

# **REVIEW OF PACIFIC COAST GROUNDFISH ESSENTIAL FISH HABITAT**

**PHASE 2 REPORT TO THE PACIFIC FISHERY  
MANAGEMENT COUNCIL**

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# 1 Introduction

The purpose of this report is to finalize Phase 2 of the Groundfish Essential Fish Habitat (EFH) review process, and to make recommendations to the Council on the scope of potential changes to the EFH provisions of the Pacific Coast Groundfish Fishery Management Plan (FMP). This process is pursuant to Council Operating Procedure (COP) 22 and regulation<sup>1</sup>. EFH provisions of the FMP were established in 2005 by Amendment 19 and include: (1) the description and identification of EFH and HAPC; (2) measures to minimize to the extent practicable the adverse effects of fishing on EFH; (3) the identification of data gaps and research needs; and (4) the identification of other actions to encourage the conservation and enhancement of EFH (PFMC 2011).

## 1.1 Background

Amendment 19 established a comprehensive strategy to identify and conserve EFH for species managed under the Pacific Coast Groundfish FMP pursuant to section 303(a)(7) of the Magnuson-Stevens Act (MSA). The purpose of Amendment 19 was to “account for the function of Pacific Coast groundfish EFH when making fishery management decisions; ensure that EFH is capable of sustaining groundfish stocks at levels that support sustainable fisheries; and, ensure that EFH is capable of sustaining enough groundfish to function as a healthy component of the ecosystem (NMFS 2005, pp 1-3).”

The technical basis for Amendment 19 included the Council’s Risk Assessment, Environmental Impact Statement (EIS), and Record of Decision (RoD). The Risk Assessment was developed on the advice of the National Research Council’s Committee on the Ecosystem Effects of Fishing (NRC 2002, Chapter 7) to determine if EFH-related problems existed and, if so, which of those problems could be addressed through Council and NEPA processes (MRAG 2004). The EIS and RoD established the technical rationale for the final decision to implement Amendment 19 (NMFS 2005; NMFS 2006).

A significant component of this current groundfish EFH review is the consideration of new information available since the adoption of Amendment 19 and of necessary changes to the technical foundation for the Council’s 2005 decision. New information under consideration in this review includes:

- Pacific Coast Groundfish 5-year Review of Essential Fish Habitat Report to the Pacific Fishery Management Council Phase 1: New Information:

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<sup>1</sup> CFR 600.815(a)(10): *Review and revision of EFH components of FMPs.* Councils and NMFS should periodically review the EFH provisions of FMPs and revise or amend EFH provisions as warranted based on available information. FMPs should outline the procedures the Council will follow to review and update EFH information. The review of information should include, but not be limited to, evaluating published scientific literature and unpublished scientific reports; soliciting information from interested parties; and searching for previously unavailable or inaccessible data. Councils should report on their review of EFH information as part of the annual Stock Assessment and Fishery Evaluation (SAFE) report prepared pursuant to § 600.315(e). A complete review of all EFH information should be conducted as recommended by the Secretary, but at least once every 5 years.

- <http://www.pcouncil.org/groundfish/background/document-library/pacific-coast-groundfish-5-year-review-of-efh/> ; and, <http://efh-catalog.coas.oregonstate.edu/overview/>
- Groundfish Essential Fish Habitat Synthesis Report: [http://www.pcouncil.org/wp-content/uploads/Groundfish\\_EFH\\_Synthesis\\_Report\\_to\\_PFMC\\_FINAL.pdf](http://www.pcouncil.org/wp-content/uploads/Groundfish_EFH_Synthesis_Report_to_PFMC_FINAL.pdf)
- Phase 2 proposals<sup>2</sup> to modify EFH: <http://www.pcouncil.org/resources/archives/briefing-books/november-2013-briefing-book/#groundfishNov2013>

## 1.2 Limitations of this Phase 2 Report

This report is limited to Council guidance that narrowed the original scope of Phase 2 as described in COP 22 and to the scientific information that has been compiled for this review.

### 1.2.1 Council Guidance for this Report

This report is designed to assist the Council in determining the scope of analysis for Phase 3. It does not consider whether or not new information warrants reconsideration of Amendment 19 and initiation of Phase 3 because those decisions were already made (PFMC November 2013). In making those decisions, the Council narrowed the scope of this report to “high-level recommendations on critical subject areas (e.g. socioeconomic) for development of alternatives for Phase 3 (not recommendations on specific proposals or proposal elements).<sup>3</sup>”

### 1.2.2 Available Science

The EFHRC notes that there are important limitations to some subject areas in the Phase 1 and Phase 2 information, as described by the Council and committees during the November 2013 Council meeting. The Council’s GMT, SSC, and GAP each recommended that conducting an assessment of the current program is needed (PFMC GMT 2013; PFMC SSC 2013; PFMC GAP 2013). Statements from these committees suggest that we do not yet know if Amendment 19 is working, what problem(s) need to be fixed, or what opportunities exist for refinement of groundfish EFH. Because we do not have an understanding of the performance of Amendment 19, the Council lacks a scientifically informed problem statement to guide Phase 3 (particularly in regards to the fishing subject areas). The Northwest and Southwest Fisheries Science Centers are developing potential scientific approaches to address the question of whether our current EFH provisions are working as expected.

To understand the limits of the Phase 1 & 2 information, it is helpful to conceptualize an idealized process. For example, NMFS Habitat Assessment Improvement Plan (HAIP NMFS 2010) describes a habitat assessment/management process modeled after the stock assessment/harvest management process, whereby relevant data are consolidated (e.g. fishery independent and fishery dependent data

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<sup>2</sup> The Council’s Request for Proposals is available online at: [http://www.pcouncil.org/wp-content/uploads/Groundfish\\_EFH\\_RFP.pdf](http://www.pcouncil.org/wp-content/uploads/Groundfish_EFH_RFP.pdf)

<sup>3</sup> Quoted from text of the Council’s final action to initiate Phase 3 in November 2013 as displayed on the Council floor for Council agenda item H.7 – Groundfish EFH Phase 2 Report and Proposals to Modify EFH.

sets), analyzed (e.g., stock assessment), and peer reviewed (e.g., STAR Panel). Such assessments articulate scientifically derived problem statements that are used as the basis for management decisions. A data gap analysis is a fundamental component of these assessments and can be used by managers to formulate risk-based management strategies (e.g., precautionary approaches) and support research (NMFS 2010, Sec. 2).

Data and analyses in a habitat assessment must cover the full range of relevant information (e.g., not just fishing impacts). The emphasis on analysis and interpretation is designed to integrate diverse data and identify problems or opportunities for managers to address through the Council process. By definition, the habitat assessment includes analysis of current management approaches relative to policy goals (NMFS 2010). The idealized process is identical to the NRC recommendation (NRC 2002) and Risk Assessment approach that was used to inform Amendment 19 (MRAG 2004).

The Council's COP 22 established a 3-phase process as follows:

- Phase 1: Data Consolidation;
- Phase 2: Request for Proposals to modify Amendment 19; and,
- Phase 3: Management Decisions

The COP 22 does not include assessment or scientific peer review - two critical steps included in the idealized process. As a supplement to Phase 2, a NMFS Synthesis report provided useful summaries and interpretation of new information but was not intended to be a comprehensive assessment (NMFS 2013, p. 1). The new data identified in Phase 1, the analyses and interpretations developed in the Synthesis report, and the scientific basis of each of the 8 public proposals have not yet been peer-reviewed.

### 1.3 Moving Forward

The lack of a scientifically peer-reviewed habitat assessment of the effectiveness of Amendment 19 is the product of a process that was based on a narrow interpretation of the 5-year review requirement as being limited to the consolidation of new data. While such an interpretation may be technically correct (we defer to legal experts), it clearly puts the Council in the difficult position of making decisions without thorough data analyses, scientific peer review, and a problem statement.

It is challenging, in the absence of a more complete assessment, to advise the Council on focal areas for Phase 3. Therefore we attempt to characterize how relevant new information influences our understanding of Amendment 19 in order to make recommendations that focus potential changes on appropriate subject areas as identified in regulation<sup>4</sup>. The structure applied to each of the nine EFH subject areas is:

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<sup>4</sup> The EFH Subject Areas identified at 50 CFR 600.815 are: (1) EFH description and identification; (2) MSA fishing activities; (3) Non-MSA fishing activities; (4) Non-fishing activities; (5) Cumulative impacts analysis; (6) Conservation and enhancement; (7)

1. summarize relevant information from the current Amendment 19 program;
2. describe our current understanding based on new information developed through Phases 1 and 2 and the eight public proposals; and,
3. present committee recommendations on any change to the current program, based on new relevant information.

While this Phase 2 report does not provide a detailed review of the eight public proposals to modify EFH, it offers brief summaries of each proposal. As a means to assist in evaluation and discussion of the proposals during its September 4-5, 2-14 meeting, the EFHRC used a Bayesian Analysis for Spatial Siting (BASS) tool as a means to clarify and organize their opinions regarding these proposals, the results of which may be valuable to Council during Phase 3. BASS results demonstrate Committee members' levels of satisfaction and certainty associated with various aspects of proposals, based on metrics that were outlined in the Council's Request for Proposals. A description of the BASS tool, as well as some results are included in Appendix A of this Report.

Although an assessment of the effectiveness of Amendment 19 would help to inform the Council when making decisions relative to EFH, the EFHRC relied upon the expert opinion of the EFHRC in making recommendations to the Council. For example, the report includes recommendations to correct mistakes made in Amendment 19 and to consider changes that have broad stakeholder support or other clearly identified opportunities to refine the current program. In addition, the EFHRC use of the BASS tool informs a recommendation to establish a Phase 3 process that ensures minimum standards of scientific objectivity. BASS is helpful in fostering transparency particularly in data-poor scenarios that rely on expert opinion in making significant decisions (such as the development of EFH alternatives).

### **Minority Section**

A minority statement was submitted that presents an analysis of the BASS scores that were produced by members of the EFHRC. Endorsers of the minority report were Chris Goldfinger, Steve Copps, Mary Yoklavich, Gary Greene, Waldo Wakefield Joe Schumaker, and Bob Eder. During the EFHRC's most recent meeting, the committee voted to remove a section of the BASS Appendix that presents the more detailed analysis of scores and identifies outlier scores. The endorsers disagreed with the decision to exclude the more detailed analysis of BASS scores. Nonetheless, because the committee voted explicitly to remove those scores, the minority report is not included here.

*End of Minority Section*

## **1.4 Recommendations**

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Identification of major prey species; (8) Identification of HAPCs; (9) Research and information needs. Our analysis of the Conservation and Enhancement subject area is included in fishing and non-fishing subject areas.

- A comprehensive habitat assessment, as described in the NMFS 2010 HAIP and implemented for Amendment 19, should be integrated into the 5-year review process. If there is not an opportunity to develop such an assessment for this current process, it should be integrated into the next 5-year review.
- The Council should consider implementing an independent scientific peer review of select Phase 1 and Phase 2 products, modeled after the STAR process.

## 1.5 Minority Statement

*Endorsed by EFHRC members Ed Bowlby, Dayna Matthews, Geoff Shester, and Megan Mackey*

A minority of the Committee believed an alternative version of the introduction is required because the current introduction is unnecessarily lengthy, and focuses heavily on detailing potential concerns and perceived problems with the Council's EFH Review process. Specifically, the introduction in the report focused several paragraphs and subsequent recommendations on the lack of an idealized process that includes an assessment and scientific peer review. The use of best available science is the standard established in Amendment 19. An assessment and peer review of the Phase 1 and Phase 2 documents is not required. Although we believe it is important to briefly capture the point regarding the need for an assessment of effectiveness and acknowledge that other Council committees have raised this issue, we note that the Council is aware of this and that NMFS has offered to scope out what such an assessment might entail. The minority of the committee is concerned that the lecturing tone of the introduction can be construed as questioning the policy decisions of the Council, thus distracting the reader from the core of the Phase 2 Report. Furthermore, the introduction did not offer any constructive guidance for an assessment nor did it specify which products should be considered for peer review.

The minority of the Committee did not feel that the introduction was an appropriate place to include recommendations based on the specific guidance from the Council. The report introduction includes new statements and recommendations that either deviated from previous Committee statements or were never discussed previously by the Committee. Since the introduction is not an EFH subject area, we do not believe it is an appropriate place for substantive recommendations. Rather, if points were made regarding specific topic areas, they would be better served under the appropriate section related to that topic so that the reader would be able to connect the topic to the point of concern.

A minority of the Committee prefers a short, simple introduction that clearly states why there is a need for action and briefly summarizes elements of the proposals reflecting the last four years of solid work by the Council, its Committees, and proposal proponents. Therefore, we offer the following alternative introduction.

### **Alternate Introduction**

#### 1.5.1 Background

The adoption of Amendment 19 to the PFMC's Groundfish FMP established the PFMC and NMFS as leaders in fish habitat protection and ecosystem-based fishery management. By protecting habitats

important to the spawning, breeding, feeding, and growth to maturity, these habitat protections help to ensure the continued productivity and recovery of west coast groundfish for the benefit of west coast communities, the California Current Ecosystem, and the Nation. The successes of Amendment 19 are embodied both in the substantive regulatory protections established based on the best available science at the time and in the establishment of an ongoing adaptive management regime designed to collect, incorporate, and respond to new information about the distribution and function of groundfish habitat.

Beginning in September 2010, the Pacific Fishery Management Council initiated its required 5-year review of Pacific Coast Groundfish Essential Fish Habitat designation and management through a deliberate process. This Phase 2 report represents the conclusion of the effort by the PFMC, NMFS, the EFHRC, and stakeholders to build upon the success of Amendment 19. Throughout this first EFH 5-year review, the PFMC has made several key decisions that have prioritized a robust process over expediency, such as making additional data requests, providing for NMFS synthesis of available data, and requesting an assessment of the effectiveness of the current suite of Amendment 19. While this has extended the originally conceived timeline, these additional efforts have resulted in a substantially improved informational basis over what was available in Amendment 19, placing the PFMC on stronger ground for refining EFH management.

### **1.5.2 Summary of Key Elements of the Phase 2 Proposals to Modify EFH and Phase 2 Report Guidance**

During Phase 2, the Council released a RFP based on the extensive work of the EFHRC, and in response, a total of eight proposals were submitted to the Council for consideration. All proposals requested modifying components of EFH. See Appendix B for descriptions and Committee recommendations on the eight proposals.

All proposals were considered complete by the EFHRC, meaning that all met the minimum requirements of the RFP that was released by the Council. Together, these proposals illustrate a suite of specific management changes that are consistent with the Council's Amendment 19 criteria and approach, including actions that may further minimize adverse impacts of fishing on EFH to the extent practicable. However, these proposals have yet to be analyzed by the EFHRC, NMFS or the PFMC.

The Phase 2 EFHRC report is based on Council Operating Procedure (COP) 22 guidance. Specifically, through the evaluation of the eight proposals, the EFHRC has reviewed groundfish EFH designations and areas currently closed to bottom contact fishing gear to protect groundfish habitat and to recommend to the Council options for elimination of existing areas, addition of new areas, or modification of existing areas. The EFHRC has also included recommendations for modifying HAPCs consistent with the proposed modification of the location and extent of areas closed to bottom trawling or other bottom contact fishing gear. The information presented includes considerations of proposed modification to groundfish EFH or its components consistent with EFH regulations at 50 CFR § 600.815(a)(1)-(a)(10), and based on the new information presented in Phase 1.

This report is designed to assist the Council in determining the scope of analysis for Phase 3. It does not consider whether or not new information warrants reconsideration of Amendment 19 because the decision to initiate Phase 3 has already been made by the Council (PFMC November 2013).

*End of Minority Section*

**Minority Section on Literature Review**

A minority statement was submitted by Dr. Geoff Shester that consisted of a literature review on corals and sponges. However, was not included because the Chair and the Staff Officer determined that it was not in bounds as a minority section to this report.

*End of Minority Section*

## 2 EFH Description and Identification

### 2.1 A Summary of Amendment 19

Fishery management plans must describe and identify EFH for all managed species [50 CFR 600.815(a)(1)]. EFH *description* comprises information necessary to understand the use of waters and substrate necessary for spawning, breeding, feeding, or growth to maturity for each life-stage of the managed species. EFH for groundfishes is described in Appendices B2 and B3 of the groundfish FMP. Appendix B2 contains life history summaries, and Appendix B3 contains habitat types used by each species and life-stage (as found in the Pacific Habitat Use Relational Database (HUD)). From HUD information developed in 2005, habitats were characterized in terms of depth range, latitude range, species-habitat associations by activity (breeding, feeding, and growth to maturity), and prey. It was intended that the HUD be updated periodically with new information.

