCs, and none are proposed based on the current EFH review. At its May 1-2, 2023, meeting, the HMSMT discussed a potential HAPC for shark pupping grounds in the Southern California Bight, and in its September 2020 [supplemental report](#), the HC suggested considering whether there is enough new information to warrant HAPCs. However, there is scant information that would inform discrete areas or depths that would be reasonable HAPC candidates.

The Council should continue considering information such as shark pupping grounds, key migratory routes, feeding areas, and areas of concentration of large adult females, that would support HAPCs. New information can be considered during the next HMS EFH review.

Fishing Impacts

FMPs must contain an evaluation of the potential adverse effects of fishing activities on EFH designated under the FMP and describe actions that could be taken to minimize adverse effects to EFH. This includes effects from fishing activities regulated under this FMP as well as other Federal FMPs. FMPs must also identify any fishing activities not managed under the MSA that may adversely affect EFH. The HMS EFH review process, including the literature review and subsequent discussions among the HMSMT, did not identify any new fishing activities or gear

different than what is currently included in the HMS FMP. Thus, the fishing impacts section is proposed to remain essentially status quo.

The following contains proposed text that would replace Section 7.4 of the HMS FMP:

Section 600.815(a)(2) of the 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 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 habitats 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 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.

Impacts of Fishing Activities and Gear on HMS EFH (7.4.1 of HMS FMP)

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 if the impact is more than minimal and not temporary. 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 and temporary 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 or temporary effect on HMS EFH.

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).

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 (*Squalus acanthias*), 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 Magnuson Act (e.g., state-managed shrimp fisheries) also capture HMS prey species, in the directed fishery or as bycatch.

The EFH literature search and review produced no information indicating that fishing adversely affects HMS EFH via removal of HMS prey species. In addition, HMS in this FMU are known to be opportunistic feeders and switch prey. For example, the following figure and caption illustrate the wide variety of representative prey species and the temporal variability of their contribution to the diets of albacore tuna and swordfish (SWFSC 2022). 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.

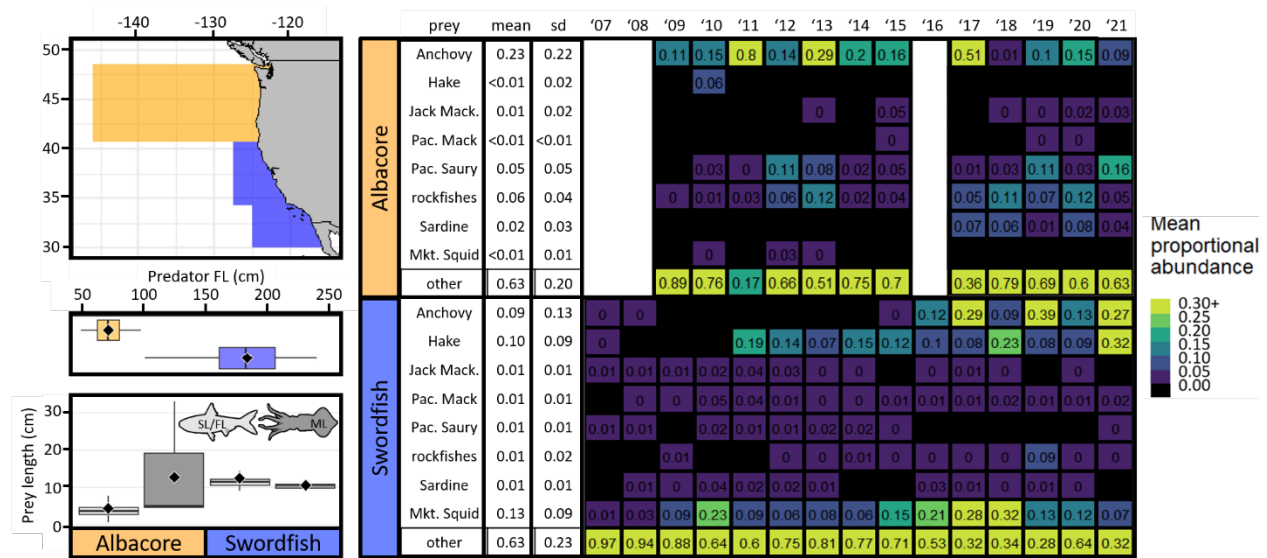


Figure 7 (from SWFSC 2022): “Diets were assessed via stomach content analysis for albacore (in orange) from the Pacific Northwest and swordfish (in blue) from Central and Southern California. Swordfish were larger on average, shown in the middle left plot. Mean lengths (black diamond) and boxplots of length distributions for forage fishes (light grey) and market squid (dark grey) are depicted on the lower left. Swordfish prey were generally larger with the exception of a large market squid consumed by an albacore. The right panel shows the annual mean proportional abundance of prey as a heat map, where the color saturates at 30%. Anchovy, pacific saury, and rockfish were particularly important prey for albacore. Hake and market squid were important for swordfish throughout the timeseries, and reliance on anchovy increased in 2019 and 2020. Both species consume a broad range of prey with significant shifts in diet composition over relatively short time periods.” (SWFSC 2022).

