



# Regional EFH Profiles

Prepared for the  
**National Essential Fish Habitat Summit**

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## Overview

The National Essential Fish Habitat (EFH) Summit is a unique opportunity for discussion among council and NOAA Fisheries habitat experts. In order to support productive working discussions at the EFH Summit, the Fisheries Leadership & Sustainability Forum worked with council and NOAA Fisheries staff to develop a series of regional EFH profiles describing each region's approach to identifying, describing, mapping, and reviewing EFH.

The purpose of these profiles is to provide all EFH Summit participants with valuable background information and to help highlight similarities, differences, and adaptations across regions. The regional EFH profiles are also intended to supplement the Regional EFH Roundtable discussion at the EFH Summit on Tuesday, May 17<sup>th</sup>.

**These profiles were developed as briefing materials for the EFH Summit and are not intended to be comprehensive.** The format, focus, and level of detail vary by profile in response to each region's approach to implementing EFH authorities, as well as the suggestions provided by council and agency staff during the review process. Please note that these profiles focus specifically on EFH and do not describe use of the HAPC designation. This topic is covered in a separate report, *Regional use of the Habitat Area of Particular Concern (HAPC) Designation*, prepared by the Fisheries Forum for the Mid-Atlantic Fishery Management Council.

### Topics

Each profile includes most or all of the following components.

- Summary: A concise, one-paragraph summary of each region's approach to implementing EFH authorities.
- Timeline: A chronology of EFH reviews and council actions in table format.
- EFH approach: A description of each region's approach to identifying and describing EFH, with an emphasis on information sources, process, and roles and responsibilities.
- Tools and models: If applicable, a description of any analytical tools and/or mapping approaches used to identify, describe, and map EFH; compile and organize information, consider fishing effects to habitat, or otherwise support use of EFH authorities.
- EFH consultations: If applicable, a description of any regional characteristics of the EFH consultation process and mechanisms for council input.
- Looking ahead (optional): If applicable, any additional information that council and agency staff felt was valuable to share related to upcoming initiatives, emerging issues and questions, or future directions.

# 1. New England

## Summary

The New England Fishery Management Council (Council) recently completed Omnibus Habitat Amendment 2, a comprehensive review of Essential Fish Habitat (EFH)/Habitat Area of Particular Concern (HAPC) for all Council-managed species and spatial management measures to minimize the adverse effects of fishing on EFH. EFH is identified by species and life history stage based on level 1 and 2 data, primarily from a long-term fishery independent trawl survey.

## EFH timeline

1998	All Fishery Management Plans (FMPs) amended to identify EFH for 18 of 28 managed species (Omnibus EFH Amendment 1)
1999-2010	EFH identified for 10 remaining species not included in Omnibus EFH Amendment 1 <sup>1</sup>
2016	Omnibus Habitat Amendment 2 was initiated in 2004 as an EFH review and grew into a more comprehensive council action addressing groundfish and habitat spatial management measures. <i>Implementation of the revised designations is expected in early 2017.</i>

## EFH identification and review

### *Omnibus EFH Amendment 1*

The Council first identified EFH for 18 species through Omnibus EFH Amendment 1 (1998) using level 1 and 2 presence/absence and relative abundance and distribution data from long-term fishery-independent resource surveys. The Council developed text descriptions that included geographic area, type of habitat (pelagic or benthic), and general information on substrates and ranges of depth, temperature and salinity for each species and life history stage. The EFH text descriptions were based on information from *Essential Fish Habitat Source Documents*, a series of technical memoranda developed by staff at the Northeast Fisheries Science Center (NEFSC).

The Council used different methods to develop EFH maps for different life history stages. For demersal life history stages (juveniles and adults except for Atlantic herring and Atlantic salmon), maps were based on average catch rates per ten-minute square of latitude and longitude (approx. 100 mi<sup>2</sup>). For planktonic life history stages (eggs and larvae) and the juvenile and adult stages of Atlantic herring, maps were based on percentages of observed range. Primary information sources included the spring and fall NEFSC bottom trawl surveys (1963-1997), NEFSC Marine Resources Monitoring, Assessment and Prediction ichthyoplankton surveys (1977-1987), and NEFSC scallop dredge surveys (1982-1997). EFH maps for inshore areas were based primarily on the results of a nation-wide resource inventory of a number of coastal estuaries and embayments conducted by the National Ocean Service in the mid-1990s and also included a limited number of ten-minute squares based on state survey data.

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<sup>1</sup> The EFH requirements of FMPs that were not included in Omnibus EFH Amendment 1 were completed on the following schedule: Monkfish FMP (April 1999), Red Crab FMP (October 2002), and Skate FMP (July 2003). Amendment 16 (2010) added Atlantic wolffish to the NE Multispecies FMP and identified EFH for the species. EFH was identified for offshore hake in Amendment 12 to the Multispecies FMP in 2000.

The Council further refined EFH maps to focus on areas of high relative abundance. The EFH Technical Team (which is now referred to as the Habitat Plan Development Team) developed a series of alternative maps for each species and life stage based on the 50th, 75th, 90th and 100th cumulative percentiles of the average catch rates (numbers per tow) in each ten minute square. The Council's Habitat Oversight Committee and Council relied on their general knowledge of each species to select a designation that best represented the areas where any given species and life stage was relatively abundant over the course of each survey. By averaging catches made over a number of years and at different times of year, this approach accounted for seasonal and temporal shifts in distribution. EFH maps for over-fished species were more precautionary.

#### *Omnibus Habitat Amendment 2*

Omnibus Habitat Amendment 2 was initiated in 2004 as a multi-purpose review of both EFH designations and measures to minimize adverse impacts of fishing on EFH across all Council FMPs. The scope was eventually expanded to become a comprehensive review of existing groundfish closures as well as habitat closures. The EFH review process began with the Habitat Evaluation Working Group, a group of academic and agency fishery scientists tasked with exploring innovative methods and tools for identifying EFH. The Habitat Evaluation Working Group, the NMFS Northeast Regional Office and Council staff formed the Habitat Evaluation Review Committee to explore new approaches to defining EFH based on peer-reviewed methodologies and provide the Council with tools to help them with identifying and describing EFH.

The review process was coordinated by the Council's Habitat Plan Development Team (PDT), which includes staff from the Council, Northeast Fisheries Science Center, Greater Atlantic Regional Fisheries Office (GARFO), and other management partners such as the U.S. Geological Survey (USGS) and regional academic institutions. The Council also has a dedicated council Habitat Oversight Committee, which is responsible for developing, modifying, or adding new measures to FMPs and the Habitat Advisory Panel, which provides support and input to the oversight committee. The EFH review process was initiated in 2004, and EFH and HAPCs were reviewed and identified in 2007. After 2007 work on the amendment focused on development of spatial management measures.

Omnibus Habitat Amendment 2 updates EFH designations for all Council FMPs. The updated designations are based on relative abundance data from trawl surveys and the approach is similar to the one taken in the Council's 1998 amendment. For this most recent review the Habitat PDT used updated EFH Source Documents and updated survey catch rate data through 2005 and added data from all the inshore state surveys in the region. A change was made in the way the survey catch data were transformed which further reduced the effect of occasional large catches on the averages. The updated EFH text descriptions include depth ranges, which are reflected in the EFH maps. Similar to Omnibus EFH Amendment 1, relative abundance was mapped by ten minute square, but ten minute squares were limited to those that conformed to species- and life stage-specific temperature ranges, and then the temperature-limited data layers were clipped by species- and life stage-specific depth limits. EFH is identified for all species individually, and most life stages have distinct text descriptions and maps, except when data limitations required combining more than one life stage for mapping purposes. The amendment is currently under review.

### **Swept Area Seabed Impact (SASI) Approach**

During the development of Omnibus EFH Amendment 2, the Council utilized the SASI approach to inform the process of minimizing the adverse impacts of fishing across gear types, fisheries, and areas. The SASI model was developed by the Habitat PDT and reviewed by the Council's SSC and an external peer review panel. The model enables managers to quantify and map, by gear type, fishing impacts on the seabed, and supports development and analysis of management measures to minimize adverse effects from fishing gear. SASI model inputs include fishing effort data, seabed substrate and energy data, and gear-specific susceptibility and recovery parameters. The SASI model maps locations that are vulnerable to different fishing gear types and helps managers visualize areas of habitat more vulnerable to fishing impacts.

### **EFH consultations**

As part of Omnibus Amendment 2 the Council has proposed a number of new HAPC designations, including some inshore areas, namely the Inshore Juvenile Cod HAPC. This HAPC encompasses a large stretch of inshore waters from Rhode Island to Maine (0-20 meters depth), and is intended to support the EFH consultation process by recognizing the importance of sensitive inshore habitat that is impacted by a wide range of development activities. EFH consultations are conducted by NOAA Fisheries GARFO staff. The Council occasionally comments on projects that could impact EFH.

### **Looking ahead**

Regional scientists are in the process of developing the EFH Geodatabase project, which will integrate state and federal trawl survey data and create a web-based mapping and data analysis tool that is designed to automate the production of EFH maps for the New England and Mid-Atlantic councils. This database will give federal and state scientists and managers additional flexibility to process, query and use data in different ways to test different EFH mapping methods and develop EFH designations, and could also provide data to feed into habitat and assessment modeling processes.