*Identifying* EFH means that the geographic location or extent of habitats used by each species and life-stage must be clearly delineated in the FMP using both text and maps. To assist NMFS and the Council in identifying EFH during the Amendment 19 process, a model of Habitat Suitability Probability (HSP) was developed to predict an overall measure of the suitability of habitat in particular locations for as many species as possible. From the HSP model, habitat for each species and life stage was predicted in terms of three variables (largely drawn from the HUD): depth, latitude, and substrate (both physical and biogenic components, where possible). These three variables are readily available and represent a subset of the essential features of habitat that influence the distribution of the FMP groundfish species. HSP predictions were coupled with coastwide geo-referenced data on habitat, and the resultant mapped habitats (polygons in the GIS) were allocated values between 0 and 100%. These values were then used to develop a proxy for areas regarded as “essential”. The higher the HSP value, the more likely the area should be identified as EFH.

Using the HSP model, spatially explicit values were predicted and mapped for the adults of all species in the FMP as well as some sub-adult life-stages for some species. However, data were insufficient to predict HSP values for all life-stages of all species. Therefore, a precautionary approach was taken whereby all locations with an HSP of >0% for any species or life-stage was identified as the combined EFH for all groundfish species and life-stages. As a result, EFH for Pacific Coast groundfishes currently encompasses all areas off the coasts of California, Oregon, and Washington from depths less than or equal to 3,500 m (1,914 fm) shoreward to the mean higher high water level or the upriver extent of saltwater intrusion, defined as upstream and landward to where ocean-derived salts measure less than 0.5 parts per thousand during the period of average annual low flow. EFH also includes the portions of specific seamounts within the EEZ that rise above 3,500 m. Although the identification of groundfish EFH in the FMP also includes areas designated as HAPCs that were not within the 3,500 m zone or on specific seamounts, no such HAPCs exist.

The best scientific data available when Amendment 19 was written did not support the presence of managed groundfishes at depths beyond 3,400 m and no fisheries were being conducted at these depths. Although no link was established between FMP groundfish species and waters deeper than 3,400 m, the Council took the precautionary approach of extending EFH to 3,500 m, to account for any scientific uncertainty regarding the depth distribution of managed groundfish species.

## 2.2 Our Current Understanding

The Phase 1 and NMFS Synthesis reports provide a great amount of new information relevant to the description of Pacific Coast groundfish EFH that could be incorporated into Appendices B2 and B3. New life-history information is available for only some FMP species and life-stages, so updating the life-history summaries would not be a major task. The HUD was updated with information on nine groundfish species not specifically considered in Amendment 19. An ongoing development and maintenance plan for the HUD and regular updates of new information would provide the best habitat information to users.

A significant amount of new information relevant to the identification of groundfish EFH, including geographic location and extent of various components of habitat, was provided in the Phase 1 and NMFS Synthesis reports. A total of 442 new sources of data on seafloor bathymetry, backscatter, and substratum type were integrated with existing 2005 habitat maps, thereby improving our knowledge of the distribution and extent of hard, soft, and mixed seafloor types. Also, new geo-referenced data on the presence of biogenic habitat (i.e., deep-sea coral and sponge taxa [DSC]) have been collected largely during underwater visual surveys, compiled, and mapped. Additional observations of DSC from NMFS bottom trawl surveys and bycatch in commercial fisheries became available during Phase 1. Distributions of macro-algae or eelgrass were not updated in the Phase 1 and NMFS Synthesis reports. However, considerable effort has been made by the individual states to map the locations of these habitats in the years since Amendment 19, and that information could be used to update maps in the FMP. Although maps of such dynamic habitats may not be definitive, they can provide a first approximation of the distribution of such habitats.

As part of the NMFS Synthesis, a model was developed that examined species-habitat relationships for subadult and adult life stages of six groundfish species (generally representative of the west coast groundfish complex<sup>5</sup>). From these models, habitat covariates were identified to help describe fish species distribution and abundance at depths covered by the NMFS west coast bottom trawl survey (50-1280 m). Model output was coupled with the new geo-referenced seafloor data to produce maps of probability of occurrence and abundance for the six groundfish species. From these models and maps,

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<sup>5</sup> The extent to which the six groundfish species are reasonable proxies for the 91 species of groundfish has not been discussed by the EFHRC.

there is a high probability of occurrence of subadult and adult stages of at least one of these six species in most habitats within the depth range of the trawl survey<sup>6</sup>.

One of the public proposals to the Council requested a change in the description and identification of groundfish EFH that would add all waters deeper than 3,500 m within the West Coast EEZ to the designation of Pacific Coast Groundfish EFH. There is no new biological information or scientific data to indicate that any of the 91 species of groundfishes in the FMP occur at depths deeper than 3,500 m, and therefore areas at depths greater than 3,500 m are not considered habitat for those species. New information in the Phase 1 and NMFS Synthesis reports is consistent with both the description and identification provided in Amendment 19, which is considered precautionary because 3,500 m is greater than the known maximum depth distribution of all life stages of the 91 FMP species. Available information indicates that the maximum depth of the deepest-dwelling fishes in the Pacific coast groundfish FMP (e.g., Pacific grenadier and Pacific flatnose) is no more than 3,300 m (Pearcy et al. 1982; Love et al. 2005; Love 2011; Scripps Institute Oceanography, Oceanographic Collections: Marine Vertebrates, <https://scripps.ucsd.edu/collections/mv>). The usual occurrence of these deep-dwelling species is much shallower than their maximum depth of distribution, and therefore habitat for FMP species is fully encompassed by the current EFH boundaries.

## 2.3 Recommendations

Although a large amount of new information has been brought to light on the distribution of groundfish species and their habitats, there still are significant data gaps. After considering the new information in the Phase 1 report and the output of the modeling work in the Synthesis, there are no new results or understanding that would support a change to the identification of EFH for the collective 91 groundfish species other than eliminating text that refers to HAPCs that are outside the 3,500 m zone and not on specific seamounts. The new information regarding the description of EFH likely will be important to ongoing conservation decisions and evaluation of impacts of future actions on EFH at the species level (including those species of particular interest to the Council, such as vulnerable or overfished species). The EFHRC therefore recommends that the Council:

- Update aspects of the descriptions of EFH for Pacific Coast groundfish, specifically the life-history summaries in Appendix B2 and the HUD/Appendix B3. This can be done outside the formal FMP amendment process.
- Rerun HSP models using updated HUD and improved bathymetry and substratum data. This can be done outside the formal FMP amendment process.
- Revise the text that identifies EFH for Pacific Coast groundfishes to eliminate HAPCs that are outside of the 3500 m zone and not on specific seamounts.

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<sup>6</sup> The extent to which the occurrence and abundance of a fish species are representative of that species EFH has not been evaluated by the EFHRC.

## 2.4 Minority Statement on EFH Description and Identification

*Drafted by Geoff Shester*

This minority statement focuses narrowly on the question of whether changes to EFH description and identification may be warranted during this 5-year review, and in particular, whether areas deeper than 3,500 m can be added as EFH. Section 2.2 discusses this idea and concludes it is not feasible. To the contrary, it would be feasible to add areas deeper than 3,500 m as EFH, and the Council should consider doing so in Phase 3.

The majority appears to believe that EFH cannot be designated outside the areas indicated by the HSP model from Amendment 19. Yet in Amendment 19, some areas shallower than 3,500 m which were not directly indicated by the HSP model were included as EFH—as a precautionary measure. Furthermore, seamounts outside 3,500 m were included as EFH with no knowledge of their relationship to groundfish use or productivity—as a precautionary measure. There is no reason why this kind of precautionary designation cannot be applied to the areas of the EEZ deeper than 3,500 m, based on the limited knowledge we have of those areas and the potential for interrelationships between those deep areas and shallower areas.

Such a designation would allow the Council to complete its intended action from 2005, which was to freeze the footprint of bottom trawling in all waters seaward of 700 fathoms to the EEZ boundary. Implementation of this closure is consistent with NOAA's precautionary approach to manage bottom-tending gear, especially mobile bottom tending gear and other adverse impacts of fishing on deep-sea coral and sponge ecosystems. NOAA's policy, described in the NOAA Strategic Plan for Deep Sea Coral and Sponge Ecosystems is to "freez[e] the footprint" of mobile bottom-tending gear, in order "to protect areas likely to support deep-sea coral or sponge ecosystems until research surveys demonstrate that proposed fishing will not cause serious or irreversible damage to such ecosystems in those areas" (NOAA 2010, PP.27-28).

The information in Phase 1 from the Deep Sea Coral and Sponge Database identifies 195 distinct coral observations and 1,141 sea pen observations in the area of the US EEZ that was not designated as EFH based on being deeper than 3,500 m, indicating that corals and sponges are known to be present in discrete locations and may occur throughout this deepwater area. While NMFS in its Record of Decision disapproved the portion of the Council's motion deeper than 3,500m because the area was not currently designated as Groundfish EFH, it did state that: "All or most of the deep sea environments are likely to be highly sensitive to impact, including very low levels of fishing effort (e.g. a single trawl), and have extended recovery times (over 7 years). Thus, they can be very sensitive to bottom trawling and would take a long time to recover from this impact" (NMFS 2006, P.25).

We recommend that the Council consider implementing a bottom trawl closure in all waters deeper than 3,500m by first designating the area as EFH and then completing the trawl footprint closure as a management measure to minimize the potential for adverse impacts to EFH. If this option does not prove desirable, other routes to achieve the full footprint closure are as follows:

1. Use the new MSA discretionary authority contained in:

- a. Section 303(b)(2)(B) (protection zones for deep sea corals);
  - b. Section 303(b)(2)(A) (excluding specific gear types); or
  - c. Section 303 (b)(12) (conserve non-target species and habitats) to protect deep sea coral and sponge habitats from impacts of fishing. This could be done in conjunction with Phase 3 for groundfish EFH.
2. Use the addition of “other grenadiers” into the Groundfish FMP as Ecosystem Component Species (November 2013 PFMC Action), to designate the deepwater area as EFH. This grenadier category includes the full suite of grenadier species caught in the groundfish fishery, including abyssal grenadier (*Coryphaenoides armatus*) with a depth range of 282 - 5180 m (Russian Academy of Sciences 2000).<sup>7</sup> This depth range would allow expansion of EFH to encompass the full EEZ boundary.

*End of Minority Section*

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<sup>7</sup> Russian Academy of Sciences, 2000. Catalog of vertebrates of Kamchatka and adjacent waters. 166 p. (as cited by FishBase.org)

## 3 Magnuson Act Fishing Activities that May Adversely Affect EFH

### 3.1 A summary from Amendment 19

#### 3.1.1 Risk Assessment

FMPs must include an evaluation of potential adverse impacts of fishing on EFH and a plan of action to minimize those impacts to the extent practicable (CFR 600.815(a)(2)(i-ii)). Acting on advice from the National Research Council's Committee on the Ecosystem Effects of Fishing (National Research Council 2002, Chapter 7), NMFS and the Council developed a comprehensive risk assessment to consider EFH-related issues through the Council and NEPA processes. A significant portion of this risk assessment focused on fishing impacts, including the following products:

- **Description of fishing gears used on the U.S. Pacific Coast** (Recht 2003), with attention to components of gear that could impact structural features of habitat.
- **The Effects of Fishing on Habitat: A West Coast Perspective** (MRAG 2004; Appendix A-10), in which adverse impacts were indexed for each gear type and recovery times were estimated for each habitat type.
- **Impacts Model for Groundfish Essential Fish Habitat** (MRAG 2004), in which cumulative anthropogenic impacts to habitat (from fishing and non-fishing sources) were considered using limited data.
- **Other relevant data products as described elsewhere in this report** (e.g., groundfish life history information, substratum data, etc.).

#### 3.1.2 Rationale for Management Measures

Significant data gaps (FMP Appendix B.5) prevented a definitive determination of adverse impacts at a functional scale (e.g., quantifying population and ecosystem effects resulting from fishing impacts to habitat). However, the risk assessment focused attention on sensitive habitats with slow recovery times as the scientific basis for Council action (NMFS 2006, sections 3.3 and 5.3). Management measures were designed to: 1) protect diverse habitat types within and across biogeographic zones; 2) protect the full range of benthic habitats to account for each managed species; 3) prioritize pristine or sensitive habitats, and gear types likely to have highest impact; 4) prioritize biogenic habitat and hard bottom (NMFS 2006, p. 14); 5) distribute socioeconomic costs resulting from implementation of the alternative, and 6) implement area closures for different gear types across habitat types to foster comparative scientific research (NMFS 2006, p. 12).

Other factors that influenced the development of management measures included the use of the precautionary principle in data-poor situations (NMFS 2006, pp. 12 & 23); negotiation and support by a coalition of non-governmental organizations, fishing industry representatives, and state governments (NMFS 2006, p. 14); privately funded buy-out of displaced fishermen (NMFS 2005, Appendix F); treaty fishing rights (NMFS 2005; and 50 CFR 660.385); displaced fishing effort threshold (NMFS 2006, p. 23); and extent of EFH (NMFS 2006, p. 24).

#### 3.1.3 Management Measures

The management measures established by the Council included gear prohibitions (FMP Section 6.6.1.1) such as exclusion of bottom trawl gear of various sizes in various depths and elimination of the comparatively high impact dredge and beam trawl gear (MRAG 2004, Appendix 10). The Council also established ecologically important closed habitat areas (excluding bottom trawl and/or bottom contact gear) for the protection of groundfish EFH (FMP Section 6.8.5). In addition, important procedural steps were taken to establish an EFH Oversight Committee (FMP Section 6.2.4), facilitate private purchase of

groundfish limited entry permits and vessels (FMP Section 6.9.4), and consider treaty fishing rights (FMP Section 6.2.5) that apply in the usual and accustomed (U&A) harvest areas of the Makah, Hoh, and Quileute Tribes and the Quinault Indian Nation.

### **3.1.4 Treaty Indian Fisheries and MSA Fishing Activities**

In recognition of the sovereign status and co-manager role of treaty Indian tribes over shared federal and tribal fishery resources, the regulations at 50 CFR 660.324(d) establish procedures that will be followed for the development of regulations regarding tribal fisheries within the U&A harvest areas. They state that the agency will develop regulations in consultation with the affected tribe(s) and insofar as possible, with tribal consensus. Application of management measures intended to mitigate the adverse impacts of fishing on EFH within U&A harvest areas are subject to these procedures (FMP Section 7.4).

The agency and tribes will need the time to determine potential impacts and effects on treaty rights. This will require a detailed analysis process carried out in a government to government consultation forum. Some tribes have informed the agency that concerns will include EFH closures in U&As, thus limiting commercial CPUE data used to determine treaty rights in their areas. Tribes have also noted that management measures restricting fishing activities for EFH or other reasons in areas outside of tribal U&As can impact tribal treaty rights (e.g. displaced fishing pressure into U&As) and may also require consultation.

## **3.2 Our Current Understanding**

Several new publications (including peer-reviewed literature, white papers, and technical memorandums) on the effects of fishing gear on benthic habitats, fish associations with biogenic habitats, and predictive modeling of biogenic habitats have been identified in the EFHRC Phase 1 report. In addition, the spatial distribution of fishing effort using bottom trawl, mid-water trawl, and fixed gears was compared before and after implementation of Amendment 19 regulations. From the Phase 1 report, (1) effects of fishing with mobile, bottom-contact fishing gear on benthic habitats are increasingly well-established worldwide; (2) there is little new information on recovery of seafloor habitats from the effects of fishing and, therefore, an improved evaluation of fishing impacts is hindered; (3) long estimates of recovery time, on the order of 100s of years, should be used for hard corals; and (4) with regard to impacts from recreational fishing gear, biogenic habitats are most at-risk followed by hard substrata and soft sediments.

Data useful to the development of public proposals to change EFH and/or regulatory measures to minimize adverse effects to EFH were summarized in the NMFS Synthesis report. Recognizing that a scientific peer review has yet to be conducted, some findings in the Synthesis report are: (1) approximately 10% of the upper slope and shelf of all habitat along the west coast is included in ecologically important closed areas (EFH conservation areas), and the bottom trawl closure seaward of 700 ftm accounts for the majority of the conservation areas; (2) effort from federally observed groundfish fisheries is highest in the Northern region, and is heavily concentrated on the upper slope and shelf over soft habitats along the entire coast; (3) patterns of fishing effort have remained moderately stable over the previous decade, but have likely varied over longer periods; there has been some displacement of trawling activity seaward from conservation areas; (4) EFH conservation areas protect some groundfish species from fishing more than others; and (5) EFH conservation areas protect

many deep-sea coral and sponge habitats, but additional areas remain open to some or all bottom contact gears.