Mitigation Considerations for Fishing Effects (7.4.2 of HMS FMP)

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.

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 NPDES permits for fish processing waste discharge.

Research to identify and evaluate potential impacts to HMS EFH from fishing activities is recommended. This may be particularly important to protect EFH for specific HMS life stages, such as nursing and pupping grounds for sharks.

Findings (7.4.3 of HMS FMP)

The current review of HMS EFH produced no evidence that HMS fishing practices or gear adversely affect EFH in a manner that is more than minimal and temporary in nature. 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.

Non-fishing Impacts and Conservation Measures (7.5 of HMS FMP)

FMPs are required to identify non-fishing activities that may adversely affect EFH. The EFH regulations suggest that “*such activities 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.*” FMPs are required to describe known and potential impacts to EFH, and to provide conservation recommendations to avoid, minimize, or compensate for adverse effects.

The description of non-fishing activities and conservation measures are used primarily as a reference in non-fishing activity consultations (e.g., by NMFS biologists or action agencies), for federally permitted activities that may adversely affect EFH. Consulting biologists use the document(s) to develop conservation recommendations, which are then conveyed to the action agency. It is important to note that while the descriptions of non-fishing impacts and associated conservation recommendations are designed to assist in the consultation process, consulting

biologists or action agencies are not bound by those specific activities or conservation recommendations. Other literature, subject matter expertise, and professional judgment are used in EFH consultations. The EFH regulations provide further details on conducting EFH consultations.

The HMS FMP currently describes several non-fishing activities and provides conservation recommendations. A recent NMFS White Paper (Kiffney et al. 2022) identifies a wide range of non-fishing activities, several of which would potentially adversely affect HMS EFH. Kiffney et al. (2022) is proposed to be incorporated by reference into the HMS FMP. Table 2 below lists both sets of non-fishing activities, which are proposed for incorporation into the HMS FMP.

Table 1: Non-fishing activities proposed for inclusion in the HMS FMP

Currently in HMS FMP	Kiffney et al. 2022
<ul style="list-style-type: none"> ● Dredging ● Dredge material disposal/fill ● Oil and gas exploration ● Water intake ● Aquaculture ● Wastewater discharge ● Discharge of oil/hazardous substances ● Coastal development impacts 	<ul style="list-style-type: none"> ● Climate change ● Upland and urban development ● Road construction and operation ● Stormwater and urban runoff ● Silviculture ● Dam operations and removal ● Mineral mining ● Oil extraction, shipping, and production ● Energy-related activities (wave/tidal, OSW, cables & pipelines, liquified natural gas) ● Agriculture and grazing ● Shoreline and bank stabilization ● Marine and freshwater transportation ● Coastal development ● Dredging ● Aquaculture ● Overwater structures ● Water intake and discharge facilities ● Pile driving and removal ● Noise pollution

Discussion

The proposed list of non-fishing impacts and conservation measures differs from the existing non-fishing impacts by adding several activities (in Kiffney et al.) not previously included. While there is some overlap with the existing list (e.g., dredging, aquaculture), most are completely new to the HMS FMP. By adding the impacts and conservation measures described in Kiffney et al. (2022), consulting biologists will have an improved library of information to evaluate adverse effects on EFH and to develop recommendations to avoid, minimize, or otherwise offset habitat impacts resulting from non-fishing activities. Minor revisions to the existing non-fishing activities were made. These will be included in revised FMP text, and Kiffney et al. will be incorporated by reference.

Research and Information Needs

The EFH regulations state that FMPs should identify “*research and data 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 contained in the HMS FMP and 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. Pupping grounds and core nursery areas have not yet been identified and need further study. 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 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 HAPCs.
- Continue efforts to identify and evaluate potential impacts to HMS EFH from fishing activities.

Review and Revision Process

The EFH regulations require a description of a process to periodically review and revise EFH. The HMS FMP currently lacks a description of the review process and should be updated to reference the Council’s EFH review process described in COP 22.

References

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