## 2. Regional EFH Profile: Mid-Atlantic

### Summary

The Mid-Atlantic Fishery Management Council (Council) identifies and describes Essential Fish Habitat (EFH) by Fishery Management Plan (FMP), using a similar process for each plan. The Council completed initial EFH text designations and descriptive maps for most FMPs by 2001, and has completed reviews and updates for four FMPs since. EFH is identified by species and life stage using level 1 and 2 data from multiple sources. The Council is conducting a project focused on strengthening existing habitat authorities/tools to address threats to fish habitat more effectively, and recently began a review of all EFH components for all Council managed species. The original designations (pre-2001) are still in effect for bluefish, Atlantic surfclams, ocean quahogs, summer flounder, black sea bass, and scup.

### EFH timeline

1999	EFH identified for the Bluefish FMP (Amendment 1), Atlantic Mackerel, Squid (longfin <sup>2</sup> and <i>Illex</i> ), and Butterfish FMP (Amendment 8), Atlantic Surfclam and Ocean Quahog FMP (Amendment 12), Summer Flounder, Scup, and Black Sea Bass FMP (Amendment 12), and Spiny Dogfish FMP (original FMP)
2001	EFH identified for the Tilefish FMP (original FMP)
2008	EFH identified for longfin eggs (Amendment 9 to the Atlantic Mackerel, Squid (longfin and <i>Illex</i> ) and Butterfish FMP)
2009	EFH updated for the Tilefish FMP (Amendment 1)
2011	EFH updated for the Atlantic Mackerel, Squid (longfin and <i>Illex</i> ), and Butterfish FMP (Amendment 11)
2014	EFH updated for the Spiny Dogfish FMP (Amendment 3)

### EFH identification and review

The Council identified EFH using level 1 and/or level 2 data primarily from distribution and relative abundance data from the Northeast Fisheries Science Center (NEFSC) bottom trawl surveys (spring and fall, 1963+), ichthyoplankton surveys (monthly, 1977+), information from species EFH source documents (technical memos) developed by NEFSC staff, and - for some inshore areas - a resource inventory conducted by NOAA's Estuarine Living Marine Resources Program (ELMR; 1994). Additional broadly-defined (level 1) areas south of Cape Hatteras and on the continental slope were added to maps for larvae and juveniles. The EFH process was developed for bluefish, and then applied to other individual FMPs. The designations were comprised of a detailed text description and a series of maps by ten-minute square areas (TMSQ).

The Mid-Atlantic EFH Technical Team, NEFSC scientists, and other experts developed alternatives for the Council to consider. Four alternatives were proposed and, for mapping purposes, the Council selected the alternative that used a distributional percentage (50%, 75%, 90%, or 100% of observations) of the catches by area based on which level of information was

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<sup>2</sup> Due to a scientific name change, *Loligo* squid is now referred to as longfin squid.

available and stock status.<sup>3</sup> EFH maps were developed for each life stage and displayed the distribution and abundance data by TMSQ. The Bluefish FMP was the first plan amended (Amendment 1; 1999) to meet the EFH requirements. Because bluefish were overfished at the time, the Council was more inclusive and risk averse and identified EFH by life stage as the highest 90% of the TMSQ where bluefish were present. Specific outcomes, additional data sources, and implementation of this approach for other FMPs are described below.

#### *Atlantic mackerel, squid (longfin and Illex), and butterfish*

EFH was first identified for all species and life stages (except longfin eggs) through Amendment 8 (1999). These species were not overfished; therefore, the Council selected the TMSQ where the highest 75% of the total catch were collected for all four species. Amendment 9 (2008) identified EFH for longfin eggs, and Amendment 11 (2011) reviewed and updated EFH descriptions and maps for all other life stages/species. EFH for longfin eggs, which attach to the seafloor, was mapped based on reported catches of eggs by trawlers. The EFH review was completed using data from fishery-independent surveys, new scientific literature, and revised EFH source documents. For the first time, maps included TMSQ where 10% or more of the bottom trawl tows from coastal state surveys in the region caught the life stages/species. In federal waters, the Council chose to use the densest survey catches (90% of the TMSQ, or 95% for unknown or overfished species). EFH for the pelagic eggs and larvae were still mapped using the ichthyoplankton survey data and the inshore ELMR areas were retained in all maps. Revised fishing impact analyses were completed in Amendments 9 and 11.

#### *Atlantic surfclam and ocean quahog*

Amendment 12 to the Atlantic Surfclam and Ocean Quahog FMP (1999) identified EFH by species and life stage. Descriptions and maps were based on information from the NEFSC clam dredge survey and EFH source documents. The Council used 90% of the TMSQ where surfclams and ocean quahogs were collected in order to be more inclusive and risk averse.

#### *Summer flounder, scup, and black sea bass*

The Council identified EFH for summer flounder, scup, and black sea bass through Amendment 12 (1999) using NEFSC trawl surveys (spring and fall) and the ELMR program. The Council considered using 100% of the TMSQ as EFH since summer flounder, scup, and black sea bass have specific associations with benthic habitats types, and were also as significantly overfished at the time. However, they chose the 90% of the TMSQ for all life stages and species since it was risk-averse and level 2 information was available. Amendment 12 also identified areas with submerged aquatic vegetation as Habitat Areas of Particular Concern (HAPC) for juvenile and adult summer flounder.

#### *Spiny dogfish*

In the Spiny Dogfish FMP (1999), EFH was identified as the highest 90% of the TMSQ for all life stages in order to be inclusive and risk averse, since spiny dogfish were overfished at that time.

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<sup>3</sup> The EFH Technical Team and bluefish experts provided guidance for determining the appropriate threshold: 1) If only level 1 information is available, the Council should identify 100% of the area where the species occurs as EFH to be risk averse, 2) If level 2 information and species is overfished, the Council should identify 90% of the area, 3) If level 2 information and the species is not overfished, the Council should identify 75% of the area, and 4) Identifying 50% of the area would be more risk averse.



Amendment 3 (2014) reviewed and updated EFH for all life stages. This EFH review used new scientific data from sampling programs including the NEFSC trawl survey, the coastal Northeast Area Monitoring and Assessment (NEAMAP) survey, and state surveys. Due to the different sex and size-specific life history stages of spiny dogfish, which occupy different habitats throughout the year, the revised designations applied to juveniles, sub-adults, and adults of both sexes, which results in five distinct life stages. The Council used 90% of the TMSQ for federal waters (geometric mean), and where dogfish occurred greater than 10% of the time in state waters. Amendment 3 also updated the evaluation of effects of fishing and non-fishing activities on dogfish EFH.

#### *Tilefish*

The Tilefish FMP (2001) identified EFH for golden tilefish by life history stage and considered data on the distribution of commercial landings. EFH was identified based on temperature and depth regimes, instead of a distributional percentage of TMSQ, since the trawl survey data was biased low because tilefish can avoid trawls in their burrows. The FMP also identified HAPC for tilefish, but no habitat protections were adopted at the time. EFH was identified as:

*“...all offshore waters over the Continental Shelf and Slope with water depths from 250 to 1200 feet, from the United States/Canadian boundary to the Virginia/North Carolina boundary.” (MAFMC 2001).*

Amendment 1 (2009) revised EFH descriptions and maps to include a more refined depth range and descriptions of the types of benthic substrate used on the outer continental shelf and slope. The updates were based on scientific information about preferred temperature and depth ranges. Amendment 1 updated the fishing impacts evaluation, designated HAPC between 100 and 300 meters within four canyons where outcrops of semi-lithified clay are known to be present (because tilefish live in burrows made with clay), and established gear restricted areas to protect these outcrops from damage by bottom trawls.

#### **Habitat project and initiatives**

The Council is conducting a habitat project to improve how they address regional habitat issues. This project includes developing overarching fish habitat goals and objectives. One piece of the habitat pilot project is completed: a series of policy documents that outline the Council's positions on five anthropogenic activities that threaten fish habitat. The Council is currently working on developing policies that focus on fishing impacts to fish habitat. The Council's Ecosystem and Ocean Planning (EOP) Committee coordinated the development of policy documents. The Council is reviewing its EFH designations, and collaborating with scientists from NOAA Fisheries and other agencies to develop new definitions by bringing new habitat science into the process.

#### **EFH consultations**

EFH consultations are conducted by NOAA Fisheries Greater Atlantic Regional Fisheries Office staff. The Council is notified of upcoming opportunities to comment, and may comment on projects that could impact EFH and has created a series of habitat policies for anthropogenic activities such as offshore energy development and coastal development. By clearly communicating its positions on these activities, the Council can more effectively comment and collaborate with partners and other agencies to address these threats.

**Looking ahead**

Regional scientists are in the process of developing the EFH Geodatabase project, which will integrate state and federal trawl survey data and create a web-based mapping and data analysis tool that is designed to automate the production of EFH maps for the New England and Mid-Atlantic councils. This database will give federal and state scientists and managers additional flexibility to process, query and use data in different ways to test different EFH mapping methods and develop EFH designations, and could also provide data to feed into habitat and assessment modeling processes.

### 3. South Atlantic

#### Summary

The South Atlantic Fishery Management Council (Council) first identified EFH through a 1998 Habitat Plan and Comprehensive Amendment to all Fishery Management Plans (FMPs). EFH is described using level 1 and 2 data, and descriptions are aggregated by species and life history stage for the region’s multispecies FMPs. The Habitat Plan later evolved into a Fishery Ecosystem Plan. Amendments to this plan are the vehicle through which the council updates and refines EFH and HAPC designations. The Council maintains a standing Habitat Protection and Ecosystem Based Management Committee and a Habitat Protection and Ecosystem Based Management Advisory Panel, which provide input on the Council’s habitat and ecosystem-related activities. The Council also maintains a set of Habitat Policies and Policy Statements that include recommendations for minimizing adverse impacts to EFH from non-fishing activities.