Several recent studies of deep sea corals and sponges (DSC), including three years of research funded by the NOAA Deep Sea Coral Research and Technology Program and a geo-referenced database, have increased our understanding of diversity, habitat associations, distribution and abundance of DSC on the continental shelf and slope of the west coast. DSC, as well as other relatively large invertebrate taxa, add complexity and structure to seafloor habitat (which also is referred to as biogenic habitat). Many fishes associate with various types of structure, such as rocks, depressions in soft sediment, kelp, thermal gradients, man-made debris, and DSC. DSC mostly occur on rocky substrata (e.g., boulders, pinnacles, rock outcrops), although sea pens in particular are found in mud and sand sediments. Many FMP groundfish species, especially the rockfishes, co-occur with DSC in the same rocky areas. DSC taxa are slow growing and vulnerable to disturbance by bottom-tending fishing gears that target North Pacific groundfish species. Adverse impacts of such disturbance can be long lasting and recovery of DSC likely can be slow.

Six of the eight public proposals submitted to the Council used new geo-referenced data on DSC as justification to suggest more areas be closed to bottom-tending fishing gear. These new data, as identified primarily from visual surveys and research and commercial trawl bycatch records included in the Phase 1 report and data catalog, depict the presence of as few as a single coral colony or sponge, while some data represent density of these organisms at particular locales. Presence-only data are strongly influenced by where and how the observations were made, and do not necessarily reflect the regional or coast wide distribution of DSC and associated habitats. Much of these data also are not species specific but rather represent higher taxonomic groups, although species-specific information is available for some localized areas. Higher taxonomic groups include multiple species that have differing environmental needs and requirements. These data limitations make it difficult to distinguish areas of importance to DSC.

However, the six public proposals include elements that suggest new areas be closed to bottom-tending fishing gear in order to protect more DSC as EFH for groundfish. Although the co-occurrence of some species of DSC and groundfishes has been described for various habitats, the degree to which any species of Pacific groundfish depends on any species of DSC for spawning, breeding, feeding or growth to maturity has not been determined. The type, size, density, and/or coverage of DSC (or any other structure-forming invertebrate taxon) that might be considered EFH have not been established for any species in the groundfish FMP. The value of DSC as a component of groundfish EFH (as defined under the MSA), therefore, remains unknown.

Some of the proposals also suggest new fishery closures to protect rocky banks and other hard substrata, based on improved information on location of seafloor sediment types (i.e., hard, mixed, and soft sediments).

Separate from the DSC issue, we have identified some inaccuracies in Amendment 19. For example, one of the eight public proposals describes the need to modify one boundary of an EFH no-trawl area in northern California based on our new understanding of seafloor substratum in the area. Specifically, a relatively small section of this particular EFH closure was originally classified as untrawlable rocky habitat and is now known to be a sunken barge in soft sediment. Opening this area to fishing would allow access to flatfishes in this sandy habitat. Based on new information on seafloor habitats, consideration of boundary modifications also may be warranted for other current EFH closures (e.g., Potato Bank closed area in the Southern California Bight).

### 3.3 Recommendations

An assessment of the effectiveness of Amendment 19 has yet to be conducted and a clear problem statement has not been established relevant to this MSA fishing impacts subject area. Also, with particular regard to the six public proposals that include elements suggesting increased protection of DSC from bottom-tending fishing gear, the function, extent, and value of DSC as groundfish EFH (as defined under MSA) remain uncertain. That said, there are topics relevant to the fishing impact subject area that may be worthwhile for consideration by the Council during Phase 3. In addition, while the EFHRC has not reviewed the technical merits of the suite of public proposals received by the Council, these proposals hold some opportunities to consider changes to the fishing subject area. The EFHRC therefore makes the following recommendations to be pursued during Phase 3 of this review:

1. Spatial fishery closures to protect DSC as groundfish EFH are appropriate to the scope of Phase 3; however, we recommend that the Council maintain a clear understanding that such measures would be precautionary (i.e., risk averse in the absence of scientific certainty). The EFHRC cautions that the function of DSC as groundfish habitat has not been scientifically established, and it is technically impossible to predict impacts (positive or negative) of spatial closures on groundfish populations. However, DSC co-occur with groundfish, contribute to habitat complexity, are sensitive and highly vulnerable to impact from fishing, and could take 100s of years to recover from such impact. Consistent with Amendment 19, consideration of precautionary action to protect DSC as groundfish EFH is reasonable, particularly if consensus to do so can be reached among diverse stakeholder groups.
2. Independent from the EFH authorities of MSA, the Council should consider the use of MSA discretionary authority contained in Section 303(b)(2)(B) (protection zones for deep sea corals), Section 303(b)(2)(A) (excluding specific gear types), and 303 (b)(12) (conserve non-target species and habitats) to protect deep sea coral habitats from impacts of fishing. This could be done in conjunction with Phase 3 for groundfish EFH.
3. The Council may reasonably choose to narrow the geographic scope of Phase 3 for the MSA Fishing subject area in order to proceed on a shorter timeline and be more responsive to local initiatives. Proceeding to Phase 3 on a coast-wide scale will take considerable time and may not be an efficient use of Council resources. Rather, the Council may be most effective by tailoring Phase 3 to respond to local initiatives that are supported by diverse stakeholder groups (e.g., the MBNMS proposal). Correspondingly, the Council may be less effective in regions of the coast in which co-managers have not reached agreement on the scope of potential changes (e.g., tribal U & As). While such proposals may be reasonably excluded from consideration during Phase 3 and revisited later, there may be consequences in the form of habitat impacts associated with delaying action that the Council should consider as well. To this end, information compiled for the 5-year review provided no evidence to suggest that the function of EFH is imperiled under current fishing practices, so there may not be an urgent need to revise Amendment 19 fishing measures on a coast-wide basis; on the other hand, there is insufficient baseline information and monitoring to confirm that EFH is adequately protected.
4. To support the likely analytical demands for Phase 3 (regardless of mandate), the Council should:
  - a. Develop a Longterm Effect Index (LEI) for DSC (see Fujioka 2006 and Oceana Proposal, p.16);
  - b. Integrate LEI with updated sensitivity and recovery tables in the NMFS Synthesis Appendices (Tables A3a.1-A3a.4, p. 154-155); and
  - c. Initiate scientific peer review of DSC sensitivity and recovery information, including LEI and NMFS Synthesis, to be used in Phase 3 NEPA analysis.

5. Modify boundaries of current EFH closures to fix clear mistakes in Amendment 19, such as the misidentification of a sunken barge as a rocky reef in the Eel River Canyon and the location of Potato Bank.
6. Make minor technical revisions to the FMP (e.g., consistency between the FMP and regulations regarding names of EFH Conservation Areas).

### **3.4 Minority Statement on MSA Fishing Activities**

*Drafted by Geoff Shester*

This minority statement proved necessary due to irreconcilable differences that emerged among EFHRC members, during the drafting of the Phase 2 report section on Magnuson-Stevens Act fishing activities. One key message of the majority's Section 3 is that changes do not need be made to EFH regulations on a coastwide basis during this five-year review, despite the tremendous amount of new information produced, because there has been no definitive proof that the Amendment 19 measures are failing. This view is not supported by the law or science, and would amount to an abdication of the Council's important stewardship obligations for ocean habitats and species. It is also inconsistent with the Council's precautionary approach as adopted in Amendment 19. Because the disagreements between the majority and minority of the EFHRC are fundamental on this issue, this minority statement provides an alternative perspective through a full treatment of all three sections regarding MSA fishing activities (summary of Amendment 19, our current understanding, and recommendations). This minority statement also provides an alternative set of overall recommendations on the MSA Fishing Effects subject area, as well as specific recommendations in light of the concerns raised by the majority's regarding the lack of a purpose and need statement and Assessment of Amendment 19.

*Note: This minority statement includes an alternative section on MSA fishing activities, and is contained in Appendix B of this Report.*

*End of Minority Section*

## **4 Non-MSA fishing activities that may adversely affect EFH**

### **4.1 Summary of Amendment 19**

Gear and area prohibitions apply to MSA and non-MSA fisheries via parallel regulations implemented by states. The non-MSA fisheries (identified in Phase 1) are as follows: pink shrimp (trawl), Dungeness crab (pot), spot prawn (pot), hagfish (pot) and California halibut (trawl). Tribes currently have extensive Dungeness crab fisheries, and potential to enter the shrimp, prawn, and hagfish fisheries.

#### Environmental Impact Statement

- Non-MSA fishing activities were incorporated into the Risk Assessment model. See Appendix A, Section 2.4 in NMFS 2005.

- All fishing gears used on the west coast were described with a generalized assessment of the potential impact on EFH. This included MSA and non-MSA gear types. See Appendix 8 NMFS 2005 to the Risk Assessment.
- Appendix 11 to the Amendment 19 Risk Assessment, Pilot Project to Profile West Coast Fishing Effort Based on the Practical Experience of Fishermen provided a spatial analysis of MSA and non-MSA fisheries in areas of Oregon.

## 4.2 Our Current Understanding

### Phase 1 Report

- Section 4.1 of the Phase 1 report supplements Appendix 8 to the Amendment 19 Risk Assessment by summarizing gear types (including non-MSA) deployed on the West Coast.
- Section 4.5 of the Phase 1 report presents an updated and improved spatial analysis of state-managed fisheries from what was available for Amendment 19.

### NMFS Synthesis Report

- Limited to federally managed groundfish fishery

### Proposals

The following is a review of the information presented in each proposal as it relates to the discussion on non-MSA fisheries. This is not an analysis of the proposals, but a review of the information provided in the proposals. In cases where information about non-MSA fisheries was not clear, additional points are provided for consideration based on known uses of areas proposed. This may not in all cases be an exhaustive list of uses, but rather a summary of potential interactions with non-MSA fisheries.

Of the five non-MSA fisheries listed above, the pink shrimp fishery has the most potential to be impacted, followed by the spot prawn fishery and then the Dungeness crab fishery.

- Pink Shrimp: Of the eight proposals submitted, three of them would potentially close areas, while one would re-open an area. Of the three proposals closing off fishing grounds, one would impact six different areas along the coast, including all of the area considered to be Fort Bragg's shrimp grounds. Another proposal would close shrimp grounds in nine areas distributed along the three states. A third proposal has two options that would close shrimp grounds on the Washington Coast.
- Spot prawn: two proposals could potentially limit this fishery. Of the two affected areas, one is located in Washington and the other in California.
- Dungeness Crab: One proposal has an option that could possibly close some crab grounds off of California.

*Note: In one proposal, if longline or pot gear were designated a destructive gear type then the number of areas affected by that proposal would increase.*

### 4.3 Additional Considerations

- The closures in the proposals may not seem particularly onerous when being looked at individually and they may even seem rather negligible when taken as a whole, as to their overall effect on the non-MSA fisheries on the west coast. However, they may very well have a detrimental effect on an individual fishermen or a given port. In a more normal year in the pink shrimp fishery, even a distance of a couple hundred yards can make or break a trip for a fisherman in some areas.
- In some of the proposals, the time frame used for the footprint of the shrimp fishery does not adequately represent the true historical footprint of the fishery. This has been exacerbated by record CPUE (2013 ODFW Annual Pink Shrimp Review, Fig. 8) in the fishery the past 4 years which has concentrated vessel activity in areas of the very best production, while other areas that have been having historically good production are being ignored.

### 4.4 Recommendations

- The nature of habitat conservation demands consideration of the full range of impacts regardless of the authorizing statute. For example, if non-MSA fisheries were to occur in a Habitat Conservation Area closed to MSA fisheries, the closure would probably not be effective in conserving habitat. For this reason, the approach taken in Amendment 19 of applying conservation measures to both MSA and non-MSA fisheries should be carried forward to Phase 3 of this 5-year review.
- If new gear restrictions or area closures are considered during Phase 3, the Council and NMFS should conduct outreach to participants in non-MSA fisheries in order to accurately characterize the socio-economic impacts of alternatives.

## 5 Non-fishing activities that may adversely affect EFH

### 5.1 Summary of Amendment 19

Non-fishing activities have the potential to adversely affect the quantity or quality of EFH in riverine, estuarine, and marine systems. Broad categories of such activities include, but are not limited to, mining, dredging, fill, 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.

The MSA (§305(b)) provides a mechanism for NMFS and the Regional Fishery Management Councils to address these impacts to EFH. Federal agencies are required to consult with NMFS on all activities, and proposed activities, authorized, funded, or undertaken by the agency that may adversely affect EFH, whether it occurs within or outside EFH. For example, certain terrestrial activities, such as paving a parking lot which can lead to increased stormwater runoff and the associated conveyance of pollutants into aquatic habitat, may adversely affect EFH and require consultation. Adverse effects may include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality and/or quantity of EFH. Adverse effects to EFH may include site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions. NMFS must provide recommendations to address these adverse effects to Federal agencies undertaking those actions.

Fishery management plans are required to identify those non-fishing activities that may adversely affect EFH and describe the known and potential adverse effects to EFH [50 CFR 600.815(4)]. For each activity, the FMP must also identify recommended options to avoid, minimize, or compensate for the adverse effects from these activities [50 CFR 600.815(6)]. These are intended to inform the Federal action agency and its applicants during the project planning and design phase as well as to those same parties and NMFS staff during the EFH consultation process.

To meet this mandate, Appendix D to the Pacific Coast groundfish FMP (NMFS 2003) contains detailed descriptions of 31 non-fishing activities that may adversely affect EFH and recommended conservation measures to address those effects. The document is organized by activities that may potentially impact EFH occurring in four discrete ecosystems: upland, riverine, estuarine, and coastal/marine systems.

### 5.2 Our Current Understanding

Since Amendment 19 was published, our understanding of the potential effects of many of the 31 non-fishing activities, and the potential conservation measures to address those effects, has improved. In addition, the Phase 1 Report identified four additional non-fishing activities that may adversely affect

EFH: alternative energy development, liquefied natural gas projects, desalination, and activities that contribute to climate change and ocean acidification.

The NMFS Synthesis Report presented an example of how the pressures exerted on groundfish EFH by non-fishing activities can be analyzed in order to inform the management framework for West Coast groundfish EFH. This work was modified from its previous application in the California Current Integrated Ecosystem Assessment (CCIEA). Halpern et al. (2009) identified 16 non-fishing pressures on the California Current ecosystem, seven of which are most relevant to West Coast groundfish EFH and had enough data to be useful for a coast-wide analysis. The NMFS Synthesis Report reported these seven pressures individually along with two climate change pressures. In addition, the 16 non-fishing pressures were summarized in a “combined” data layer. The analysis found that:

- Non-fisheries pressures were greatest in the Salish Sea sub-region, which is highly exposed to numerous land-derived pressures.
- Among other sub-regions, offshore pressures were more intense in the north, while nearshore pressures were more intense in the south.
- There was little variation in the mean intensity of non-fisheries pressures across EFH conservation areas compared to other spatial management regions. This was likely because EFH conservation areas were located offshore and relatively unexposed to land-derived pressures.
- Habitat areas of particular concern (HAPCs) were proportionately more exposed to high non-fisheries pressures than other spatial management areas.

Updating the descriptions and conservation measures for the non-fishing activities in Appendix D and incorporating the non-fishing pressures analysis from the NMFS Synthesis Report into the appendix would inform the Council when making management decisions and Federal agencies, their applicants, and NMFS during the EFH consultation process or other processes that manage non-fishing pressures.

While this new information may warrant updating Appendix D, Amendment 19 specifically states that this appendix is supporting information for the management program, does not describe the management framework or Council groundfish management policies and procedures, and is published under separate cover. It may, therefore, be periodically updated without being subjected to the Secretarial review and approval process described in §304(a) of the MSA.

### 5.3 Recommendations

- The EFHRC recommends that the Council update the descriptions, and associated conservation measures, of the non-fishing activities in Appendix D and include the four additional activities identified in the Phase 1 report.
- The EFHRC recommends that the Council incorporate the non-fishing pressures analysis, including the GIS layers used in the analysis, from the CC IEA into Appendix D.

- If the Council decides to update Appendix D, the EFHRC recommends that it do so outside of an FMP amendment process, as described in Amendment 19.

## 6 Cumulative Impacts Assessment

### 6.1 Summary from Amendment 19

To the extent feasible and practicable, FMPs should analyze how the cumulative impacts of fishing and non-fishing activities influence the function of EFH on an ecosystem or watershed scale (50 CFR 600.815(a)(5)). Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. An assessment of the cumulative and synergistic effects of multiple threats, including the effects of natural stresses (such as storm damage or climate-based environmental shifts) and an assessment of the ecological risks resulting from the impact of those threats on EFH, also should be included. A cumulative impacts analysis for EFH has a narrower focus than one conducted under the National Environmental Policy Act (NEPA), which analyzes the cumulative impacts on the environment as a whole, including the biological resources, historic and archaeological sites, socioeconomic services and issues, and community structure and character.

The assessment of cumulative impacts of fishing and non-fishing activities on EFH for Amendment 19 was limited for several reasons. First, it was not possible to measure the cumulative impacts of different gear types operating in a single location, primarily because of the lack of spatially explicit effort data and a need to better interpret the sensitivity and recovery scales for different gear types. However, Amendment 19 did recognize that doing so would be possible if better effort data was available to develop gear “footprints” and develop a better calibration of impacts using indices of sensitivity and recover rates. The second, and perhaps bigger, issue was the different pathways for the effects from fishing and non-fishing activities. Fishing gears have a primarily physical impact on habitat, although other less obvious effects, such as the selective removal of portions of the food chain and sediment suspension, also occur. Non-fishing impacts, however, range from similar kinds of physical disturbance to sedimentation and chemical alteration of the seawater, among many other things. Evaluating the cumulative effects of all of these potentially impacting processes is an immensely complicated task, for which sufficient data were lacking.

### 6.2 Our Current Understanding

The Phase 1 and Synthesis reports contain analyses of the fishing effort for a number of gear types used in both Council-managed and state-managed fisheries: bottom trawls, mid-water trawls, roundhaul gear, and pot and trap gear. Working within the confidentiality limits of the MSA, EFHRC estimated the footprints for each gear type. While these footprints fill in one of the major gaps from Amendment 19, they do not address the lack of a common metric for assessing the cumulative impacts of these gear types.

The Synthesis Report contains analyses of 16 non-fishing pressures, both individually and cumulatively. These pressures include various types of pollution (atmospheric, inorganic, organic, ocean-based, light, etc), changes in sediment inputs, nutrient inputs, coastal engineering, shipping activity, power plants, oil

rigs, aquaculture, and species invasions. While these analyses do not directly address all of the non-fishing activities, they provide a first estimate of the cumulative pressures from these activities. The areas that are most highly impacted by these stressors are those along the coast and in the estuaries, where development pressures are the greatest.

While gaps in the data remain, the situation is vastly improved over that of Amendment 19. With this new information, it may be possible to assess, at least qualitatively, the cumulative impacts of fishing and non-fishing activities.

Like the information in the appendices to the groundfish FMP, a cumulative impacts assessment can be viewed as supporting information for the management program and does not describe the management framework or Council groundfish management policies and procedures. It may, therefore, be possible to conduct and periodically update this assessment without being subjected to the Secretarial review and approval process described in §304(a) of the MSA.

### **6.3 Recommendation**

The EFHRC recommends that the Council consider assessing the cumulative impacts of fishing and non-fishing activities, using the information in the Phase 1 and Synthesis Reports.

## 7 Prey species

### 7.1 Summary from Amendment 19

The EFH Final Rule<sup>8</sup> states that “FMPs should list the major prey species for the species in the fishery management unit” and indicates that “actions that reduce the availability of a major prey species, either through direct harm or capture, or through adverse impacts to the prey species’ habitat that are known to cause a reduction in the population of the prey species, may be considered adverse effects on EFH if such actions reduce the quality of EFH.” Subsequent NMFS guidance<sup>9</sup> clarified that “prey should be included in EFH descriptions as a component of EFH.” However, the term “major prey species” has yet to be defined by NMFS, and no criteria currently exist for determining which prey species should be considered “major.”

Amendment 19 provided general lists of prey categories for various life stages of FMP groundfish, typically at broad levels of taxonomic specificity (general prey types or families, e.g., “Clupeids”). These lists are found in the HUD database and in Appendix B3 of the Pacific Coast Groundfish FMP. The full list is included in Table 14 of the EFHRC’s Phase 1 Report. However, the EFHRC notes that Amendment 19 did not include or synthesize significant information on groundfish diets that was available prior to Amendment 19. Furthermore, much of the available information on groundfish diets was collected several decades ago during periods where prey were present in different relative abundances in the ecosystem than they are presently. For example, Pacific sardines appear to be more prevalent in the diets of certain groundfish in the 2000s than they were in the 1980s (Brodeur et al. 2009). This indicates that diet compositions may vary depending on seasonal and multi-decadal temporal and spatial scales. There is also wide variation in the quality of groundfish prey data (i.e., sample size, geographic scope, seasonal scope, interannual scope) as well as the methods for how prey data are collected and reported in the literature (i.e., taxonomic specificity, weight vs. number).

### 7.2 Our Current Understanding

In addition to compiling historical data, new data has been collected on groundfish diets since 2006 from NWFSC Groundfish Surveys, several stock assessments that have been completed since 2006, and a synthesis of diet information that was completed in 2009 (Dufault et al. 2009). The NMFS Synthesis (2013, p. 90-99) provided new diet information for 11 selected groundfish representing a wide diversity of species in this assemblage, largely in response to the gaps and new data identified by the EFHRC. Groundfish diets comprised a wide range of taxa from polychaete worms to finfish, and some groundfish have much more specialized diets than others. Rather than simply list all species identified as prey as was done in Amendment 19, the NMFS Synthesis provided quantitative estimates of percent diet composition of each prey species in the diets of the 11 selected groundfish species. The results indicated that there is sufficient new information not included in Amendment 19. However, the Phase I report and the NMFS Synthesis did not propose criteria for distinguishing “major prey” for groundfish

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<sup>8</sup> 50 C.F.R. § 600.815(a) (7).

<sup>9</sup> NMFS Memorandum by P. Montanio: Guidance to Refine the Description and Identification of Essential Fish Habitat. October 30, 2006.

nor did they conduct any assessment of potential impacts to prey species by fishing or non-fishing activities.

One proposal received by the PFMC in response to the EFH RFP addressed prey species (Oceana/Ocean Conservancy/NRDC). This proposal includes recommendations for identifying major prey species for FMP groundfish at a more taxonomic specific level based on a new proposed Major Prey Index and using the newly available data from the Phase 1 Report and NMFS Synthesis. The Major Prey Index represents a novel tool that integrates multiple metrics of prey importance and data quality criteria. No proposal recommended changes to management of groundfish prey species currently under Council management. Furthermore, no assessment has been conducted to date of whether fishing or non-fishing activities are causing adverse impacts to Groundfish EFH through reduction in prey. Therefore, the EFHRC concludes that the Phase 1 Report, NMFS Synthesis document, and one proposal present new information on prey species that could form the basis for a more robust approach to identifying major prey species of groundfish in the Description of EFH.

In summary, the Phase 1 Report, data catalog, NMFS synthesis report, and Oceana/Ocean Conservancy/NRDC proposal offer additional information that is relevant, and is at a higher level of specificity than what is currently included in the Groundfish FMP. Furthermore, more specific identification of major prey species for Groundfish may also provide benefits to the Council for cross-cutting initiatives such as the Fishery Ecosystem Plan and its associated Forage Initiative.

### 7.3 Recommendations

- The EFHRC recommends that higher levels of specificity (ideally at the species level) would be more useful than broad prey categories for EFH management purposes. For example, species-specific major prey identification would enable NMFS and the Council to clearly identify which groundfish prey species are currently under Council management.
- The EFHRC recommends that the Council consider modifying the description of major prey species for groundfish. The Council should establish criteria for distinguishing major prey species (rather than a full exhaustive list of all prey items) for each groundfish species and life stage. The new Major Prey Index proposed by Oceana/Ocean Conservancy/NRDC has merit both in terms of methodology and substance. This index should be further explored as a potential tool for refining and updating the list of major prey species in the Groundfish FMP during Phase 3.
- The EFHRC recommends that once the Council has updated its list of major prey species in its description of EFH, that the Council conduct an assessment of 1) the extent to which fishing and/or non-fishing human impacts may be occurring on major prey species for groundfish, either through direct take or impacts to prey habitat; and 2) whether these impacts have significantly reduced the availability of such prey so as to reduce the quality of EFH (i.e., are there adverse impacts?).

## 8 Designation of Habitat Areas of Particular Concern

### 8.1 Summary from Amendment 19

According to the regulations that implement the EFH provisions of the MSA, FMPs should identify specific types or areas of habitat within EFH as habitat areas of particular concern (HAPCs) based on one or more of the following considerations [50 CFR 600.815(a)(8)]:

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

While the HAPC designation does not add any specific regulatory authority or process, it highlights certain habitat types and areas that are of high ecological importance. Councils may implement management measures to minimize the effects of fishing activities on these habitats; and Federal actions with potential adverse impacts to HAPC will be more carefully scrutinized during the consultation process and may be subject to more stringent EFH conservation recommendations.

The Council designated both habitat types and habitat areas (termed ‘areas of interest’) as groundfish HAPCs, which in some cases may overlap. For each HAPC, there was a clear link to the EFH regulatory considerations, which is described in Amendment 19 to the Pacific Coast Groundfish Fishery Management Plan and the associated Final Environmental Impact Statement (EIS) (NMFS 2005), and Record of Decision (NMFS 2006).

#### HAPCs based on Habitat Types

Four habitat types were designated as groundfish HAPCs in Amendment 19: estuaries; canopy kelp; seagrass; and rocky reefs. Amendment 19 describes the defining criteria of habitat-type HAPCs and mapped their locations using the best available data. While the estuary HAPC was accurately and precisely mapped, this was not so for the other habitat type HAPCs due to temporal and spatial variation (canopy kelp and seagrass) or incomplete mapping data (canopy kelp, seagrass, and rocky reefs). The map, therefore, is only a first approximation of the location of these other HAPCs, which must rely, instead, on the defining characteristics described in Amendment 19.

#### HAPCs based on Habitat Areas

A number of habitat areas, or “areas of interest” were designated as HAPCs in Amendment 19 due to their unique geological and ecological characteristics:

- Off of Washington: All waters and sea bottom in state waters shoreward from the three nautical mile boundary of the territorial sea shoreward to MHHW.
- Off of Oregon: Daisy Bank/Nelson Island, Thompson Seamount, and President Jackson Seamount.
- Off of California: all seamounts, including Gumdrop Seamount, Pioneer Seamount, Guide Seamount, Taney Seamount, Davidson Seamount, and San Juan Seamount; Mendocino Ridge;

Cordell Bank; Monterey Canyon; specific areas in the Federal waters of the Channel Island National Marine Sanctuary; specific areas of the Cowcod Conservation Area.

#### EFH 5-Year Review Process for New HAPC Designations

Currently, the process to designate new HAPCs is done through the establishment of a standing committee that serves the Council by considering EFH related proposals including those related to HAPCs. This committee is currently the EFHRC.

### **8.2 Our Current Understanding**

Since the passage of Amendment 19, newly collected and interpreted data on seafloor habitats have increased our understanding of where habitat-type HAPCs are located, particularly the extent and location of rocky reefs. Section 3.2 of the Phase 1 report describes (in both text and maps) new information on the distribution of seafloor habitat types, including data on bathymetry, physical habitat interpretations, and biogenic components of habitat. These data indicate the location of currently known rocky reefs, including newly-mapped rocky reefs, which in some cases are delineated at higher resolutions using multibeam echosounder data, as compared to the data presented in 2005.

The EFH Synthesis Report provides updated information on the proportions of habitat types indicating that coast-wide hard and mixed substrate appears to be relatively rare (7.2% and 3.3%, respectively) when compared coast-wide to soft substrate (89.5%). The rarity of habitat type is one of the four considerations for designating HAPCs [50 CFR 600.815(a)(8)]. Additionally, there is new information since the 2006 designation of EFH conservation areas that also highlight the abundance and distribution of known biogenic habitats found on both hard and soft substrate as discussed in the Synthesis Report.

The Phase 1 report, Section 3.3, also includes summaries of recent information related to habitats for each life-history stage of the five species groups designated in the FMP for Pacific Coast groundfishes. The same habitats (estuaries, canopy kelp, seagrass, and rocky reefs), which are identified as habitat-type HAPCs, remain important for all life history stages of groundfish. This new life-history information does not provide evidence to suggest that the four categories of habitat-type HAPCs warrant any changes.

Three proposals recommend new HAPC designations, with a total of 5 proposed HAPCs. Four HAPCs are proposed off the coast of California: Point Sur Platform, La Cruz Canyon, Fanny Shoal to Rittenburg Bank, and Cochrane Bank. One HAPC is proposed off the coast of Washington: Olympic 2.

The five proposed HAPCs identify areas that include known hard substrate and soft substrate, observed adult and juvenile groundfish species and observed biogenic habitat. Several of the proposed HAPCs are shown to contain observed biogenic habitat in relatively high abundance according to the Synthesis

Report<sup>10</sup>. The following highlights from each of the proposed HAPCs are provided to show some of the key considerations relevant to designating a HAPC:

**MBNMS 1 - Point Sur Platform:** The proposed area includes hard and soft bottom habitat on the shelf and is identified by MBNMS as a Sanctuary Ecologically Significant Area, defined by the location of unique, rare, or important habitat. This area has been surveyed by ROV and camera sled and many types of rockfish have been observed.

**MBNMS 2 - La Cruz Canyon:** The area contains a geologic feature of mainly hard substrate (83.2%) in relatively shallow depths (95 – 354 m) on the outer shelf and shelf break. It is identified by MBNMS as Sanctuary Ecologically Significant Area as defined above.

**GFNMS 1 - Fanny Shoal to Rittenburg Bank:** This area has rocky habitat and range of biogenic habitat including one of the highest levels of observed abundance in the region. A minimum of 23 taxa of adult and juvenile groundfish species have also been observed in this area, with a significant positive correlation between observed rockfish and biogenic habitat.

**GFNMS 2 – Cochrane Bank:** More than half of the proposed area includes known hard substrate. A minimum of 23 taxa of adult and juvenile groundfish species have also been observed in this area. One large black coral colony, *Antipathes dendrochristos* (Opresko 2005), was found on Cochrane Bank, representing a substantial range extension for the species.

**OCNMS 1 – Olympic 2<sup>11</sup>:** The proposed area includes additional rocky reef physical habitats, biogenic structures, and shelf and canyon habitats. More than 11,000 fish of 55 different species were recorded during 35 ROV surveys of the proposed HAPC area.

Also, according to the Phase 1 Report, currently designated HAPCs have a greater proportion of areas exposed to 'high' non-fisheries threats (i.e. nearshore pollution) - both individual and cumulative - than were present in non-HAPC areas. This is largely due to HAPCs in shelf areas being exposed to land-based threats, and their selection in 2005 by the Council to address non-fishing impacts. All five proposed HAPCs are on the continental shelf, but at further distance from the mainland compared to currently designated HAPCs. Therefore, the proposed HAPCs have lower combined pressure intensity according to the Synthesis Report primarily because of distance from the mainland. Additionally, all five proposed HAPCs are within a National Marine Sanctuary, which can provide additional protections from non-fishing impacts, including protections from seafloor disturbances (other than fishing gear), ballast water exchange, effluent discharge, and offshore drilling for oil and gas.

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<sup>10</sup> It should be noted that biogenic habitat knowledge is non-uniform: No systematic regional survey of coral and sponge distributions and abundance has been conducted. A majority of observations have been made over the past two decades, primarily during targeted studies on habitats suspected to support coral and sponge communities.

<sup>11</sup> There are 3 proposed design options for the proposed Olympic 2 HAPC. Option 1 would be the existing boundaries of Olympic 2 Conservation Area and Options 2 and 3 include additional rocky reef physical habitats, biogenic structures, and increased shelf and canyon habitats.

Four considerations are used for identifying specific types or areas of habitat within EFH as HAPCs according to the regulations that implement the EFH provisions of the MSA. Each HAPC proposal and its corresponding consideration(s), as put forward in each proposal, are presented in the Table below. The EFHRC has not considered the scientific rigor or created standards for these determinations, but rather the information presented is based on considerations raised in each of the proposals.