#### EFH timeline

1998	Habitat Plan and Comprehensive Amendment; EFH identified for all species and FMPs, first Habitat Policies developed
2004	Dolphin Wahoo FMP implemented, EFH designated for wahoo
2009	Habitat Plan integrated into a Fishery Ecosystem Plan (FEP); Comprehensive Ecosystem-Based Amendment 1 (CE-BA 1) provides spatial representation of EFH, establishes Deepwater Coral HAPCs and spatial fishing gear management measures
2011	EFH identified for Sargassum through Comprehensive Ecosystem-Based Amendment 2 (CE-BA 2)
2014-15	Habitat Policies updated
2016	Fishery Ecosystem Plan 2 (FEP2) under development

#### EFH identification and review

##### *Habitat Plan*

The Council first designated EFH for all managed species in 1998 through a Habitat Plan, paired with a Comprehensive Amendment that amended all of the council’s current FMPs<sup>4</sup>. The Habitat Plan was developed through a collaborative process and series of workshops involving the Council’s Coral Advisory Panel, Habitat and Environmental Protection Advisory Panels, and additional technical experts. These partners helped the council identify and compile information, and assess information quality and data gaps. The Habitat Plan was intended as a source document and provides an ecological characterization of the interconnected habitat types that support ecosystem function in the South Atlantic region.

The Council’s EFH descriptions are primarily based on Level 1 and 2 data and include concise definitions of important EFH components for each species and/or complex, paired with more detailed descriptions. EFH definitions are based on habitat types, features, and/or depth

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<sup>4</sup> In 1998, dolphin were included in the Coastal Migratory Pelagics FMP; in 2004 the Council implemented a separate Dolphin Wahoo FMP and designated EFH for wahoo to include the same areas identified as EFH for dolphin. EFH was also initially identified for red drum which is no longer federally managed.

contours, and include all life history stages. EFH definitions for the council's multispecies fisheries (snapper grouper and coastal migratory pelagics) are aggregated across species. For example, one component of EFH for the snapper grouper complex is defined as:

*"...coral reefs, life/hard bottom, submerged aquatic vegetation, artificial reefs and medium to high profile outcroppings on and around the shelf break zone from shore to at least 600 feet where the annual water temperature range is sufficiently warm."*  
(SAFMC 1998)

Additional habitat types and features may be identified as components of EFH for specific species and/or life history stages. For example, high salinity bays, estuaries, and seagrass habitat is identified as EFH specifically for cobia, part of the CMP complex. A habitat type or feature may be identified as EFH for multiple FMPs; for example the Gulf Stream is identified as EFH for all South Atlantic FMPs due to its role in larval dispersion. The Habitat Plan also includes more comprehensive descriptions of habitat types, along with information about habitat use and species distribution where available.

The Council administers two habitat-related FMPs, the Coral, Coral Reef, and Live/Hardbottom Habitat FMP (Coral FMP) and the Sargassum FMP. Harvest of these species is prohibited or restricted. The species managed under these FMPs are identified as EFH for other species. For example, coral reefs are EFH for species in the snapper-grouper complex. EFH is also identified for the coral and Sargassum species in these FMPs. For example, EFH for coral includes

*"...rough, hard, exposed, stable substrate in subtidal to outer shelf depths, subtropical (15-30°), within a wide range of salinity and turbidity levels sufficiently low enough to provide algal symbionts adequate sunlight penetration for photosynthesis."*(SAFMC 1998)

#### *Fishery Ecosystem Plan*

The Council's original Habitat Plan evolved into the Council's 2009 Fishery Ecosystem Plan (FEP), developed as a comprehensive source document for information about the South Atlantic ecosystem. The FEP integrates and updates the detailed habitat information presented in the Habitat Plan and specifies the original 1998 EFH descriptions. Updates and changes to EFH and HAPCs are implemented through Comprehensive Ecosystem-Based Amendments (CE-BAs) or individual FMPs.

CE-BA 1 in 2009 provides spatial representations of EFH and HAPCs designated in 1998. Maps are based on information compiled from multiple sources, including the Southeast Fisheries Science Center and state partners, and vary in resolution and level of coverage. CE-BA 1 also establishes Deepwater Coral HAPCs, and implements spatial management measures for the shrimp and golden crab fisheries to minimize adverse habitat impacts. CE-BA 2 in 2011 identifies EFH for the Sargassum FMP, defined as the top 10 meters of the water column in the South Atlantic Exclusive Economic Zone (EEZ) bounded by the Gulf Stream.<sup>5</sup>

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<sup>5</sup> The Sargassum FMP was first submitted to NMFS in 1999 but disapproved due to lack of an estimate for MSY and justification for setting OY = 0. The plan was approved in 2003 but EFH designations were disapproved.

### **Adverse fishing impacts**

The Council has addressed adverse impacts to habitat from fishing through multiple pathways. The 1998 Habitat Plan and Comprehensive Amendment does not include any measures to minimize adverse impacts from fishing, stating that the “the Council has already prevented, mitigated, or minimized most adverse effects from most fisheries prosecuted in the South Atlantic EEZ.” In the snapper grouper fishery bottom-tending gear types are prohibited (fish traps, trawls, entanglement gear) or restricted (bottom longlines). Coral, coral reef, and live/hardbottom habitats are protected through the establishment of HAPCs accompanied by gear restrictions and spatial management of the shrimp and golden crab fisheries. Coral and Sargassum are further protected through their respective FMPs, which prohibit or strictly limit harvest of managed species.

### **Council bodies**

The Council’s standing Habitat Protection and Ecosystem Based Management Advisory Panel (Habitat Ecosystem AP) provides a mechanism for collaborating with state and federal agencies in support of habitat conservation. The Habitat Ecosystem AP is structured as four state sub-panels, each including membership by state marine fisheries agencies, the U.S. Fish and Wildlife Service, state coastal zone management, conservation organizations, and commercial and recreational stakeholders. The Habitat Ecosystem AP provides input on the council’s habitat and ecosystem-related work. The Council also maintains a standing Habitat Protection and Ecosystem Based Management Council Committee.

### **EFH consultations and habitat policies**

EFH consultations are conducted by the NOAA Fisheries Southeast Regional Office. As part of the original Habitat Plan in 1998 the Council approved a series of habitat policies that support the MSA mandate to identify actions to encourage the conservation and enhancement of EFH. These policies were developed with guidance from the Habitat AP and address oil and gas exploration, development and transportation, dredging and dredge material disposal, submerged aquatic vegetation, and ocean dumping. Policies may include recommendations for minimizing adverse impacts from development activities, and statements supporting or opposing specific practices associated with development activities.

As part of the FEP II development process, the Council recently developed an updated series of habitat policy statements, which address marine aquaculture, submerged aquatic vegetation, beach dredging and filling, beach renourishment and large scale coastal engineering; energy exploration, development, transportation and hydropower re-licensing; alterations to riverine, estuarine and nearshore flows; and non-native and invasive species. In addition, future policies will address artificial reefs, food webs and connectivity, and climate variability and fisheries.

### **Looking ahead**

The Council is currently in the process of developing an updated Fishery Ecosystem Plan (FEP II), and updating information supporting EFH designations and refining spatial information where available. The Council developed a Habitat and Ecosystem Atlas, which allows users to view multiple mapping services and information sources through a single portal, including EFH and HAPC designations and habitat information. In addition, a SAFMC Digital Dashboard was developed and is being further refined to better provide access to individual services (including the SAFMC EFH Service) as well as the overall Atlas, a Data Catalogue to download select spatial layers, regional partner and project links, and developing ArcGIS Online products.

## 4. Caribbean

### Summary

The Caribbean Fishery Management Council (Council) is proposing to transition management of federal fisheries in the U.S. Caribbean from the current species-based fishery management plans (FMPs) to island-based FMPs. Currently, the Council and NOAA Fisheries organize FMPs in the U.S. Caribbean by species or species groups (i.e., Spiny Lobster, Reef Fish). Island-based FMPs will be structured by island or island group and will require reviewing existing Essential Fish Habitat (EFH) and new EFH if new species are proposed for management.