<b>Proposal Name</b>	<b>Considerations for the Designation of HAPCs [50 CFR 600.815(a)(8)]</b>			
	The importance of the ecological function provided by the habitat.	The extent to which the habitat is sensitive to human-induced environmental degradation.	Whether, and to what extent, development activities are or will be stressing the habitat type.	The rarity of the habitat type.
MBNMS 1: Point Sur Platform	✓			✓
MBNMS 2: La Cruz Canyon	✓			✓
GFNMS 1: Fanny Shoal/Farallon Islands to Rittenburg Bank	✓	✓		✓
GFNMS 2: Cochrane Bank	✓	✓		✓
OCNMS 1: Olympic 2	✓	✓		✓

### 8.3 Recommendations

1. The EFHRC recommends the development of an updated map showing the approximate location and extent of HAPC habitat types. Although the designation of habitat-type HAPCs must rely on the defining characteristics described in Amendment 19, an updated map would better represent the known location of habitat-type HAPCs at a new fixed point in time, since the previous map does not reflect the new information.
2. The EFHRC recommends that the Council consider designating new HAPCs based on information in the Phase 1 report, the Synthesis report, and the proposals.

## 9 Research and Information Needs

Thoughtful delineation of research and information needs has been a feature of the Council's groundfish EFH process beginning with Amendment 19 and continuing through this 5-year review. The following analyses have been produced:

- **2004 Amendment 19 Risk Assessment: Section 5.3 – Data Gaps Analysis** describes limitations of information on geological substrate, bathymetry, biogenic habitats, habitat use by groundfish, sensitivity and recovery of habitat types, fishing effort, non-fishing effects, cumulative impacts, and socio-economics. This analysis includes the significance of specific data gaps and needed research.
- **Pacific Coast Groundfish Fishery Management Plan: 2005 Appendix B.5 Research Needs and Data Gaps Analysis for Groundfish Essential Fish Habitat**, adapted from the above product.
- **PFMC's 2012 Pacific Groundfish EFH Phase 1 Report: Section 7 - Information and Research Needs**, which details limiting factors for this current review process and provides recommendations focused on improving the designation, monitoring, and effectiveness of groundfish EFH.
- **PFMC's 2013 Research and Data Needs: Section 3 – Marine Protected Areas and Essential Fish Habitat; Section 4 – Economics and Social Science Components and Appendix II**, include high priority items in the Addendum to the Pacific Coast Groundfish 5-year Review of EFH.
- **September 2012 Supplemental EFHRC Report<sup>12</sup>**, in which the EFHRC prioritized information needs from the Phase 1 report.
- **April 2013 Supplemental EFHRC Report<sup>13</sup>**, in which the EFHRC prioritized information needs in addition to the NMFS Synthesis document.

In addition, NMFS produced the 2010 Habitat Assessment and Improvement Plan (HAIP, NMFS 2010) to evaluate habitat-related research needs for each region of the U.S. The HAIP identifies the amount and type of information that should be available to NMFS and the Councils to address EFH and other habitat-related mandates, and includes a detailed assessment of the budget and personnel needed for each NMFS Science Center to adequately pursue these mandates.

### 9.1 EFHRC Statement

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<sup>12</sup> [http://www.pccouncil.org/wp-content/uploads/H6b\\_SUP\\_EFHRC2\\_SEP2012BB.pdf](http://www.pccouncil.org/wp-content/uploads/H6b_SUP_EFHRC2_SEP2012BB.pdf)

<sup>13</sup> [http://www.pccouncil.org/wp-content/uploads/D6c\\_SUP\\_EFHRC\\_APR2013BB.pdf](http://www.pccouncil.org/wp-content/uploads/D6c_SUP_EFHRC_APR2013BB.pdf)

The EFHRC re-affirms the data and research needs that have been listed in Section 7 of the Council's Pacific Groundfish EFH Phase 1 Report and prioritized in the EFRC's September 2012 supplemental report; the EFHRC also concurs with Sections 3, 4, and Appendix 2 of the Council's 2013 Research and Data Needs document. We further support the resource needs for the NW and SW Fisheries Science Centers described in the HAIP and note that without funding to address those needs, Council decisions on groundfish EFH will continue to be significantly affected by data gaps. Most of the data gaps described in Amendment 19 remain as significant obstacles to this review.

Consistent with the Introduction section of this report, some analytical needs (as described in the products listed above) can be pursued using existing data and information as part of a comprehensive habitat assessment. For example, the Information and Research Needs section of the Phase 1 Report calls for an evaluation of "corals and sponges as essential habitat for groundfish . . . ". This task could be accomplished using existing literature and data, and should be completed as soon as possible in order for the Council to make informed decisions during Phase 3 of this 5-year review. Conducting new research to address data deficiencies also is necessary and likely will require new funding; supporting these studies should be viewed as a programmatic investment for future reviews.

Without support to conduct such analyses and research, the Council will not have adequate answers to critical questions such as:

- Have EFH fishery closures met the goals and objectives of Amendment 19?
- How much habitat needs to be protected to maintain a sustainable fishery?
- What changes have occurred to fish and invertebrate communities inside the closures?

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## Appendix A: BASS Description and Summary of Proposals

### 1. Summary of Proposals

The Council issued a request for proposals to modify provisions of Pacific Coast groundfish EFH, with proposals due July 31, 2013. Eight proposals were received, representing a wide substantive and geographic range. Two proposals were from National Marine Sanctuaries (NMS), four were from conservation organizations, one from a commercial fishing-related group, and one was co-sponsored by a NMS and the Washington State Department of Fish and Wildlife. All eight proposals and supporting documentation are available on the Council's ftp site: [ftp.pccouncil.org/pub/GF\\_EFH\\_Review\\_2011-2012](ftp.pccouncil.org/pub/GF_EFH_Review_2011-2012). The RFP and other primary documents related to the EFH review can be found at <http://www.pccouncil.org/2013/05/25450/rfp-gf-efh-may2013/>. Five are confined to limited geographic areas, and three are essentially coastwide. One proposal (EDF) was subsequently withdrawn from consideration. Following is a brief summary of each proposal.

The proposals primarily focused on protecting discrete areas from fishing and fishing gear impacts. In many cases, proposed closed (or restricted) areas were somewhat coincident with existing closed areas. In other cases, proposals include spatially distinct areas for consideration of various levels of restricted fishing activity. Some proposals include recommendations to open up parts of currently closed areas.

The EFHRC's evaluation included a determination regarding the EFH subject areas described in the regulations (listed in Section 1.4). Table 2 below shows which proposals contain elements of those EFH subject areas.

Table 2: EFH subject areas as represented in proposals.

Proposal	EFH Subject Area								
	1	2	3	4	5	6	7	8	9
A	√	√	√		√		√		
B	√	√			√			√	
C	√	√			√				
D	√	√			√			√	
E	√	√							
F	√	√			√			√	
G	√	√			√			√	√
H		√							

Proposal Letter code

A = Oceana/NRDC/OC  
B = Marine Conservation Institute  
C = Greenpeace  
D = Olympic Coast National Marine Sanctuary  
E = Fishermen’s Marketing Association  
F = Gulf of the Farallones National Marine Sanctuary  
G = Monterey Bay National Marine Sanctuary  
H = Environmental Defense Fund

EFH Subject Area

1 = Identification and Description  
2 = MSA Fishing Activities  
3 = Non-MSA Fishing Activities  
4 = Non-Fishing Activities  
5 = Conservation and Enhancement  
6 = Cumulative Effects  
7 = Prey Species  
8 = Habitat Areas of Particular Concern  
9 = Research Recommendations

**Proposal Summaries**

Fishermen’s Marketing Association (FMA)

The FMA proposal is to modify the existing bottom trawl closed area known as Eel River Canyon, such that the eastern boundary of the closure would align with the 75 fathom contour. This also aligns with the eastern boundary of the trawl RCA. The proponents state that the existing eastern boundary extends into sandy bottom habitat that is outside of the canyon area, and it divides a divides historic tow locations into two sections that are too small to trawl individually. The proposers contend that while the modification would benefit a few local fishermen, it would not have a great impact on the value of the entire fishery. The proposal was considered by the Council in 2008, under an interim proposal process, but the Council made the decision at that time to forego any EFH changes until the upcoming periodic review was completed.

Oceana/Natural Resources Defense Council/Ocean Conservancy (Oceana/NRDC/OC)

Oceana also submitted a proposal in 2008 under the interim proposal process, but on a much more limited scale than the current proposal. As with the Eel River Canyon proposal, the Council chose to forego making any changes to EFH until the periodic review was completed. The current Oceana/NRDC/OC proposal is to create or modify 66 bottom trawl closed areas, open nine areas to bottom trawling that are currently closed, improve enforcement of EFH Conservation Areas, implement new management measures related to midwater trawl gear in EFH Conservation Areas, improve the identification of major prey species for groundfish, and add all West Coast waters deeper than 3500 meters, as EFH.

Monterey Bay National Marine Sanctuary (MBNMS)

The MBNMS proposal is to create three and modify seven discrete areas that would be closed to bottom trawling (except demersal seine gear), and to open five areas that are currently closed to bottom trawling. The proposal also includes conceptual “Voluntary Management Areas” as a pilot project that would involve voluntary agreements to avoid bottom trawling in three areas and proposes added enforcement provisions related to location and deployment of trawl gear.

### Gulf of the Farallones National Marine Sanctuary (GNMS)

The GNMS proposal is to modify one existing bottom trawl closed area and add two additional areas, based on presence of biogenic habitats including rocky reefs and canyons, which are currently included in groundfish EFH descriptions as habitat elements of HAPCs. The proposal offers options for one of the new closed areas to be closed to bottom trawl gear (except demersal seine), or to all bottom contact gear. The other two areas are proposed as closed to bottom trawl gear (except demersal seine).

### Greenpeace

Greenpeace proposes identifying nine submarine canyon areas as EFH, applying protective measures to freeze the existing footprint of fishing activities, and beginning a process to phase out some fishing gear types such as drift gill nets and bottom trawls. In many cases, the proposed canyon areas co-occur with existing HAPCs or other management or Conservation Areas. The nine proposed areas are distributed between the Washington coast and (approximately) Morro Bay, California.

### Environmental Defense Fund (EDF) (*Subsequently withdrawn from consideration*)

EDF proposes eliminating the small footrope requirement south of 40° 10' N. latitude, to provide greater protection to shelf soft bottom habitats. The requirement was designed to decrease effort over rocky reef habitats, but EDF notes that greater impact to soft bottom habitat has been a trade-off. The proposal suggests that rocky reef habitats and species will still be protected because of the risk of catching rebuilding species and exceeding individual quota pounds.

### Olympic Coast National Marine Sanctuary (OCNMS) and Washington State Department of Fish and Wildlife (WDFW)

This proposal offers three options for modifying the existing Olympic 2 bottom trawl closed area. All three options include extending the current prohibition on bottom trawl gear to include all bottom contact gear. Option 1 maintains status quo spatial boundaries, while Options 2 and 3 propose expanding the spatial boundaries. The proposal would apply only to non-tribal fisheries.

### Marine Conservation Institute (MCI)

The MCI uses predictive habitat modeling to identify areas likely to have highly suitable deep sea coral habitat and proposes 29 new areas for additional habitat protections, based on modeling results. Most areas proposed for closure to bottom contact gear are adjacent to existing closed areas, although several are spatially distinct from existing areas closed to various types of bottom fishing gear. Seven areas would be closed to all bottom contact gear 22 of the new areas are proposed to be closed to bottom trawl gear and the proposed closed areas are distributed along the entire West Coast.

## **2. EFHRC's Approach to Proposal Review and Evaluation**

EFHRC members reviewed the eight proposals between early August and the two-day EFHRC meeting September 4-5, 2013. During that one-month review period, EFHRC members were asked to provide qualitative evaluations of each proposal, against a background of the review criteria in the RFP. The EFHRC also had access to the Bayesian Analysis for Spatial Siting (BASS) tool, described in Section 4.2 below.

Although the short time period coupled with the volume of information contained in many of the proposals precluded a full technical analysis, the EFHRC was able to evaluate the suite of proposals qualitatively. The EFHRC expressed two other points relative to proposal evaluation and the Council's consideration of potential changes to existing EFH. First, the EFHRC's charge did not include a thorough analysis of the effectiveness of existing EFH, and therefore, the Committee did not conduct such analysis. The NMFS Synthesis did evaluate habitat coverages of existing habitat protection measures, however, it did not assess effectiveness. A more thorough evaluation of existing closures could be helpful to the Council in determining whether EFH designations and associated fishing closures have protected habitat to the degree anticipated. Second, the EFHRC anticipates that a full analysis of potential changes to EFH (including areas closed to various types of fishing activities) embodied in the eight proposals would be conducted during an FMP amendment process and in conjunction with NEPA requirements for alternatives analysis before Council decisions are made regarding these proposals.

The EFHRC's primary tasks were to evaluate the information compiled during Phase 1 and Phase 2, and make recommendations to the Council as to whether new and newly-available information warrant further consideration of changes to existing groundfish EFH. To collect committee input on how each of the eight proposals addressed the questions in the RFP, the EFHRC used the Bayesian Analysis for Spatial Siting (BASS) Decision Support tool. Ten EFHRC members participated, evaluating 18 proposal "measures" included in the BASS system, at the Portland EFHRC meeting September 4-5, 2013.

## **3 Overview of Decision Support Tools as Applied by the EFHRC**

Marine Spatial Planning (MSP) involves the spatial and temporal allocation of human activities to achieve ecological, economic, and social objectives that are usually specified through a political process (Douve and Ehler, 2009). MSP often is hindered by insufficient or uncertain information and/or by competition between user groups. As a result, a wide variety of decision support systems (DSS) have been developed to promote efficient use of marine space and resources, while reducing use-use and use-ecosystem conflicts (Coleman et al., 2011).

Bayesian belief networks (BBNs) have become a popular means for ecological and stakeholder evaluation and their usage in a spatial context has been demonstrated in several fields to model ecological support functions and other interactions useful for decision support (Dlamini, 2010; Hicks and Pierce, 2009; Lockett, 2012; Stelzenmuller et al., 2010). The Bayesian Analysis for

Spatial Siting (BASS) tool uses BBNs to describe inferred causal relationships between environmental variables and spatial site suitabilities.

The Bayesian Analysis for Spatial Siting (BASS) tool integrates uncertainties and stakeholder values with scientific measures. Additionally, scientific measures and stakeholder values can be used alone in various BASS scenarios. Although the analytical capabilities of BASS originally were designed for an evaluation of renewable energy devices, the stakeholder functions of BASS are generic and can be used in any subjective decision-making process. It was in this mode that BASS was used, essentially operating as a “voting machine” to tabulate and compile the responses from the committee members for 18 criteria for each proposal.

In addition to the primary objective of directly selecting or filtering decision alternatives, stakeholder data collected using BASS can also provide powerful diagnostic utility to the decision making process. This is a particularly valuable tool to help the facilitator understand the nature of the data (member evaluations) including: whether the evaluation process was conducted with consensus on the meaning of the criteria, and whether the process was conducted fairly. A few useful diagnostic questions addressing consensus include:

- Where are there disagreements or confusion within the committee?
- Are there specific proposals that cause disagreement?
- Are there members with outlying evaluations on a given proposal(s)?

Identifying proposals that cause disagreement in member evaluations reveals where further consideration of criteria may be needed. Identifying members with outlying evaluations provides an opportunity to expose and address specific member concerns. Knowing where consensus is high on the other hand allows a facilitator avoid topics that have already been settled.

#### **4 How BASS was used by the EFHRC**

The EFHRC utilized BASS in reviewing proposals for its capacity to facilitate opinion-based decision making in data-limited scenarios. The BASS tool was used in stakeholder mode by the EFHRC to evaluate general satisfaction or agreement with the public proposals to modify groundfish EFH. The EFHRC used BASS to inform their discussion of the merits of each proposal and to clarify evaluation criteria. The EFHRC intended to use results from the BASS analytical tool to inform the committee’s decisions regarding the proposals and to make recommendations to the Council. Personnel from Oregon State University (Chris Romsos, Chris Goldfinger and Morgan Erhardt), the developers of BASS, supervised the data collection and assisted committee members with data entry and other questions.