### EFH timeline

1998	Generic EFH Amendment to Reef Fish, Spiny Lobster, the Queen Conch, and the Coral FMPs identifies and describes EFH for 17 managed species and the coral complex
2004	Environmental Impact Statement (EIS) for a Generic EFH Amendment (EFH-EIS)
2005	Comprehensive SFA Amendment to the FMPs of the U.S. Caribbean
2011	EFH 5-year review

### EFH identification and review

#### *Generic Amendment*

The Council first identified habitats as an important component of the U.S. Caribbean fisheries in the Fishery Management Plan for Corals and Reef Associated Plants and Invertebrates of Puerto Rico and the US Virgin Islands in 1994; “Coral reefs serve as breeding grounds, nurseries, feeding grounds and refuge ... The fisheries are dependent on the well-being of the habitat and thus wise management is needed ...” (CFMC 1994). The Council first described EFH through a 1998 Generic Amendment that updated all of the region’s fishery management plans. Using level 1 data, the Council described EFH as the functional relationships between life history stages of species and habitat for the spiny lobster, queen conch, reef fish and coral FMPs. EFH was specifically described for various life stages of 17 species and corals representing key managed species from the reef fish, spiny lobster, queen conch and coral FMPs. EFH was described as everywhere the managed species commonly occur. This includes all estuarine and marine waters of the Caribbean from the shoreline to the Exclusive Economic Zone; therefore EFH was defined as:

*“...all waters and substrates (mud, sand, shell, rock and associated biological communities), including coral habitats (coral reefs, coral hardbottoms, and octocoral reefs), sub-tidal vegetation (seagrasses and algae) and adjacent intertidal vegetation (wetlands and mangroves).” (CFMC 1998).*

The Council and NOAA Fisheries developed EFH tables from scientific literature that describe life history and ecological requirements of species by life stage. No management measures or regulations were proposed as a result of the Generic Amendment. At the time, existing habitat protections included a prohibition on the use of explosives, chemicals, and anchoring in sensitive areas, gear restrictions, and the establishment of marine protected areas. The Council also protected habitats important to certain life stages such as seasonal closures for spawning aggregations.

*EIS-EFH and Comprehensive SFA Amendment*

The Council hired a consultant and worked with NOAA Fisheries staff to complete an EIS for a Generic EFH Amendment in 2004. The EIS supported the EFH provisions of the Comprehensive SFA Amendment in 2005, which described EFH for 322 species or species groups using level 1 information. EFH was identified and described using functional relationships between life history stages of species and habitat for the spiny lobster, queen conch, reef fish and coral FMPs.

The council consulted with regional experts, the Scientific and Statistical Committee, and the Habitat AP to identify additional information on species-life stage habitat relationships. Due to data limitations, the Council developed a single aggregate EFH designation and map for each FMP, drawing on habitat utilization from regional experts and the EFH tables developed through the 1998 Generic Amendment.

EFH definitions

<b>FMP</b>	<b>Life stage</b>	<b>EFH Definition</b>
Spiny lobster	Phyllosome larvae	All waters from mean high water to the outer boundary of the EEZ
	Other life stages	Seagrass, benthic algae, mangrove, coral, and live/hard bottom substrates from mean high water to 100 fathoms depth
Queen conch	Eggs/larvae	All waters from mean high water to the outer boundary of the EEZ
	Other life stages	Seagrass, benthic algae, coral, live/hard bottom and sand/shell substrates from mean high water to 100 fathoms depth
Reef fish	Eggs/larvae	All waters from mean high water to the outer boundary of the EEZ
	Other life stages	All substrates from mean high water to 100 fathoms depth
Coral	Larvae	All waters from mean low water to the outer boundary of the EEZ
	Other life stages	Coral and hard bottom substrates from mean low water to 100 fathoms depth

*EFH 5-year review*

The Council completed a EFH 5-year review in 2010 with the help of a contractor, who consulted with the Council, NOAA’s Habitat Conservation Division of the Southeast Regional Office (SERO), and the Habitat Conservation Division of U.S. Caribbean Field Office to review the EFH-EIS for inaccuracies and information needs, which were not identified at the time. As part of the review, the team conducted a scientific literature search and contacted regional experts and NOAA Fisheries to identify new or updated information for EFH. The team also explored new methods to describe and identify EFH. New information and/ or distribution maps from these studies were used to update or complement the current EFH but the literature search did not find any information that would greatly alter the current EFH. Upon completion of the review, the Council decided a comprehensive or generic EFH amendment was not needed at the time and EFH information could be updated as management actions are developed.

**EFH Consultations**

EFH consultations are conducted by NOAA Fisheries Southeast Regional Office staff located in San Juan, Puerto Rico.

**Looking ahead**

The Council will continue to address the need to describe and characterize mesophotic and deep water habitats beyond 30 m that are potential coral areas.



## 5. Gulf of Mexico

### Summary

The Gulf of Mexico Fishery Management Council (Council) is currently undertaking a third Essential Fish Habitat (EFH) 5-year review process. The region's second review in 2010 did not result in any changes to EFH descriptions. EFH is described for each species and life stage based on areas of high species density and a functional relationships analysis using level 1 and 2 information.

### EFH timeline

1998	EFH described for various life history stages of 26 representative managed species and common coral complexes (Generic Amendment for Addressing EFH Requirements)
2004	Environmental Impact Statement (EIS) for the Generic Amendment for Addressing EFH Requirements
2005	Generic Amendment Number 3 for Addressing EFH Requirements, HAPC, and Adverse Effects of Fishing describes EFH for seven Fishery Management Plans (FMPs), including 55 species and two classes of coral
2010	EFH 5-year review of the Final Generic Amendment Number 3
2015	EFH 5-year review initiated, completion expected by December 2016

### EFH identification and review

#### *Generic Amendment*

EFH was first described in the 1998 Generic Amendment for each life history stage of 26 representative species that commonly occur in the marine and estuarine waters of the Gulf of Mexico from seven fishery management plans (FMPs), including shrimp, red drum, reef fish, stone crab, coral, spiny lobster, and coastal migratory pelagic resources. EFH was described using level 1 and 2 data based on species distribution maps and habitat association tables, produced by Council, NOAA Fisheries, and National Ocean Service staff. Since the managed species for this amendment occur in all estuarine and marine habitats, the Council developed two broad definitions of EFH:

*Estuarine EFH: "...all estuarine waters and substrates (mud, sand, shell, rock and associated biological communities), including the sub-tidal vegetation (seagrasses and algae) and adjacent inter-tidal vegetation (marshes and mangroves)." (GMFMC 1998).*

*Marine EFH: "...all marine waters and substrates (mud, sand, shell, rock, hardbottom, and associated biological communities) from the shoreline to the seaward limit of the EEZ." (GMFMC 1998).*

The Council identified almost all estuarine and marine waters of the Gulf of Mexico Exclusive Economic Zone (EEZ) as EFH. No regulations resulted from this amendment.

#### *EIS and Generic Amendment 3*

In response to litigation, the Council performed a detailed analysis to develop an EIS (2004) in support of the 1998 Generic Amendment. This effort also constituted the first 5-year EFH review conducted by the Council. The Council hired a contractor to complete the EIS and established two panels, a User Review Panel and a Technical Review Panel, to review the methods and draft the EIS. The User Review Panel was composed of representatives from the fishing industry, oil and gas industry, and wetlands property owners. The Technical Review Panel included staff from the Council and state and federal agencies. The Council's Habitat Protection Committee (HPC), Science and Statistical Committee (SSC) and the Habitat Protection Advisory Panel (HPAP) participated in the review process.

The EIS led to Generic Amendment 3 in 2005, which refined EFH designations to focus on the habitat of greatest importance to managed species by removing EFH designations from most Gulf of Mexico waters between 100 fathoms and the outer boundary of the EEZ. EFH was identified and described for 55 species and two coral classes for areas with higher species densities and based on levels 1 and 2 information from the 1998 Generic Amendment and functional relationships analysis. The functional relationships analysis "...determined habitat suitability for each species life stage based on substrate type and depth and relative abundance within 5 Gulf of Mexico eco-regions." (GMFMC 2010).

Suitable habitat for each species and life stage was mapped with in a geographic information system (GIS). The Council used these maps to deliberate and create general EFH text descriptions. Generic Amendment 3 minimizes adverse impacts to EFH through gear restrictions and modifications, and through an educational program to help commercial and recreational fishermen to minimize impacts to coral reefs from fishing gear.

#### *Recent 5-year EFH review*

The Council conducted their second 5-year EFH review in 2010. This review included a literature survey for new information about EFH, managed species distribution, and fishing impacts on habitat, and an exploration of alternative methods to refine EFH, including model-based approaches to identify and describe EFH. The overall recommendation from this 5-year review was that a comprehensive or generic EFH amendment was not needed at the time and EFH should be updated as actions are developed for specific FMPs.

#### **EFH consultations**

EFH consultations are conducted by NOAA Fisheries Southeast Regional Fisheries Office staff. The Council occasionally comments on projects that could impact EFH.

#### **Looking ahead**

Council staff are currently working on a more comprehensive third 5-year EFH update and review. They are developing web resources to help facilitate more user-friendly exploration of EFH information.

## 6. Western Pacific

### Summary

The Western Pacific Regional Fishery Management Council (Council) first identified Essential Fish Habitat (EFH) and developed EFH maps in 1999. EFH is identified by species assemblage using primarily level 1 and 2 data, typically for two or more life history stages combined. In 2009, the Council reorganized its species-based fishery management plans (FMPs) into a set of five place-based Fishery Ecosystem Plans (FEP), and existing EFH and Habitat Areas of Particular Concern (HAPC) descriptions were carried forward. The Council completed its first five-year review for Hawaii Archipelago bottomfish in 2012, and received Secretarial approval on the amendment implementing changes to EFH in April of 2016. The region is currently reviewing EFH for additional management unit species in each FEP.