Qualitative decision measures were developed and used to evaluate the EFH proposals. “How To” documents were distributed to the committee members on the use of BASS, along with login information. EFHRC members had time before the meeting to familiarize themselves with BASS and the basic login and evaluation process. The BAS system is an online system that members could log into at any time to work with and score the proposals, and save their work. Evaluations officially began at the September meeting. Each EFHRC committee member scored decision criteria according to their satisfaction that a proposal met the criteria and their confidence or certainty in the satisfaction score. The probability that a proposal satisfies a particular measure was computed within BASS. Examination of the degree of satisfaction with each measure was useful in describing strengths and weaknesses of the proposals. Thus, the mean probability of committee satisfaction for each proposal is presented against each decision measure (Section 3: Table 1 & Figure 1).

Using an online web application, EFHRC members entered their level of satisfaction and uncertainty for each of 18 evaluation measures (which were derived directly from the EFH Phase II RFP)<sup>14</sup>:

**1. Proposal Completeness** – Is the proposal complete? Please indicate your satisfaction regarding proposal completeness (move the dot up or down). Indicating very high or 100% satisfaction will indicate a complete proposal. If you are uncertain of your estimation, here or in any subsequent evaluation, adjust your certainty (the right/left placement of the dot) accordingly.

**2. Proposal Consistency** –Is the proposal consistent with the goals and objectives of the FMP and the Council’s responsibility to identify and protect EFH and minimize the adverse effects to EFH from Council-managed fishing activities? Please indicate your satisfaction that the proposal is consistent with the goals and objectives of the FMP and the Council’s responsibility to identify and protect EFH and minimize the adverse effects to EFH from the Council-managed fishing activities. 100% satisfaction indicates that that the proposal is completely consistent.

**3. Spatial Accuracy** – Are the coordinates consistent with the proposed actions and do they map out correctly? Please indicate if the spatial components of the proposed action are satisfactory. Coordinates and boundaries that are consistent with a proposed action should be scored as highly satisfactory.

**4. Data Sufficiency** – Are the data and analyses sufficient to evaluate the proposal effects and objectives, and if not, why? Please indicate if the proposal presents data and analyses sufficient to evaluate the proposed effects and objectives? Proposals that present sufficient information and analysis should be scored as highly satisfactory.

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<sup>14</sup> RFP criteria not used in the BASS assessment include those where (1) there was no discriminating metric; (2) there was no consensus on description of the metric; and, (3) it could not be incorporated into BASS.

**5. Data and Info. Supports Proposal** - How well does the available information, including the nature of the data, support the proposal? Please indicate your satisfaction that the available data is useful in supporting the proposed action. Proposals where the data and information are sufficient and appropriately used should be scored as highly satisfactory.

**6. Habitat Important to GF FMP Stocks** – What is the importance of affected habitat types to any groundfish FMP stocks for their spawning, breeding, feeding, or growth to maturity? Please indicate satisfaction for affected habitat types that are demonstrated to be important as defined. Vary your satisfaction and certainty according to your assessment/understanding and according to the support provided through the proposal.

**7. Habitat Vulnerable** - To what extent is the habitat vulnerable to the effects of fishing and other activities? For consistent evaluation across stakeholders, vulnerability should be assessed as follows:

High Satisfaction = High Vulnerability

Low Satisfaction = Low Vulnerability

In this way satisfactory evaluations are given for proposals that identify vulnerable habitats.

**8. Habitat Unique/Rare** - Are there unique rare or threatened habitats in areas addressed by this proposal? Proposals that address unique, rare, or threatened habitats should be evaluated as satisfactory.

**9. Change in Fishing Location and Effort** – What are the changes in location and intensity of fishing effort that may adversely affect EFH? Do the proposed changes in location and intensity of fishing effort adversely affect EFH? Proposals that don't adversely affect EFH should be rated as satisfactory.

**10. Collaboration** – What has been the degree of collaboration with affected fishermen, conservation interests, communities, and other stakeholders, to identify socioeconomic costs and benefits? High collaboration = High Satisfaction.

**11. Best Available Models** – If models are used in the proposal, are they consistent with the best available information? High satisfaction indicates that the proposal uses models that are consistent with the best available information. Proposals that do not use models should be ranked 50% satisfaction 0% certain (leave the dot at its origin).

**12. Stakeholder Impact Potential** – How will fishing communities and other stakeholders be positively affected by the proposal? High positive impact potential = High Satisfaction. Low positive impact potential = Low Satisfaction.

**13. Impact on Tribal Usual and Accustomed** – Will Tribal Usual and Accustomed areas be positively affected by the proposal? High positive impact potential = High Satisfaction. Low positive impact potential = Low Satisfaction.

**14. Impact to Overfished Stocks** – How will overfished Stocks be affected by the proposal? Positive Impact = High Satisfaction, negative Impact = Low Satisfaction

**15. State, Tribal, Federal Coordination** –Has there been coordination with appropriate state, Tribal, and Federal enforcement, management, and science staff? Proposals demonstrating coordination = High Satisfaction

**16. Improves Knowledge/GAPS for EFH** – Does the proposal address data gaps identified in the original risk analysis such that there is an increased understanding of EFH for one or more species? (e.g. does new data document the importance of a habitat type to groundfish, or has data quality improved enough to change understanding of habitat distribution?) Proposals that address data gaps identified in the original risk analysis and/or increase the understanding of EFH for one or more species = High Satisfaction.

**17. Improves Knowledge of Habitat Use** –Does the proposal address data quality regarding habitat use? (E.g. improves from level 1 (presence/absence) to level 2 (density) or higher?) Proposals that improve knowledge of habitat use = High Satisfaction

**18. Identifies Existing Deficiencies** – Does the proposal demonstrate that some elements of groundfish EFH may no longer be precautionary and comprehensive? (e.g. distribution/density no longer matches closed areas, new information shows that some habitats are not being adequately protected, or new information on recovery shows that a habitat type is more or less sensitive than previously known.) Proposals that demonstrate protection deficiencies or inadequate protections = High Satisfaction

During the meeting EFHRC members were guided in the interpretation of each measure. There was considerable discussion regarding how each measure should be evaluated with the goal of developing a uniform understanding of each measure across committee members. Nevertheless, survey design is an imperfect process at best and there is undoubtedly some uncertainty remaining among the members on the precise meaning of each question. This is an aspect that is not specific to the use of a decision support system, and is inherent in any survey or decision making process. The EFHRC membership generally agreed that the use of the BASS system helped to focus and improve understanding of the criteria and the implications of their decisions.

## **5 Section 3: Results**

The results of the EFHRC process as collected by the BASS system were summarized by Decision Measure & Proposal and presented graphically during the meeting. Only RAW satisfaction scores (no uncertainty) were used during the meeting to give the members a quick look at the results because we didn't have access to the adjusted (including uncertainty) numbers (software

limitation). The raw data were used during the meeting to assist with writing summary recommendations. Post meeting plots and tables (Table 1, Figures 1&2) present adjusted Probability of Satisfaction scores utilizing the uncertainty values recorded in BASS. Summary plots were used in committee to guide the discussion while developing recommendations.

**Results by Measure:** Table 1 and Figure 1 are helpful for getting a sense of how the committee viewed individual proposals and based on the 18 specific criteria requested from the RFP. While proposals often cluster with similar scores for particular measures there are numerous examples of proposals scoring above (standing out) or below (falling short) the 0.5 Probability of Satisfaction threshold. Furthermore, it is straightforward to identify global trends such as criteria that were not well satisfied by any proposal. Figure 1 shows the cumulative results of all 18 measures by proposal and reveals that some criteria such as “Spatial Accuracy (# 3), and “Importance to FMP stocks” (#6) were consistently satisfied. Some measures such as “Impact of Tribal Usual and Accustomed Areas” (#13) & “Knowledge of Habitat Use” (#17) are examples of criteria that were not well satisfied in any proposal in the view of the EFHRC members. Other measures were highly variable, with high consistency for measures 9, 14, 17 with varying levels of satisfaction, and high variability is noted for most of the remaining measures.

Table 1. BASS (Bayesian Analysis for Spatial Siting) adjusted results from the September 4-5 EFHRC meeting. Scores reflect the mean probability of satisfaction in each evaluation measure across the 10 EFHRC members.

Proposal Evaluation Measure	Mean Probability of Satisfaction (adjusted by evaluator uncertainty)							
	EDF	FMA	GFNMS	GP	MBNMS	MCI	OCEANA	OCNMS
01 Proposal Completeness	0.5795	0.7585	0.8395	0.577	0.854	0.7345	0.857	0.849
02 Proposal Consistency	0.582	0.6435	0.7905	0.4715	0.7505	0.599	0.789	0.7525
03 Proposal Spatial Accuracy	0.6715	0.8005	0.7885	0.606	0.816	0.7145	0.807	0.7385
04 Proposal Data Sufficiency	0.299	0.602	0.7475	0.344	0.74	0.41	0.7205	0.568
05 Data and Info. Supports Proposal	0.292	0.624	0.735	0.342	0.7425	0.512	0.6445	0.566
06 Habitat Important To GF FMP Stocks	0.621	0.682	0.752	0.704	0.751	0.612	0.633	0.674
07 Habitat Vulnerable	0.55	0.41	0.662	0.556	0.678	0.547	0.628	0.636
08 Habitat Unique/Rare	0.44	0.304	0.63	0.634	0.715	0.543	0.5455	0.6025
09 Change in Fishing Location and Effort	0.556	0.656	0.54	0.564	0.654	0.525	0.552	0.506
10 Collaboration	0.401	0.522	0.6	0.27	0.79	0.3335	0.6375	0.5085
11 Best Available Models	0.468	0.5	0.56	0.524	0.614	0.419	0.5965	0.542
12 Stakeholder Impact Potential	0.484	0.662	0.572	0.2965	0.694	0.361	0.457	0.405
13 Impact on Tribal Usual and Accustomed	0.476	0.5	0.5	0.332	0.5	0.338	0.485	0.436
14 Impact on Overfished Stocks	0.51	0.514	0.586	0.733	0.632	0.54	0.5885	0.56
15 State, Tribal, Federal Coordination	0.331	0.5265	0.63	0.288	0.742	0.302	0.6175	0.4905
16 Improves Knowledge/Gaps for EFH	0.301	0.315	0.454	0.329	0.6925	0.376	0.4725	0.435
17 Knowledge of Habitat Use	0.344	0.354	0.48	0.353	0.522	0.4	0.48	0.456
18 Identifies Existing Deficiencies	0.678	0.632	0.768	0.452	0.679	0.532	0.7145	0.7185

Proposal abbreviations used in Table 1 and all other appendix figures:

EDF = Environmental Defense Fund

GFNMS = Gulf of the Farallones National Marine

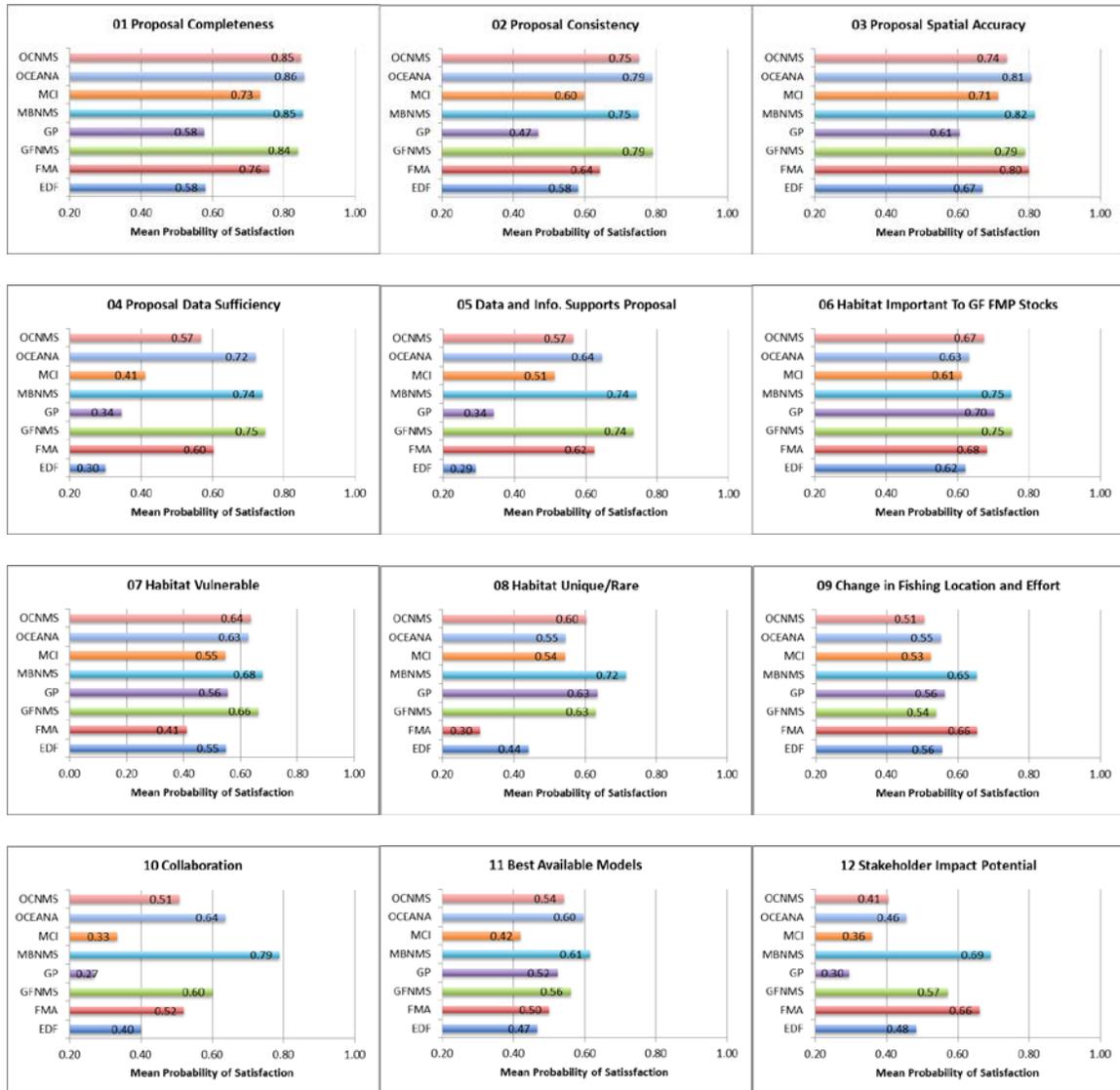
FMA = Fisherman’s Marketing Association

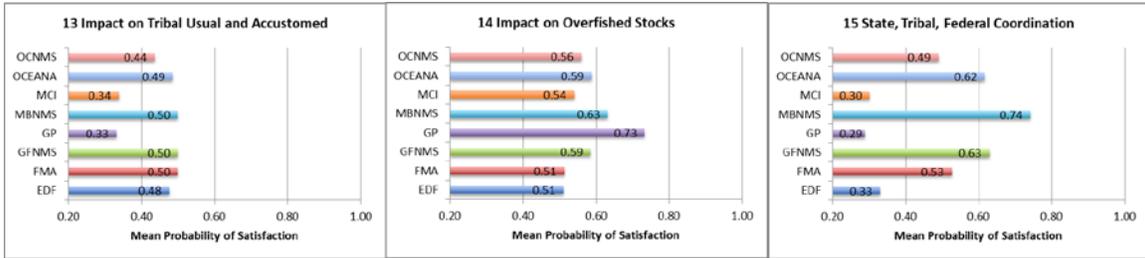
Sanctuary

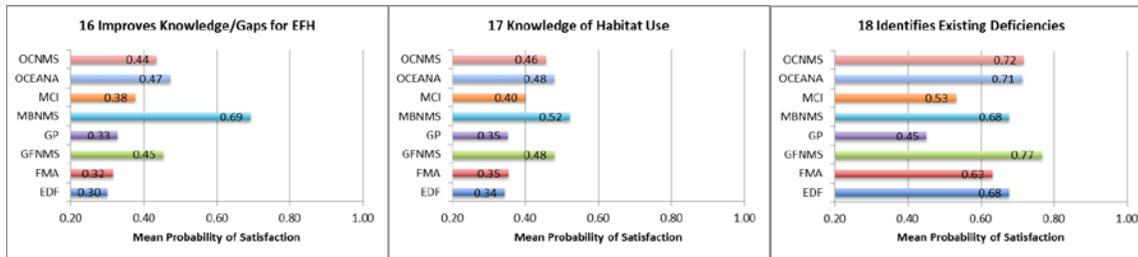
GP = Greenpeace  
 MBNMS = Monterey Bay National Marine  
 Sanctuary

OCEANA – no abbreviation used  
 OCNMS = Olympic Coast National Marine  
 Sanctuary

Figure1. The following bar charts present mean Probability of Satisfaction scores for each evaluation measure (chart) summarized by proposal (bar) and across all committee members (10 member evaluations per bar).