### EFH timeline

1999	EFH first identified described and mapped for four species-specific FMPs
2001	EFH identified for the Coral reef ecosystem FMP
2008	Deepwater shrimp added to Crustaceans FMP (Amendment 13); EFH identified. EFH review initiated for Hawaii Archipelago Bottomfish
2009	Existing species-based FMPs reorganized into Fishery Ecosystem Plans; EFH and HAPC designations maintained
2012	EFH review completed for Hawaii Archipelago Bottomfish. EFH review initiated for other management unit species in each region (with the exception of crustaceans)
2016	Secretarial approval received for Amendment 4 to the Hawaii Archipelago Fishery Ecosystem Plan, updating EFH descriptions for bottomfish and seamount groundfish

### EFH identification and review (see table below)

#### *Comprehensive Amendment*

The Council first identified EFH in 1999 through a comprehensive amendment that amended the region's four existing FMPs for pelagics, bottomfish, crustaceans, and precious corals. The Western Pacific region has limited habitat information and bathymetry is characterized by deep water and steep drop-offs. The Council adopted a precautionary approach to identifying EFH for species assemblages, primarily in terms of suitable depth ranges. The Council chose to identify specific beds of precious corals as EFH, rather than using a depth range, because suitable habitat conditions for these species are rare.

EFH is identified based primarily on level 1 and 2 data, with higher level information available for some species and life stages. The Council also used a "Level 0" to indicate where no information on distribution exists, most frequently for egg and larval stages. Additional information about the life history and habitat use is provided by species and life history stage, where available. Adverse habitat impacts from fishing gear were considered minimal. Bottom trawls, bottom-set nets, explosives, and poisons were prohibited by the management regime in place at the time EFH was described.

#### *Coral reef ecosystem FMP*

The Council later developed a Coral Reef Ecosystem FMP that includes thousands of species not managed under existing FMPs. A general EFH description is provided for all species, and EFH descriptions for some taxa and life history stages may provide a more limited affiliation with particular substrates. EFH is also described through the use of tables depicting the affiliation of life history stages with habitat composite types that include mangrove lagoons, estuarine, seagrass beds, soft substrate, coral reef/hard substrate, deep slope terraces, and pelagic/open ocean. As with the other four FMPs, adverse habitat impacts from fishing gear are considered minimal.

*Deepwater shrimp*

Amendment 13 (2008) to the Crustaceans FMP added eight deepwater shrimp species to the management unit, and designates EFH at the species assemblage level. Very little information exists describing the distribution and habitat associations of these species.

EFH Definitions (Adapted from Table 1, WPRFMC 2012)

<b>Management Unit</b>	<b>Juveniles and adults</b>	<b>Eggs and larvae</b>
Pelagic	Water column from shoreline to 1000 m isobath	Water column down to 200 m from shoreline to EEZ
Bottomfish	Overall designation for post-settlement/sub-adult/adult - Water column and bottom habitat from shoreline to 400 m isobath; depth ranges vary by complex for individual species and life stages	Eggs: Water column down to 400 m from shoreline to 50 mi from shore Post-hatch pelagic: water column down to 400 m from shoreline to EEZ Depth ranges vary by complex for individual species and life stages
Seamount groundfish	Water column and bottom habitat in depths from 120 m to 600 m, in EEZ waters west of 180° W and north of 28° N	Pelagic zone to a depth of 600 m, in EEZ waters west of 180° W and north of 28° N
Precious corals	Keahole, Makapuu, Kaena, Westpac, Brooks, and 180 Fathom gold/red coral beds, and Milolii, S. Kauai, and Auau Channel black coral beds	N/A
Crustaceans	Bottom habitat from shoreline to 100 m isobath	Water column down to 150 m from shoreline to EEZ
Coral reef ecosystem	Water column and bottom habitat from shoreline to 100 m isobath	Water column down to 100 m from shoreline to EEZ
<i>Heterocarpus</i> shrimps	Outer reef slopes between 300 and 700 m surrounding every island and submerged bank in the Western Pacific Region	Outer reef slopes between 550 and 700 m surrounding every island and submerged bank in the Western Pacific Region

*Fishery ecosystem plans*

In 2009 the Council reorganized the five species-specific FMPs into five place-based fishery ecosystem plans, which include the American Samoa Archipelago, Hawaii Archipelago, Mariana Archipelago, Pacific Pelagics, and Pacific Island Remote Areas. Each of the FEPs incorporated existing EFH and HAPC descriptions.

#### *Hawaii Bottomfish EFH Review*

The region's first EFH review was initiated in 2008. This process focused on Hawaii Archipelago bottomfish due to the availability of new science, and in order to focus limited funding and staff capacity. The NOAA Fisheries Pacific Islands Regional Office (PIRO) hired a contractor to review available information. The final report was completed in 2012 after review through the Western Pacific Stock Assessment Review (WPSAR) process and by the Council's Scientific and Statistical Committee (SSC).

The Council's preliminary preferred alternatives (as recommended by the WPSAR panel and endorsed by the SSC) retained the aggregate designation of 0-400 m and proposed changes to bottomfish EFH that include specifying three species sub-groups (shallow, intermediate, and deepwater complexes), defining four life history stage categories (eggs, post hatch pelagic, post settlement and subadult, adult), and providing updated EFH text descriptions for each species. Changes were also proposed for seamount groundfish, including designating HAPC congruent with EFH and adjustments to overall and life stage-specific EFH depths ranges. Secretarial approval was received for Amendment 4 to the Hawaii Archipelago Fishery Ecosystem Plan in April 2016, reflecting the Council's preferred alternative.

#### *Current EFH review process*

PIRO hired a contractor to conduct a review of EFH and HAPC for all managed species, excluding crustaceans and the Hawaii bottomfish and seamount groundfish, which was drafted and presented to the Council in 2012. This review was put on hold temporarily due to the need for more information and limited resources to address needs. However, the EFH review is now being conducted through the plan team annual report process in accordance with the FEPs. The FEPs require the plan teams to review EFH information, as necessary, during assembly of the annual report. The Council restructured its plan teams in 2015 with the expertise necessary for assembling annual reports that meet the requirements of both the Stock Assessment and Fishery Evaluation (SAFE) reports and the Council's FEP annual reports.

During production of the 2015 Annual SAFE Report, the Pacific Islands Fisheries Science Center's (PIFSC) habitat expert on the plan team updated the precious corals species descriptions. The Council will consider the review as well as other management implications from the review when the species descriptions draft is complete. PIRO is contracting for a review of non-fishing activities, corresponding conservation and enhancement recommendations, and cumulative impacts to EFH. The scope of work for this contract was collaboratively developed by the Council, PIFSC, and PIRO habitat staff. Finally, an SSC member is developing a method to utilize existing fisheries-independent survey data with geographically-explicit marine habitat information to identify EFH for Hawaiian Coral Reef Ecosystem Management Unit Species (CREMUS) and assess the relative value of marine habitats. The approach will be applicable to CREMUS groups for other regions under the Council's jurisdiction where similar NOAA Fisheries independent surveys have occurred and GIS data exist.

#### **EFH consultations**

EFH consultations are conducted by PIRO.<sup>6</sup> Council and PIRO staff coordinate on a proportion of the couple of hundred EFH consultation/review requests that are received by PIRO each year. Most of these requests are for non-fishing actions. The main Federal action agencies consulted with include the Navy, Army Corp of Engineers, and U.S. Department of Transportation. The types of projects most often consulted on include military training and testing activities, harbor construction and dredging, and shoreline hardening.

PIRO prioritizes review of federal actions with more than minimal adverse effect on EFH. PIRO also prioritizes actions with adverse effect on EFH where: the federal action agency is unfamiliar with EFH and the consultation requirement and process; the federal action agency has a history of non-compliance with MSA; the action is connected to important past or ongoing consultations; the action occurs within a NOAA Fisheries priority site; and/or the community has expressed a particular interest in NOAA Fisheries review of EFH/habitat impacts.

Existing EFH consultations are focused in coastal areas in Hawaii, the Marianas and American Samoa where the majority of development occurs. EFH in nearshore waters as designated for a range of management unit species includes the seafloor and the marine water column. PIRO's EFH conservation recommendations often address mitigation of impacts to coral reef, seagrass, and water quality. Emerging actions in the region include open ocean aquaculture, offshore renewable energy development, and deep sea minerals mining. The nature of these activities drives an increasing need to refine offshore EFH, understand new potential impacts to EFH and ensure effective coordination between Council and PIRO staff conducting EFH consultations.

### **Looking ahead**

At its 165<sup>th</sup> meeting in Honolulu, HI, the Council voted to include the EFH review process in the Regional Operating Agreement. Council, PIFSC, and PIRO leadership will schedule the 5-year EFH reviews in a process similar to how stock assessments are scheduled for the region. This will help ensure that EFH reviews are consciously prioritized with respect to the region's limited resources, and provide the plan team with direction on which EFH reviews to conduct.

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<sup>6</sup> The NOAA Fisheries Pacific Islands Regional Office and Pacific Islands Fisheries Science Center were both established in 2003. Prior to 2003, fishery management responsibilities for the region, including EFH consultations, were supported by the NOAA Fisheries Southwest Regional Office and Southwest Fisheries Science Center.

## 7. Pacific

### Summary

The Pacific Fishery Management Council (Council) identifies and reviews Essential Fish Habitat (EFH) on a Fishery Management Plan (FMP) basis. The Council’s approach to identifying EFH is different for each FMP, based on data availability and the life history of managed species. The Council recently completed an EFH review and FMP amendment for Pacific Salmon, and is nearing the completion of an EFH review and amendment process for Pacific Coast Groundfish. The Groundfish EFH Review process follows a three-phase process formally described in the Council’s Operating Procedures, and provides for significant stakeholder participation.

### EFH timeline

1998	EFH identified for the Coastal Pelagic Species (CPS) (Amendment 8) and Pacific Coast Groundfish (Amendment 11) FMPs
2000	EFH identified for Pacific Salmon (Amendment 14)
2004	Highly Migratory Species (HMS) FMP implemented, EFH identified
2006	EIS completed for Pacific Coast Groundfish FMP. Amendment 19 to the FMP modified EFH definition, added text descriptions, and provided maps based on habitat suitability analysis. EFH review completed for CPS; does not result in changes.
2008	Krill added to CPS FMP (Amendment 12); EFH identified
2009	EFH review initiated for Pacific Salmon
2010	EFH review initiated for Pacific Coast Groundfish FMP. EFH review completed for CPS; does not result in changes.
2014	Updates to salmon EFH implemented (Amendment 18 to the Pacific Salmon FMP). NMFS publishes final rule January 2015.
2015	Amendment 28 to the Pacific Coast Groundfish FMP (ongoing) will include any changes to groundfish EFH and HAPCs.

### EFH identification and review

#### *Coastal Pelagic Species*

The CPS FMP includes four pelagic finfish species, market squid, and krill (multiple species). The Council first identified EFH for CPS in 1998. EFH is broadly defined for all species and life stages in the complex as:

*“All marine and estuary waters from the shoreline...to the limits of the EEZ and above the thermocline where sea surface temperatures range from 10 to 26 c.” (PFMC 1998).*

This definition is based on Level 1 presence/absence data, oceanographic data, and published literature. The Council conducted reviews in 2006 and 2010, and concluded that no changes were needed. Fishing gear impacts to pelagic CPS EFH are minimal and there are no measures in place to minimize adverse impacts.

In 2008, the Council added krill to the CPS FMP (Amendment 12) under a new “prohibited harvest species” category in order to preserve trophic relationships in the California Current ecosystem. EFH is defined for each of two primary krill species (including all life stages) as a

surface layer that extends from shore outward to a defined isobath and depth. EFH is primarily based on Level 1 presence/absence data based on published literature, a fishery independent survey, and input from krill researchers.

#### *Highly Migratory Species*

The HMS FMP was implemented in 2004 and includes tunas, billfish (including swordfish) and sharks. EFH descriptions are based on Level 1 and some level 2 information from catch and logbook data, observer data, tagging studies, expert opinion, and published literature and life history information. HMS are highly mobile pelagic species, and EFH is described in terms of the oceanographic and environmental features that influence their distribution. EFH descriptions may refer to a combination of water depth, temperature, foraging habits, references to seasonal movements, the influence of cold and warm water years (associated with El Niño events), and associations with features such as upwellings and plumes. EFH is described by species and life history stage, though early life history stages of many species are not found within the U.S. Exclusive Economic Zone (EEZ). Fishing gear impacts to pelagic HMS EFH are minimal and there are no measures in place to minimize adverse impacts. EFH for HMS has not yet been reviewed.

#### *Pacific Coast Salmon*

The Pacific Coast Salmon FMP includes Chinook salmon, coho salmon, and Puget Sound pink salmon. EFH was first identified through Amendment 14 in 2000. EFH is broadly identified for all three species.

*“In the estuarine and marine areas, salmon EFH extends from the extreme high tide line in nearshore and tidal submerged environments within state territorial waters out to the full extent of the EEZ offshore of Washington, Oregon, and California north of Point Conception...The geographic extent of freshwater EFH is identified as all water bodies currently or historically occupied by Council-managed salmon in Washington, Oregon, Idaho, and California.” (PFMC 2014).*

This inclusive definition reflects the anadromous life history strategies of salmon, which require a continuum of fresh to marine habitats; as well as data limitations and variation in habitat quality and use. EFH descriptions for each species include additional life history and habitat use information. Descriptions and maps are primarily based on Level 1 data, with some higher level data available by species and life history stage. Additional important EFH components (e.g., migration corridors) are identified for freshwater and marine habitats. The inland extent of freshwater EFH is geographically defined by U.S. Geological Survey hydrological units (HUs), with exclusions where natural or manmade barriers such as dams limit the upstream extent of EFH. Pacific Salmon EFH also includes Alaska waters identified as salmon EFH by the North Pacific Fishery Management Council.

The Council initiated a review of Pacific Salmon EFH in 2009. The process was led by an Oversight Panel that included council, regional office, and science center staff, with support from an independent contractor. The Council reviewed a final report in 2011, and implemented changes to the FMP in 2014 that include updating EFH descriptions, description of the adverse effects of fishing on salmon EFH, adding or removing HUs as EFH, updating the list of barriers that define the upstream extent of EFH, and updating the description of non-fishing activities that may adversely affect salmon EFH.



## *Pacific Coast Groundfish*

### 1998 Process (Amendment 11)

The Pacific Coast Groundfish FMP includes more than 90 species with diverse habitat needs. The Council first identified EFH for Pacific Coast Groundfish in 1998 (Amendment 11). EFH was identified as the entire EEZ and marine coastal waters inshore of the EEZ (PFMC 1998). EFH was further described in terms of seven “composite” EFH types that recognize ecological relationships between species and habitat types. These included estuarine, rocky shelf, non-rocky shelf, canyon, continental slope/basin, neritic zone, and oceanic zone habitats. The EFH Technical Team considered identifying EFH based on areas of high density, trawl survey and fishery dependent information. The team concluded that this approach would not adequately represent areas of importance to groundfish, due to spatial and temporal limitations on trawl survey data as well as a lack of early life history information. Amendment 11 did not adopt any measures to minimize adverse impacts to EFH.

### 2006 Process (Amendment 19)

An Environmental Impact Statement was later completed for Amendment 11, and led to Amendment 19 to the Groundfish FMP. EFH designations were informed by a habitat suitability analysis that considered depth, latitude, and substrate type to approximate the distribution of groundfish species. The model generated a Habitat Suitability Probability (HSP) of 0% to 100% for most species and life history stages, which was used to generate EFH maps. The Council adopted a precautionary approach to identifying EFH for groundfish, which includes all areas where HSP is greater than 0%:

*“...Depths less than or equal to 3,500m to mean higher high water level or the upriver extent of saltwater intrusion...seamounts in depths greater than 3,500m as mapped in the EFH assessment GIS [and] areas designated as HAPCs not already identified by the above criteria.” (PFMC 2006).*

Amendment 19 also constituted the Council’s first 5-year review for groundfish EFH. The EFH Technical Team conducted a literature review and developed an appendix that describes habitat associations by species and life history stage. The amendment implemented three categories of closed areas to minimize adverse impacts to EFH, including 34 bottom trawl closed areas, 17 bottom contact closed areas (closed to all bottom tending gear, including fixed gear such as long lines and pots); and a bottom trawl footprint closure of the EEZ between 1280 and 3500m.

### Current Groundfish EFH Review (Amendment 28)

The Council initiated a three-phase EFH review process in 2010. This process follows a formal Process for Essential Fish Habitat Review and Modification, described in the Council’s Operation Procedures (COP22). The review process was guided by an Essential Fish Habitat Review Committee (EFHRC) that includes participation by NOAA Fisheries science center and regional office staff, fishery stakeholders, and the academic and conservation communities.

- Phase 1 (completed): the EFHRC reviewed new information. NOAA Fisheries staff with the Northwest and Southwest Fisheries Science Centers provided a Synthesis Report to the Council to summarize new information and provide a starting point to consider changes to EFH and HAPCs. The new information and analyses are available online at: <http://efh-catalog.coas.oregonstate.edu/mapservice/>.

- Phase 2 (completed): The Council evaluated this new information and initiated a request for proposals to consider changes to EFH and HAPC. Eight proposals were submitted. The EFHRC developed a final report and recommendations to the Council.
- Phase 3 (ongoing): The Council is in the process of developing and analyzing alternatives for Amendment 28.

The Council is also considering revising rockfish conservation areas (RCAs) which are depth-based closures based specifically on species conservation, and merged the RCA and EFH changes into a single action that will become Amendment 28. The Council anticipates selecting preferred alternatives later in 2016.

### **EFH consultations**

The majority of EFH consultations on the West Coast occur in areas that also have species listed as “threatened” or “endangered” under the Endangered Species Act (ESA), which has its own consultation requirements. In these cases, the EFH and ESA consultations are conducted simultaneously by the same staff biologist to streamline the process and reduce the regulatory burden on the action agencies. A single combined EFH/ESA Assessment is submitted by the action agency and NOAA Fisheries produces a single EFH/ESA consultation document.

### **Looking ahead**

In 2013, the Council adopted a Fishery Ecosystem Plan (FEP) that serves as a repository for information relevant to the other four FMPs. While the FEP is not regulatory, the information compiled in it serves as a catalyst for management actions in the other four FMPs. For example, the Council adopted an ‘ecosystem initiative’ that adds language to each of the four FMPs prohibiting directed harvest of forage fish species that aren’t already under management. In addition, there have been informal discussions about developing EFH definitions common to all four FMPs. These definitions could be included in the FEP, with corollary regulatory language included in the other FMPs.