### Summary Recommendations by Measure:

#### Measure 1: Proposal Completeness, EFHRC Mean Satisfaction Score

All proposals were considered complete however, the MCI and GP proposals would benefit from additional work. The EFHRC noted that the MCI proposal presents a model to be considered, rather than explicit management measures. The Greenpeace proposal lacks details and supporting information.

#### Measure 2: Proposal Consistency, EFHRC Mean Satisfaction Score

All proposals were considered consistent with EFH provisions with the exception of certain aspects of the Greenpeace (GP) proposal. In this proposal the EFHRC felt that the identification of canyons along the entire west coast was very generalized and that feature combined with the discussion on pelagic habitat without further analysis does not provide connection to EFH management areas and regulations. In addition Greenpeace proposes moving forward on the concept of removal or phasing out of all gear types in these canyon areas.

#### Measure 3: Proposal Spatial Accuracy, EFHRC Mean Satisfaction Score

The proposals generally appeared to be accurate. The EFHRC did not identify any inaccuracies, but a detailed analysis of the coordinates was not performed.

#### Measure 4: Proposal Data Sufficiency, EFHRC Mean Satisfaction Score

The MCI, GP, EDF proposals did not provide data analysis that could be reviewed. The other proposals provided sufficient data to review.

#### Measure 5: Data and information Supports the Proposal, EFHRC Mean Satisfaction Score

There were concerns with the predictive accuracy (e.g., the taxonomic resolution utilized) of the model that was the basis of the MCI proposal, because the proposal did not include the data supporting the model results. Regarding the EDF proposal, there was some uncertainty regarding whether a footrope change would reduce impacts to soft substrate and whether there would be continued incentive to stay off rocky habitat. The Greenpeace presented rationale for their proposal but did not provide data from the synthesis report.

#### **Measure 6: Habitat is Important to Groundfish FMP Stocks, EFHRC Mean Satisfaction Score**

All proposals addressed habitat important to GF FMP stocks.

#### **Measure 7: Habitat is Vulnerable, EFHRC Mean Satisfaction Score**

All proposals provided for vulnerable habitats except FMA asserted there are not vulnerable habitats in areas proposed to reopen.

#### **Measure 8: Habitat is Unique or Rare, EFHRC Mean Satisfaction Score**

All proposals except FMA and EDF provided for unique and rare habitats. Regarding EDF's proposal, there was a lack of certainty of the outcome. The FMA proposal is also uncertain as it did not have an objective that addressed unique and rare habitats.

#### **Measure 9: Change in Fishing Location and Effort, EFHRC Mean Satisfaction Score**

For all of the proposals except FMA there is a lot of uncertainty in the EFHRC as to how they will affect fishing location and effort outside the areas proposed for closure. Further analysis will be required to understand these effects.

#### **Measure 10: Collaboration, EFHRC Mean Satisfaction Score**

The MBNMS proposal provided a high level of collaboration across a broad stakeholder spectrum, by reference and by incorporating community input in the proposal. Several others demonstrated significant collaboration, but are still continuing dialogue with their respective communities (Oceana, OCNMS, GFNMS). The remainder (MCI, GP) did not present evidence of an outreach effort. FMA is a stakeholder group itself, and it wasn't clear whether this measure applied adequately to the FMA proposal.

#### **Measure 11: Best Available Models, EFHRC Mean Satisfaction Score**

The MCI proposal presents a model that could be used in determining likely high value biogenic habitats in unsurveyed areas, but the EFHRC was not able to conduct a thorough review of the model, and therefore had significant concerns about its applicability to the EFH process.

#### **Measure 12: Stakeholder Impact Potential, EFHRC Mean Satisfaction Score**

It was difficult to analyze this feature in the proposals, as impacts likely vary for different stakeholder groups and the EFHRC did not conduct an analysis of the overlap of proposed areas with current fishing grounds. A full analysis of each proposal overlaid with fishing effort information in the EFH data portal should be conducted before any conclusions are made regarding stakeholder impacts, displaced revenue, etc. The MBNMS proposal addressed stakeholder impact potential to a significant degree as evidenced by the consensus support of stakeholders. The EFHRC agreed that the Greenpeace proposal would have a significant impact on a wider suite of fishing stakeholders than other proposals, and MCI

proposes to close some areas that are highly trawled, thus also having an impact on the fishing community.

**Measure 13: Impact to Tribal Usual and Accustomed Areas (U&A), EFHRC Mean Satisfaction Score**

Half the proposals only address areas that are outside the tribal U & A areas: MBNMS, GFNMS, EDF, and FMA. The other four (Greenpeace, MCI, OCNMS, and Oceana) include modifications to EFH Conservation Areas within tribal U & As, and will require collaboration and consultation with the treaty tribes, should they go forward.

**Measure 14: Impact on overfished stocks, EFHRC Mean Satisfaction Score**

All proposals except the FMA and EDF may have a positive impact to overfished groundfish FMP stocks.

**Measure 15: State, Tribal, and Federal Coordination, EFHRC Mean Satisfaction Score**

MBNMS, Oceana, and GFNMS all demonstrated coordination with the appropriate resource managers, while MCI, Greenpeace, and EDF did not. The NMS representative felt that the OCNMS demonstrated coordination, while the Tribal representative disagreed.

**Measure 16: Improves Knowledge/Gaps for EFH, EFHRC Mean Satisfaction Score**

Most of the proposals did not call out a research component specifically, except MBNMS. The EFHRC recognized this does not mean that research is not ongoing in some circumstances. There is a research component that is part of the Phase I and NMFS Synthesis Reports, and this was used by many of the proposers.

**Measure 17: Knowledge of Habitat Use, EFHRC Mean Satisfaction Score**

It was not clear to the committee how any of the proposals would improve the information needed to improve knowledge of habitat use.

**Measure 18: Proposal identifies existing deficiencies, EFHRC Mean Satisfaction Score**

The EFHRC discussed the fact that most of the proposals identified deficiencies.

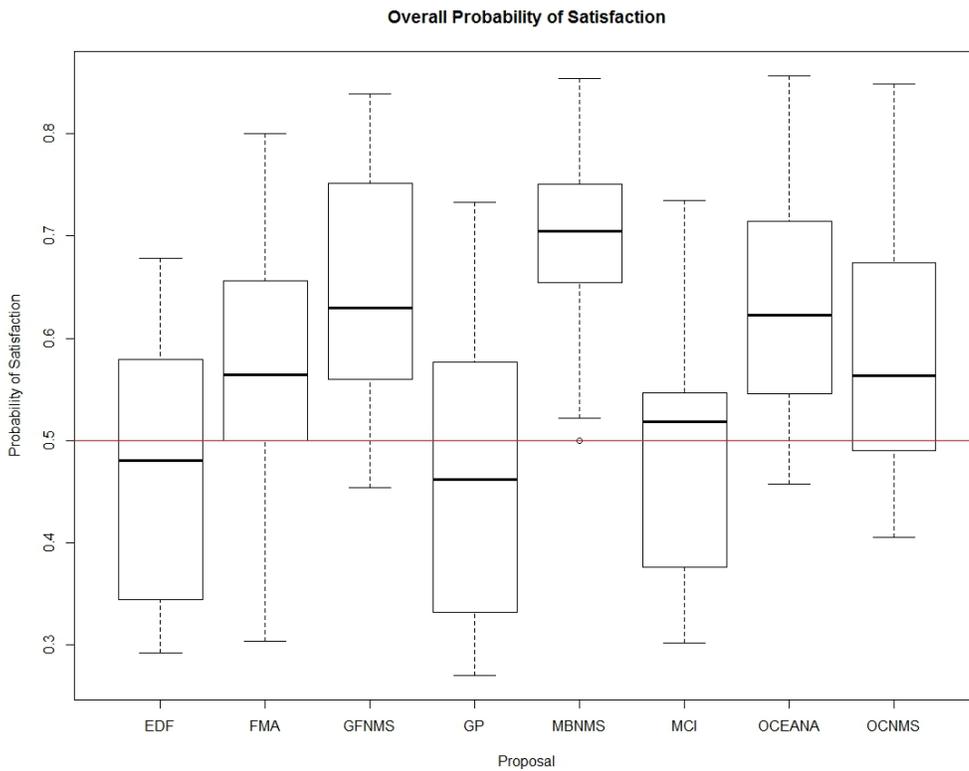
***Cumulative Results by Proposal:*** Figure 2's box-plot provides a cumulative satisfaction, or overall committee and all measure, view of proposal performance. This assumes that all measures were equally important, an aspect of the process not directly addressed by the committee. We consider the 0.5 satisfaction threshold as a transition between satisfactory and unsatisfactory criteria performance. From Figure 2 we can split the proposal filed into 2 groups using the 0.5 threshold and median overall evaluation.

- satisfactory evaluations (FMA, GFNMS, MBNMS, MCI, OCEANA, OCNMS)
- unsatisfactory evaluation (EDF and GP)

Three proposals overall satisfaction rose above 60%: GFNMS, MBNMS, and Oceana. One proposal, MBNMS rose above 70% satisfaction. Six proposals were greater than 0.5 (50%) in overall satisfaction (FMA, GFNMS, MBNMS, MCI, OCEANA, OCNMS), and two proposals received less than 0.5 (50%) satisfaction (EDF and GP). No proposals fell below 0.4 (40%) in overall satisfaction.

The EFHRC discussed at some length whether or not to establish a threshold for the proposals, and therefore to approve those above and reject those below a threshold. The data are presented here for reference only, and no further analysis along these lines is included here.

Figure 2. Box-plot demonstrating the overall, all committee members and all decision measures, probability of satisfaction for each proposal. Each box and whisker represents the mean of evaluations by the full committee (n = 10) for each evaluation measure (n = 18). The dark central bar represents the median value, while the box represents the first and third quartiles. Whiskers extend 1.5 times the Inner Quartile Range.



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## **Appendix B: Minority Statement on Magnuson Act Fishing Activities that May Adversely Affect EFH (Alternative to Section 3 on MSA Fishing Activities)**

### **3.4.1 A Summary of Amendment 19**

In 1996, based on a wide scientific recognition that protecting fish habitat is critical to maintaining productive and sustainable fisheries, Congress added the Essential Fish Habitat provisions to the Magnuson-Stevens Act, including a mandate to “minimize to the extent practicable adverse effects on such habitat caused by fishing, and identify other actions to encourage the conservation and enhancement of such habitat” (16 U.S.C. 1853(a)(7)). In response, the PFMC and NMFS issued an Environmental Assessment (NMFS 1998) concluding that no changes to management were warranted as there was no evidence indicating that fishing impacts had impaired the function of habitats in supporting groundfish. After a successful legal challenge by conservation groups (*AOC v. Daley* 2000), the court dismissed NMFS’ analysis, rationale, and conclusion as inadequate under the National Environmental Policy Act (NEPA), along with similar NEPA analyses conducted by four other Regional Fishery Management Councils. The court required a full Environmental Impact Statement (EIS) process in each region.

Shortly thereafter, the National Academy of Sciences’ National Research Council (NRC) released a report on the impacts of trawling and dredging on seafloor habitats (NRC 2002). In that report, the NRC concluded based on the best available scientific information that bottom trawling causes the following adverse impacts:

- changes in physical habitat of ecosystems;
- changes in biological structure of ecosystems;
- reductions in benthic habitat complexity;
- changes in availability of organic matter for microbial food webs;
- changes in species composition; and
- reductions in biodiversity.

The NRC also concluded that the impacts are most severe in habitats with low disturbance rates or long-lived biogenic structures, such as corals and sponges. The report recommended a suite of management changes, including area closures, conversion to fixed gears, and reduction of bottom trawl effort (NRC 2002).

Concurrently with the PFMC, though on a faster pace, the NMFS Alaska Region released a draft EIS for the North Pacific Fishery Management Council in 2004, which eventually helped to establish the precedent used by the PFMC in interpreting the EFH mandate in the Amendment 19 process. NMFS stated in the draft Alaska EFH EIS that no adverse impacts from fishing were occurring based on the criteria of groundfish abundance (in relation to Minimum Stock Size Threshold) and the absence of a clear signal of stock productivity impairment resulting from habitat impacts, and therefore determined that no action was warranted (NMFS 2004, Appendix B). However, in response to controversy over the basis for this conclusion, NMFS requested review of its approach by the Center for Independent Experts

(CIE) (Drinkwater 2004), which convened a panel of six leading experts to conduct a peer review of NMFS' methodology and conclusions. The CIE concluded that NMFS' approach:

“was not considered to be appropriate for several reasons, including that habitat effects are only one of many factors that influence the stock abundance, the criterion provides no spatial information, and the expected lag between habitat destruction and detection of its effect on the stock productivity is expected to be long, such that the habitat may be destroyed before mitigation could be implemented.” (Drinkwater 2004, P.2)

Furthermore, the CIE review indicated that a precautionary approach is not optional with habitat, but rather should be a required interpretation of the EFH mandate in the absence of complete information on habitat use by groundfish:

“a precautionary approach needs to be applied because of the large uncertainties in our knowledge of the links between habitat and the life stages of the various fish species.” (Drinkwater 2004, P.2)

Of particular relevance to this section were the scientific findings of the CIE related to deep sea corals and sponges:

“MSST is inappropriate with regard to the impact of fishing on sensitive habitats, such as corals and sponges, where any habitat impact is unlikely to be temporary and reductions > 50% cannot be regarded as minimal.” (Drinkwater 2004, P. 17)

“Since it is likely difficult to detect an influence on the stock until after the habitat is damaged, perhaps even until much of the habitat is destroyed, the use of the precautionary approach is paramount. This is especially true for those habitats with long recovery times, e.g. hard corals and sponges.” (Drinkwater 2004, P.18)

“Recommendation: Apply the precautionary approach to the evaluation of the effects of fishing on habitat and their subsequent influence on the sustainability of commercial fish stocks especially where the model suggests the habitat is heavily reduced and/or the recovery times are long, as well as where little is known about the role of habitat in the life history stages.” (Drinkwater 2004, P.18)

“In regards to local habitats the destruction of corals and sponges with their long recovery times are of particular concern. In keeping with the precautionary approach, these should receive special consideration.” (Drinkwater 2004, P. 21)

Lastly, the CIE review addressed the problematic “burden of proof” inherent in the argument that a productivity link between habitat and groundfish must be established before action is warranted:

“A precautionary approach needs to be applied to the evaluation of fishing effects on EFH. This is especially important given that many of the stock collapses or severe declines around the world could have been avoided or lessened by following a

precautionary approach. It is also important given that many of species in Alaskan waters have unknown life history characteristics. In spite of this lack of knowledge these species were not listed as requiring any sort of special concern. The bar seems to be set rather high for ‘proving’ a link between EFH and fish production and the burden of proof is clearly shifted to those who believe EFH is important.” (Drinkwater 2004, p.21)

The conclusions and recommendations of the CIE report confirmed the need to take action in the absence of definitive functional linkages between habitat components and groundfish production. Questions of how much habitat is necessary to protect in order to sustain the productivity of groundfish were at the time of Amendment 19, and are currently, unanswerable given the state of the science. Instead, the approach became to minimize the footprint of mobile bottom tending gear fisheries over time to discrete areas in a way that maximizes habitat conservation and minimizes impacts to the fishery.

This is consistent with the precautionary approach established in the NMFS Final Rule regarding levels of information for identifying EFH. Federal regulations on EFH state that a hierarchical approach should be used to organize the information necessary to identify and describe EFH (50 C.F.R. § 600.815(a)(1)(iii)(A)). Four levels are defined. Levels 1 and 2 indicate that there is information documenting co-occurrence or association, however, not enough information to draw conclusions about the relative importance of particular habitat types, whereas Levels 3 and 4 indicate that the level of information is sufficient to evaluate whether fitness advantages conferred by a particular habitat type (i.e., functional associations). Importantly, these distinctions relate to the amount of information, not the results or findings of the information. The implication of the information levels is the burden of proof necessary to conclude that a certain habitat type is a component of EFH for a given FMP species. For example, if information is only available at Level 1, then documented occurrence of an FMP species with a habitat type is sufficient to conclude that such habitat constitutes EFH. For Level 4, evidence of a clear functional relationship is necessary to for concluding a habitat types is EFH. Therefore, the degree or strength of evidence necessary to declare a habitat as EFH is contingent on the level of information. In other words, all components of habitat are to be considered part of EFH for groundfish until proven otherwise. Therefore, the need to establish a functional relationship between groundfish and corals and sponges only exists if information is available to make such a determination.