## 8. North Pacific

### Summary

The NOAA Fisheries Alaska Regional Office, Alaska Fisheries Science Center, and North Pacific Fishery Management Council (Council) collaborate closely to identify, describe, and review Essential Fish Habitat (EFH) and Habitat Areas of Particular Concern (HAPCs) for the region's six fishery management plans (FMPs): the Bering Sea/Aleutian Islands Groundfish (BSAI) FMP, Gulf of Alaska Groundfish FMP, BSAI Crab FMP, Scallop FMP, and Salmon FMP. The region recently completed an EFH review in 2015 and presented a Summary Report to the Council in spring of 2016. The region's updated EFH description methodology describes EFH by species and life history stage using level 1 and 2 data. The region is considering fishing effects to habitat with the use of a Fishing Effects (FE) model that calculates potential habitat reduction by estimating impacts and recovery in a continuous time framework.

### EFH timeline

1999	Environmental Assessment (EA) completed; EFH first identified and described for all FMPs through individual FMP amendments. <sup>i</sup>
2005	Environmental Impact Statement (EIS) completed; FMP amendments <sup>ii</sup> to update EFH and HAPC and implement habitat conservation measures.
2009	Arctic FMP implemented; EFH described for 3 species
2010	First 5-year EFH review completed for five FMPs (excluding Arctic). HAPC Process defined and aligned with EFH Review, or Council can initiate at its discretion.
2012	Updates to EFH implemented through omnibus amendment <sup>iii</sup>
2015	Second 5-year EFH review completed (including Arctic)
2016	Summary report presented to Council; future actions TBD

### EFH identification and review

#### *1999 Initial EFH Descriptions*

EFH was first identified in an EA for the region's five FMPs in 1999 and adopted through individual FMP amendments. EFH was broadly described by the general distribution of a species life stage (level 1-2) under all stock conditions; or as the area where one would reasonably expect to find a certain life stage of that species. Scientists added a level 0 to help identify areas where information was not sufficient to describe EFH, however this was not within the regulatory bounds of EFH (and later was removed). No measures were implemented to address habitat impacts from fishing. An up-to-date review of fishing gear characteristics was prepared. A review of non-fishing activities was also included.

#### *2005 EIS*

The Alaska Region completed an EIS for EFH Habitat Identification and Conservation in Alaska in 2005 to provide a more thorough analysis of EFH and HAPCs (NMFS 2005). The region adopted a slightly similar approach used in 1999 (EFH based on general distribution); however the availability of GIS datasets and technology reflected updated regulatory guidance and the best available science. EFH was then described as 95% of the general distribution of the population where the species life stage has been documented through fishery independent surveys, research, observations, or catch logs.

For each FMP EFH is described by species and life history stage, primarily using level 1 data (presence/absence) or not at all. Distribution data were available for adult and late juvenile life history stages of some species. For early life stages (egg and larvae), EFH is based on presence/absence data or was inferred. EFH maps derived from this information were then reviewed by stock assessment authors. Changes to EFH descriptions were implemented through amendments to each FMP. The Council also adopted a formalized process for identifying and reviewing potential HAPCs and incorporating stakeholder input through a proposal process.

Fishing effects were analyzed using the Long Term Evaluation of Fishing Effects Index (LEI) model that calculated potential habitat reduction by estimating impacts and recovery in a continuous time framework. This analysis incorporated fishery observer data and a literature review of impacts to species in Alaska. The Council determined that while fishing activity does impact benthic habitat, adverse impacts to EFH are not more than minimal or temporary in nature and do not impact the ability of EFH to support the productivity of managed species. The Council adopted precautionary measures to conserve EFH, including EFH Habitat Conservation and Protection Areas that limit or prohibit bottom contact by certain fishing gears. The LEI was the first attempt to analyze fish habitat and fishing gear interactions.

#### *2009 Arctic FMP*

In 2009 the Council adopted a Fishery Management Plan for Fish Resources of the Arctic Management Area, as a precautionary approach to prevent the development of unregulated fisheries in a changing region. EFH is identified, described, and mapped using level 1 data for late juvenile and adult stages of the three species identified as potential commercial targets (Arctic cod, saffron cod, snow crab). Insufficient information exists to describe EFH for early life history stages for these fish. Descriptions were reviewed by stock assessment authors. Additionally in the analysis, an ecosystems component species analysis was prepared.

#### *2010 EFH Review*

The Alaska Region's 2010 EFH review process reviewed EFH for all FMPs with the exception of the Arctic FMP. The process resulted in amendments to the Council's FMPs descriptions of EFH and adjusted the Council's timeline for designating HAPCs to align with the 5-year EFH review cycle.<sup>7</sup>

#### *2015 EFH Review*

In 2015 the region initiated a 5-year review process for all six of the region's FMPs. This process is similar to the process followed in 2010, although focused on three of the ten EFH FMP components, each supported by a technical subgroup. Outputs are reviewed by the Council's Ecosystem Committee, Scientific and Statistical Committee (SSC), and Advisory Panel and subsequently presented to the full Council. This process includes an important role for stock assessment authors and Plan Teams, who are tasked with reviewing outputs from the EFH description methodology and fishing effects analysis.<sup>8</sup>

#### *EFH description methodology*

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<sup>7</sup> The Council's approach for proposing, reviewing, and designating HAPCs is described in detail in the 2010 [HAPC Process Document](#)

<sup>8</sup> A detailed description of the EFH review process, including roles and responsibilities of technical groups, is available in the NPFMC April 2014 briefing book.

The 2015 EFH review represents a major step forward for the methodology and level of information used to identify and describe EFH. Alaska Fisheries Science Center scientists developed species distribution models for major groundfish and invertebrate species throughout the region, resulting in updated text descriptions and new distribution maps by species, life stage, and season. Information inputs include long-running fishery independent surveys, supplemented with commercial catch data for adult life stages. Models were reviewed by the Council's SSC. The descriptive model outputs were reviewed by stock assessment authors, who recommended updates to EFH descriptions. One outcome of this process is that the level of information used to identify and describe EFH for most life history stages increased from "unknown" to "known" (level 1), or from level 1 to level 2.

A different process was followed for the Salmon and Arctic FMPs. For salmon species, a review team including NOAA Fisheries and Alaska Department of Fish & Game scientists reviewed existing EFH and new information. Stock assessment authors or experts followed a similar approach for the Arctic FMP.

#### *Fishing effects analysis*

The LEI model described above was updated and refined (Fishing Effects (FE) model). The changes to the model are significant in many areas. For example, about 2,000 sediment data points in the Bering Sea were available for the 2005/2010 analyses (and the Gulf and Aleutians utilized "shallow" and "deep" habitat proxies); that number has increased to over 400,000 throughout the Gulf, Aleutians, and Bering Sea. The FE model utilizes the Swept Areas Seabed Impacts (SASI) literature database review developed by the New England Fishery Management Council to estimate impacts to habitat. The LEI model was run in continuous time and written in MatLab, while the FE model is run in discrete time and has been converted to R. The most important update, however, has been the implementation of the VMS-enabled Catch-in-Areas database, which incorporates over 600,000 spatially-explicit VMS fishing events into the model at a 25km<sup>2</sup> resolution.

#### *Non-fishing impacts*

An updated review of non-fishing effects and impacts to EFH will be provided for review in June 2016. The document will review activities, other than fishing, that may have adverse effects on EFH and includes new sections addressing environmental change, including ocean acidification, and climate change in Arctic waters. Importantly, the document discusses EFH waters as waters that originate as rainfall, groundwater, or snowmelt and later flow into marine waters.

#### *Outcomes*

The Alaska Region's EFH process culminated in a summary report that was provided to the Council's Ecosystem Committee, the SSC, and the Advisory Panel, and presented to the Council in April 2016. If the Council chooses to take action, updates or changes would be implemented through FMP amendments. The Council may also identify priorities to inform the HAPC proposal process. The Alaska Region also intends to prioritize stocks for habitat assessment in conjunction with the 5-year review process.

#### **EFH research**

The NOAA Fisheries Alaska Regional Office and Alaska Fisheries Science Center coordinate the Alaska Essential Fish Habitat Research Plan (Plan), which directly funds habitat research to address EFH information needs. The Plan supports an annual Request For Proposal (RFP) process

to fund EFH research in support of five research priority themes, which focus on identifying, managing, and conserving habitats that are most important to the productivity of federal managed species.

### **EFH consultations**

EFH consultations are conducted by Habitat Conservation Division staff at the NOAA Fisheries Alaska Regional Office. Taking into account that EFH is a national program, the Alaska Region experiences less pressure (by comparison) from the coastal development activities that account for the majority of EFH consultations. However, consultations can play a role in national and cross-regional issues, such as large scale oil and gas developments, mineral mining, hydropower, national military defense, and global seafloor cable projects. The Council and Regional Office have an established process through which Alaska Regional Office Habitat Conservation staff keep the Council apprised of consultations and activities that may impact federally managed fisheries.

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<sup>i</sup> Amendment 55 to the FMP for the Groundfish Fishery of the BSAI, Amendment 55 to the FMP for Groundfish of the GOA, Amendment 8 to the FMP for BSAI King and Tanner crabs, Amendment 5 to the FMP for Scallop Fishery off Alaska, Amendment 5 to the FMP for the Salmon Fisheries in the EEZ off Alaska

<sup>ii</sup> Amendment 78 to the FMP for the Groundfish Fishery of the BSAI Area, Amendment 73 to the FMP for Groundfish of the GOA, Amendment 16 to the FMP for BSAI King and Tanner Crabs, Amendment 9 to the FMP for the Scallop Fishery off Alaska, and Amendment 7 to the FMP for the Salmon Fisheries in the Exclusive Economic Zone (EEZ) off the Coast of Alaska.