The EFH Final Rule (Section 600.815(a)(1)) describes how “habitat use” is to be inferred when information is Level 1:

In the event that distribution data are available only for portions of the geographic area occupied by a particular life stage of a species, habitat use can be inferred on the basis of distributions among habitats where the species has been found and on information about its habitat requirements and behavior. Habitat use may also be inferred, if appropriate, based on information on a similar species or another life stage.

This same section also defines the burden of proof standard to be used by the Councils:

Councils should interpret this information in a risk averse fashion to ensure adequate areas are identified as EFH for managed species. Level 1 information, if available, should be used to identify the geographic range of the species at each life stage. If only Level 1 information is available, distribution data should be evaluated (e.g., using a frequency of occurrence or other appropriate analysis) to identify EFH as those habitat areas most commonly used by the species.

Use of the term “risk averse” in this context makes clear that the law and regulations do not require proof of causality before designating EFH, but rather use of whichever level of information is available. When information is at Level 1, any habitat that fish are associated with should be designated as EFH. The nationwide EFH final rule made clear:

“It is not appropriate to require definitive proof of a link between fishing impacts to EFH and reduced stock productivity before Councils can take action to minimize adverse fishing impacts to the extent practicable. Such a requirement would raise the threshold for action above that set by the Magnuson-Stevens Act.” 67 Fed. Reg. 2354 (Jan. 17, 2002).

Observations of fish outside any given habitat type do not provide evidence that such habitat types are not EFH. First, habitat use does not need to be obligate to affect the population of fish. For example, facultative and fortuitous habitat use has been shown to enhance fish populations even if the habitat use is not obligate (Mumby et al. 2004). Second, there may be various forms of complex habitat in a given area, giving fish several options to use as shelter. In this case, for example, removal of some of the complex habitat (i.e., corals) decreases the availability of suitable habitats, even though other suitable habitats still remain. Reducing the availability of suitable habitat reduces the carrying capacity of the species that uses the habitat, even if other suitable habitat remains, hence reducing productivity (Rubec et al. 1999). Therefore, even if corals and sponges are not the only type of complex habitat available to fish, their damage or removal may reduce the productivity of fish. Furthermore, if biogenic habitat is only utilized by fish at certain times of the year, it may have a strong influence on survivorship or reproductive success. For example, a fish may depend on the presence of biogenic habitat only at specific events such as spawning periods or at different times of day (e.g., diel shifts in habitat use). Even though these events may be infrequent, they have a strong effect on population dynamic processes that determine productivity. Therefore, the absence of fish in biogenic habitat at one specific moment in time is not evidence that the habitat is not linked to the survivorship or fecundity of commercial fish and invertebrates.

Amendment 19 and the associated FEIS contained an extensive literature review of the habitat use by FMP groundfish. The general conclusion of that review is that while detailed quantitative assessments of habitat use and linkages to groundfish productivity were lacking, there are clearly documented associations and co-occurrences between several species of FMP groundfish and structure-forming invertebrates, including corals and sponges.

On this basis, Amendment 19 took a precautionary approach based largely on Level 1 information showing co-occurrence in both the designation of EFH (where corals and sponges are included as components) and in the management of MSA fishing activities, as the presence of corals and sponges was among the primary criteria for area closures to bottom trawl fishing gear. Furthermore, NOAA asserted: “NOAA has determined that certain fishing practices, especially those using mobile bottom-tending gear (including beam and otter trawls, dredges, and other mobile fishing gear that is dragged along the ocean floor) may adversely affect deep-sea corals and sponges and the communities that depend upon them” (70 Federal Register 39700, July 11, 2005). The co-occurrence of groundfish with these biogenic habitats was sufficient to trigger the MSA requirement to minimize adverse impacts. The PFMC chose to focus new protective measures on the gear type with the highest relative impacts on habitat (i.e., bottom trawling) and on the habitat types that were either most sensitive to trawling with long recovery times (i.e., biogenic habitats, hard substrate, seamounts) or were not yet subject to trawling (i.e., freeze the footprint). NMFS (2006) affirmed that such actions were “necessary and appropriate to take precautionary action to protect EFH from the possible adverse impacts of fishing.”

In summary, the approach taken by NMFS and the PFMC in Amendment 19 was not optional, but required on a coastwide basis based on the best available science and legal mandate.

### 3.4.2 Our Current Understanding

#### *Advances in NOAA Policy*

Since the adoption of Amendment 19, new amendments were made to the Magnuson-Stevens Act in 2006, and new NOAA policies and additional scientific information have both reaffirmed and bolstered the validity of the PFMC’s approach. The value of protecting deep sea coral and sponge ecosystems was recognized to extend beyond their value as EFH for managed fish, and Congress added new provisions to give Regional Councils new authority to protect deep sea corals and sponges from fishing impacts; Congress also established a new Deep Sea Coral Research and Technology Program within NOAA (MSRA Section 408).

Subsequently, NOAA published its NOAA Strategic Plan for Deep-Sea Coral and Sponge Ecosystems (NOAA 2010), including the following management objectives related to fisheries:

1. Protect areas containing known deep-sea coral or sponge communities from impacts of bottom-tending fishing gear.
2. Protect areas that may support deep-sea coral and sponge communities where mobile bottom-tending fishing gear has not been used recently [e.g., in the past 5 to 20 years or other appropriate period], as a precautionary measure [i.e. freeze the footprint].
3. Develop regional approaches to further reduce interactions between fishing gear and deep-sea corals and sponges.
4. Enhance conservation of deep-sea coral and sponge ecosystems in National Marine Sanctuaries and Marine National Monuments.

The strategic plan identified the primary legal bases for implementing these policies as being the MSA requirements to minimize bycatch (Sec. 301(a)(9)) and minimize adverse impacts on EFH (Sec. 303(a)(7)), as well as MSA authority to establish protective measures (Sec. 303(b)(2)(B) and 303(b)(12)) and National Marine Sanctuaries Act authority to implement management measures within Sanctuaries.

The strategic plan indicates that NMFS will be identifying areas of high coral and sponge distribution and will request the Councils and Tribes evaluate new bottom trawl closures in these areas to minimize bycatch and physical damage from fishing gear, with anticipated products to include “Enhanced protection from fishing gear impacts of areas known to contain high concentrations of deep-sea corals or sponges” (NOAA 2010, PP.26-27).

*The EFHRC Committee Process*

In 2008, the Council considered two interim proposals for modifying regulations to EFH outside the EFH 5-year review process, but postponed action on those proposals. In doing so, the Council declared that the upcoming 5-year review would be the appropriate time to consider proposals for EFH modifications on a coastwide basis.

In Phases 1 and 2 of the current EFH 5-Year Review process, the EFHRC, NMFS, and external contractors put a tremendous amount of effort into updating the information base on which the Council can make decisions regarding modifications to the management of fishing impacts on EFH. New information includes:

- New data showing previously unknown locations of habitat types meeting criteria for protections (corals, sponges, sea pens, hard and mixed substrate) in areas open to trawling throughout the US west coast (Phase 1 Report, Section 3);
- New data brought forward on locations of coral and sponge bycatch, which is a direct indicator of adverse impacts to these habitat types (Phase 1 Report, Section 3);
- Literature reviews confirming previous understanding of fishing impacts (Phase 1 Report, Section 4);
- New data on fishing locations and effort (Phase 1 Report, Section 4);
- Assessment of habitat type coverage by permanent trawl closures (NMFS Synthesis, Section 2); and
- New maps of fishing impacts based on the Amendment 19 index (NMFS Synthesis, Section 4).

The amount of new information on coral and sponge distribution across the US west coast (largely compiled by NOAA’s Deep Sea Coral Research and Technology Program) cannot be understated; the number of distinct records of U.S. West Coast coral observations has increased 42-fold and sponge observations 10-fold since Amendment 19 was adopted.

Year	Coral Records	Sponge Records
2005 (Amend 19; as compiled by Shester and Warrenchuk 2007))	2,396	1,294
2014 (EFH Phase 1 Data)	102,289	12,988

The EFHRC concluded by consensus that the NMFS Synthesis report and Phase 1 reports, "...provide a sufficient basis for anyone wishing to submit a proposal for changes to groundfish essential fish habitat." (Supplemental EFHRC Report, April 2013, Agenda Item D.6.c). In addition, the EFHRC developed a series of consensus conclusions about the available information in the Phase 1 Report and NMFS Synthesis, including the identification of significant new areas outside EFH Conservation areas throughout the U.S. West Coast EEZ containing habitat types that the Council prioritized for protection in Amendment 19, including corals and sponges and hard substrates (Supplemental EFHRC Report, April 2013, Agenda Item D.6.c). This statement also concluded that the "[EFH conservation areas] resulted in minimal disruption of bottom trawl fishery dynamics."

The EFH Review Committee previously identified a top priority task for completion as a part of Phase 2, concurrent with the proposal process, to "Re-assess the role of corals and sponges as habitat for groundfish based on an updated literature review" (Supplemental EFHRC Report, April 2013, Agenda Item D.6.c). Therefore, concurrent with the Phase 2 process, conservation organizations took the initiative to contact external experts and engaged them to conduct a review of newly available literature on this topic. This literature review was presented to the full Committee for consideration as part of the Phase 2 report. The Chair and Council staff declined to consider this literature review in its report, and we are submitting the review as public comment and as part of the record of the Council's consideration of this agenda item (March 2014 Agenda Item D.2.d, Public Comment). Based on this review, studies with Level 1 information show further associations of numerous FMP groundfish species with corals and sponges, and at least some Level 2 studies have documented higher abundances of certain FMP groundfish in areas with higher densities of corals and sponges.

Building on previous work during the interim proposal process, the EFHRC developed and the Council adopted a Request for Proposals (RFP) for modifications to EFH, with minimal content requirements to allow for full participation, and the Council established clear guidelines under which the EFHRC would conduct a high-level evaluation of proposals. The suite of proposals generated through the RFP process indicates a comprehensive suite of opportunities to increase protections for sensitive habitats in areas with relatively low recent bottom trawl effort. The proposals used a wide range of criteria for protection, including corals, sponges, hard and mixed substrate, canyons, seamounts, freezing the footprint, and habitat representation. The proposals also identify specific areas that could be reopened while increasing overall protections on a regional and coastwide basis. It appears from the proposals that significant additional potential may exist to prevent adverse impacts to habitat in a manner consistent with the Council's approach in Amendment 19. Since the proposals themselves are considered new information in the context of the 5-year review, the Council's need for action may and should be informed by the needs, objectives, and opportunities outlined in the proposals.

In summary, new information provided in the Phase 1 and 2 Reports, NMFS Synthesis, and the suite of proposals together provide a strong basis for revising the Amendment 19 fishing measures at a coastwide scope during this 5-year review. The new data reveals significant continued bottom trawl effort overlapping with sensitive habitats, as well as ongoing bycatch of corals and sponges, and

suggests that bottom trawling is continuing to cause adverse impacts to EFH throughout the U.S. West Coast. While perfect information is not available for managing EFH, the potential for long-term and irreversible adverse impacts indicates that precautionary action should be taken to reduce the impact of bottom trawling on benthic habitats in the Pacific region.

### 3.4.3 Recommendations

Minority recommendations with respect to Magnuson-Stevens Act fishing activities and EFH are subdivided into the following categories.

#### *Recommendations for the Scope of Phase 3 regarding MSA Fishing Impacts*

1. Consider the full suite of proposals and the full geographic scope of the West Coast EEZ during Phase 3 unless and until quantitative NEPA analysis indicates that certain aspects of proposals are not warranted or inconsistent with the ongoing requirements to minimize bycatch and impacts to EFH to the extent practicable or with the Council's newly established discretionary authorities.
2. Conduct an analysis of fishing impacts using a Long-Term Effect Index, as suggested in recommendation 4 of the majority's Section 3, EFHRC Phase 2 Report.
3. Reaffirm the Council's precautionary approach to protecting sensitive habitat types that was established in the EFH Final Rule and Amendment 19.
4. Consider establishing new and additional EFH Conservation Areas prohibiting bottom trawl gear to protect hard, mixed, and soft substrates, as well as deep sea corals, sponges, sea pens, and other biogenic habitats in Phase 3, on the same legal and scientific grounds as were present in Amendment 19.
5. Include within the scope of Phase 3 the consideration of new MSA discretionary authorities to protect deep sea corals and sponges, and the ongoing MSA requirement to reduce bycatch of corals and sponges to the extent practicable.
6. Acknowledge in the scope of Phase 3 that the need to protect corals and sponges as EFH has been further established by new scientific studies of habitat associations with groundfish at information Level 1 and 2 (as defined in the EFH Final Rule) as well as by new NOAA policies to protect deep sea corals and sponges.
7. Enhance communication and consultation with Tribal governments regarding any proposed changes to EFH.

#### *Recommendations for Establishing the Purpose and Need of Phase 3*

New information brought forward in Phases 1 and 2 of the EFH review indicates previously unidentified geographic areas throughout the U.S. West Coast EEZ that contain sensitive habitat types meeting PFMC

criteria for protection as EFH Conservation Areas. The following recommendations are offered for Council consideration regarding the purpose and need for action in Phase 3.

1. Ensure that fishing impacts to EFH continue to be minimized to the extent practicable, based on the ongoing mandate in the MSA.
2. Minimize bycatch of corals, sponges, and other structure-forming invertebrates in the groundfish fishery to the extent practicable.
3. Refine and modify the network of EFH Conservation Areas in light of information and analyses that have become available subsequent to the adoption of Amendment 19, as contained in the Phase 1 and 2 products of this EFH 5-year review.
4. Refine EFH Conservation Area boundaries to increase both fishing opportunities and habitat protections based on newly available data on habitat types and fishing effort at finer spatial scales than were available in the Amendment 19 process.
5. Take advantage of new opportunities for more cost-effective conservation of EFH based on collaborative stakeholder dialogue and consensus.
6. Make adjustments to allow for increased fishing opportunities in areas where impacts are likely to be less severe, provided that overall local and regional habitat protections are maintained and/or strengthened.
7. Ensure adequate protections for sensitive habitats currently within the Rockfish Conservation Areas, to ensure that adverse impacts of fishing on EFH continue to be minimized and prevented as these areas are considered for reopening.
8. Continue to manage EFH in an adaptive and iterative way as envisioned by Amendment 19 and the nationwide EFH regulations.

#### *Recommended Guidance for NMFS Science Center Assessment of Amendment 19*

Much of the majority's EFHRC Phase 2 report discusses concerns with the lack of an assessment of Amendment 19. The Council in fact has requested such an assessment, and at the March 2014 meeting the Council is scheduled to provide guidance to the NMFS Science Centers on the desired contents of this evaluation. We suggest the following questions and focus areas as a starting point to help guide the NMFS assessment of Amendment 19 toward useful products that will inform the Council's decision making in Phase 3.

1. What are the long-term effects of current fishing patterns on sensitive habitats as identified by the Council (e.g., corals, sponges, sea pens, hard & mixed substrates)?
2. To what extent has Amendment 19 minimized the bycatch of corals, sponges, and sea pens? Identify discrete geographic locations where this bycatch is occurring at the highest rate.
3. Were there any discernable economic impacts on the groundfish fishery, local or coastwide, attributable to the implementation of EFH Conservation Areas? Specifically, were there increased costs or decreased revenues, or changes in landings?
4. Develop and display results of a long-term effect index displaying the impacts of each fishing gear type on various habitat types, including but not limited to hard corals, sponges, and hard substrate.

5. How accurate is the trawl footprint closure? To what extent are there remaining areas not subject to bottom trawling since Amendment 19 that fall outside EFH conservation areas? Identify the locations of such areas.
6. How has our knowledge of the protection levels of sensitive habitat types (corals, sponges, sea pens, hard substrate, seamounts, submarine canyons) changed since Amendment 19 was adopted?
7. In the area shallower than 700 fathoms, are there zones and/or depth ranges with disproportionately low levels of protection relative to others?
8. To what extent are there areas that may contain corals or sponges that have not been trawled since implementation of Amendment 19, which are currently open to trawling?
9. Which EFH Conservation Areas resulted in the greatest relative displacement of bottom trawl effort after Amendment 19, and to what extent have groundfish catch rates in the vicinity of those areas changed since 2006?

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