<sup>iii</sup> Amendment 98 to the Fishery Management Plan for Groundfish of the Bering Sea and Aleutian Islands Management Area, Amendment 90 to the Fishery Management Plan for Groundfish of the Gulf of Alaska, Amendment 40 to the Fishery Management Plan for Bering Sea/Aleutian Islands King and Tanner Crabs, Amendment 15 to the Fishery Management Plan for the Scallop Fishery off Alaska, and Amendment 1 to the Fishery Management Plan for Fish Resources of the Arctic Management Area.

## 9. Atlantic Highly Migratory Species

### Summary

The Atlantic Highly Migratory Species (HMS) management unit, which includes swordfish, tunas, sharks, and billfish, is managed by the NOAA Fisheries Atlantic Highly Migratory Species Management Division. HMS are pelagic, wide-ranging species and habitat associations are based on oceanic conditions and features; however, life stages of certain shark species are dependent on coastal and estuarine habitats. Essential Fish Habitat (EFH) is identified by species and life stage based on level 1 data from a wide range of fishery dependent and independent sources.

### EFH timeline (adapted from Table 1.1, NMFS 2015)

1999	EFH first identified and described for all HMS species
2003	EFH updated for 5 shark species (blacktip, sandbar, finetooth, dusky, and nurse shark)
2006	Fishery Management Plans (FMPs) combined into Consolidated Atlantic HMS FMP, first comprehensive EFH review
2009	EFH updated for all Atlantic HMS (Amendment 1 to Consolidated HMS FMP)
2010	EFH defined for additional species (smoothhound sharks, roundscale spearfish)
2015	Second 5-Year EFH review completed
2016	EFH updated for all Atlantic HMS (Amendment 10 to the Consolidated HMS FMP – <i>in progress</i> )

### Atlantic HMS management and EFH authorities

The Atlantic HMS management unit includes swordfish, tuna, shark, and billfish species, and the management unit spans the U.S. east coast, Caribbean, and Gulf of Mexico Exclusive Economic Zones (EEZs). Atlantic HMS are managed internationally through the International Commission for the Conservation of Atlantic Tunas (ICCAT) and domestically in the U.S. under the Magnuson-Stevens Act (MSA) through a FMP administered by NOAA Fisheries under the Secretarial authority of the MSA. The Atlantic HMS FMP is subject to the same requirements as all federal FMPs, including the requirement to describe and identify EFH. EFH reviews, and the development and selection of management alternatives, are conducted by HMS Division staff with input through an HMS Advisory Panel and the public rulemaking process.

### EFH identification and review

#### *Initial EFH designations*

NOAA Fisheries first identified EFH for HMS in 1999. At that time, there were two separate FMPs: the Atlantic Billfish FMP, and the Atlantic Tunas, Swordfish, and Sharks FMP. Due to the data-poor nature of some species and the need to use multiple data sources housed inside and outside the agency (all of which have their own structure and caveats), EFH for HMS is defined by the most common type of data (i.e., distribution or level 1 data). HMS habitat is usually described in terms of species' associations with dynamic oceanographic features such as currents, and tolerance for properties including temperature, salinity, and oxygen content, rather than by associations with substrate or benthic habitat type. HMS may also depend on habitat areas outside of the U.S. EEZ that cannot be identified as EFH. For tunas, swordfish, and billfish, EFH is identified for three life history stages: egg/larval/spawning, juvenile, and adults; for sharks, the earliest life history stage is defined as neonates/young of year.

EFH descriptions are based on published and unpublished life history information, expert opinion, and presence/absence and relative abundance information derived from observers, tagging programs, and research surveys. EFH maps were developed by analyzing spatial information in GIS to establish probability boundaries that are further refined to reflect aggregations and geographical boundaries.

Adverse impacts to EFH (for both HMS and council-managed species) from HMS fishing gear are minimal, as most HMS gear is fished in the water column. EFH for HMS is primarily offshore pelagic habitat but is nonetheless impacted by land-based and coastal development activities. HMS associate with oceanographic features such as river plumes and currents that transport and concentrate the effects of land-based and coastal development activities. In addition, many shark species use coastal and estuarine habitat that could be susceptible to anthropogenic activities for mating, pupping, and early life stages.

#### *Recent EFH review under the previous FMP*

In 2003, NOAA Fisheries updated EFH for 5 shark species to reflect new information and changes in stock status. EFH maps were updated based on the concentration of observations per ten-minute square (approx. 100 mi<sup>2</sup>). EFH was identified for overfished stocks based on 1 observation per ten-minute square. A higher threshold of 10 observations per square was used for rebuilt stocks.

#### *First EFH review under current FMP*

In 2006, NOAA Fisheries combined the two FMPs into the Consolidated Atlantic Highly Migratory Species FMP, consolidated EFH information, and initiated the first comprehensive EFH review. Changes to EFH were implemented later through Amendment 1 in 2009. NOAA Fisheries updated EFH maps using kernel density estimator and percent volume contour spatial tools contained in the Hawth's Toolkit ([spatialecology.com](http://spatialecology.com)). These tools first generate a raster shapefile depicting the density of points within a defined area surrounding each output raster cell, and then delineate probability boundaries that encompass 95% of the observations (shown as polygons). Output polygons were then subjected to stringent scientific and public review via the amendment process, and then adopted as HMS EFH. This approach was intended to provide a reproducible, transparent method for identifying spatial boundaries based on areas of high concentration. The use of a precautionary 95% probability boundary reflects that HMS species are wide-ranging and that observations (e.g., research surveys) provide greater coverage of some geographic areas.

#### *Second EFH review under current FMP*

NOAA Fisheries conducted an EFH review in 2015, and determined that updates to EFH were warranted. The review identified new information, including insights into life history, stock structure, and spatiotemporal distribution, which could be used to update EFH text descriptions and/or maps for some species. NOAA Fisheries will update EFH maps for all species with new observer, survey, and tagging data using the same 95% probability boundary approach used in 2009. The amendment will likely be completed in 2017.

#### **EFH consultations**

EFH consultations are coordinated by NOAA Fisheries staff within the Habitat Conservation Division of the Greater Atlantic Regional Fisheries Office and the Southeast Regional Office.



**Looking ahead**

The Atlantic HMS Management Division is working with the NOAA Fisheries Office of Habitat Conservation to evaluate and improve Atlantic HMS EFH products, and with NOAA Fisheries scientists to identify statistically robust methods to incorporate different types of data (survey, observer, conventional tag, acoustic tag, and pop-up satellite tag) into EFH designations.

## Reviewers and references

### Reviewers

The following council and NOAA Fisheries staff contributed their time and expertise to review regional EFH profiles. Some profiles reflect additional input and review by other council and agency staff and technical experts.

#### New England

- Michelle Bachman, Fishery Analyst, New England Fishery Management Council
- David Stevenson, Marine Habitat Resource Specialist, Habitat Conservation Division, NOAA Fisheries Greater Atlantic Regional Fisheries Office

#### Mid-Atlantic

- Jessica Coakley, Fishery Management Specialist, Mid-Atlantic Fishery Management Council
- David Stevenson, Marine Habitat Resource Specialist, Habitat Conservation Division, NOAA Fisheries Greater Atlantic Regional Fisheries Office

#### South Atlantic

- Roger Pugliese, Senior Fishery Biologist, South Atlantic Fishery Management Council
- Pace Wilber, Atlantic Branch Supervisor, Habitat Conservation Division, NOAA Fisheries Southeast Regional Office

#### Caribbean

- Graciela Garcia-Moliner, FMP and Habitat Specialist, Caribbean Fishery Management Council
- David Dale, Regional EFH Coordinator, Habitat Conservation Division, NOAA Fisheries Southeast Regional Office

#### Gulf of Mexico

- Claire Roberts, EFH Specialist, Gulf of Mexico Fishery Management Council
- John Froeschke, Fishery Biologist, Gulf of Mexico Fishery Management Council
- David Dale, Fishery Biologist, Habitat Conservation Division, NOAA Fisheries Southeast Regional Office

#### Western Pacific

- Rebecca Walker, Fisheries Analyst, Western Pacific Regional Fishery Management Council
- Danielle Jayewardene, Regional EFH Coordinator, Habitat Conservation Division, NOAA Fisheries Pacific Islands Regional Office

#### Pacific

- Kerry Griffin, Staff Officer, Pacific Fishery Management Council
- John Stadler, Regional EFH Coordinator, NOAA Fisheries West Coast Regional Office

#### North Pacific

- Steve MacLean, Fishery Analyst, North Pacific Fishery Management Council

- Matt Eagleton, Regional EFH Coordinator, Habitat Conservation Division, NOAA Fisheries Alaska Regional Office
- John Olson, Marine Habitat Resource Specialist, Habitat Conservation Division, NOAA Fisheries Alaska Regional Office

#### Atlantic Highly Migratory Species

- Peter Cooper, Fishery Management Specialist, NOAA Fisheries Highly Migratory Species Management Division
- Jennifer Cudney, Fishery Biologist, NOAA Fisheries Highly Migratory Species Management Division

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### Mid-Atlantic

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### Western Pacific

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Personal communication with Danielle Jayewardene, Regional EFH Coordinator, Habitat Conservation Division, NOAA Fisheries Pacific Islands Regional Office. January 26, 2016.

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