ECOSYSTEM FISHERY MANAGEMENT PLAN

The Pacific Fishery Management Council (Council) first voted to move forward with incorporating ecosystem-based fishery management principles through an Ecosystem-Based Fishery Management Plan (EFMP) in November 2006 and refined the intent in April 2007. The plan envisioned by the Council at that time would not replace the existing Fishery Management Plans (FMPs), but would advance fishery management under these FMPs by introducing new theories, new scientific findings, and new authorities to the current Council process. The EFMP would serve as an "umbrella" plan over the four existing fishery management plans, helping with coast wide inter-FMP scientific information, policy guidance, and research planning; creating a framework for status reports on the health of west coast ecosystems; and dealing with comprehensive area-based measures in a full ecosystem context.

In November 2009, the Council made progress on developing an EFMP by appointing members of an Ecosystem Plan Development Team (EPDT) and an Ecosystem Advisory Subpanel (EAS). Additionally, the Council provided guidance on the initial tasks for these two new advisory groups. The Council reviewed its record of decisions and guidance and heard reports from the Scientific and Statistical Committee, the Habitat Committee, and the public before assigning the following initial tasks to the EPDT, the EAS, and Council staff:

- Schedule presentations by scientists from the NMFS Northwest and Southwest Fisheries Science Centers on the state of the science in support of ecosystem-based fishery management.
- Review the Council record of dialogue on ecosystem-based fishery management including statements by the Council, its Advisory Bodies, and the public.
- Review the existing Council fishery management plans (FMP) to identify existing approaches and commonalities regarding ecosystem approaches to management.
- Inventory ecosystem-related management tools for their applicability to the EFMP process.
- Review existing ecosystem-based management efforts of other regional fishery management councils.
- Prepare a report to the Council that includes a draft statement of purpose and need; a list of initial goals and objectives; a range of options on 1) the geographic range of the EFMP, 2) the regulatory scope of the EFMP, and 3) the management unit species within the EFMP.

The EPDT has developed a report (Agenda Item H.1.b, Attachment 1) that is built on many of the November 2009 tasks and is a focused response to the last task on the list above. The EPDT and the EAS worked closely in the report's development through a joint session and subsequent separate meetings to refine the report and provide initial information and recommendations on proceeding with EFMP development. Summary minutes of key meetings are included in the briefing materials under Agenda Item H.1.b and H.1.c. Additionally, the EPDT and the EAS are each preparing supplemental reports that will include comments and recommendations intended to assist Council decision-making on the direction of and next steps for an EFMP.

Because an EFMP and ecosystem-based management principals will likely have cross-cutting and broad applications for Council fishery management activities, the EPDT and the EAS have expressed interest in soliciting input from many of the Council's Advisory Bodies early in the process. Accordingly, several of the Advisory Bodies scheduled to attend the September Council meeting will discuss the EFMP, including the Scientific and Statistical Committee, the Habitat Committee, the Groundfish Management Team, and the Groundfish Advisory Subpanel.

Council Action:

1. **Review and comment on the EPDT report, *Ecosystem-Based Management Planning for U.S. West Coast Fisheries.***
2. **Provide guidance on the draft purpose and need statements and goals and objectives of the EFMP.**
3. **Provide guidance on the format and regulatory scope of the initial EFMP.**
4. **Adopt a geographic range and scale for the EFMP.**
5. **Consider scheduling regular Council updates on the science of ecosystem-based management and the status of the ecosystem.**
6. **Provide guidance and tasks on the next steps, future work, and schedule on EFMP development.**

Reference Materials:

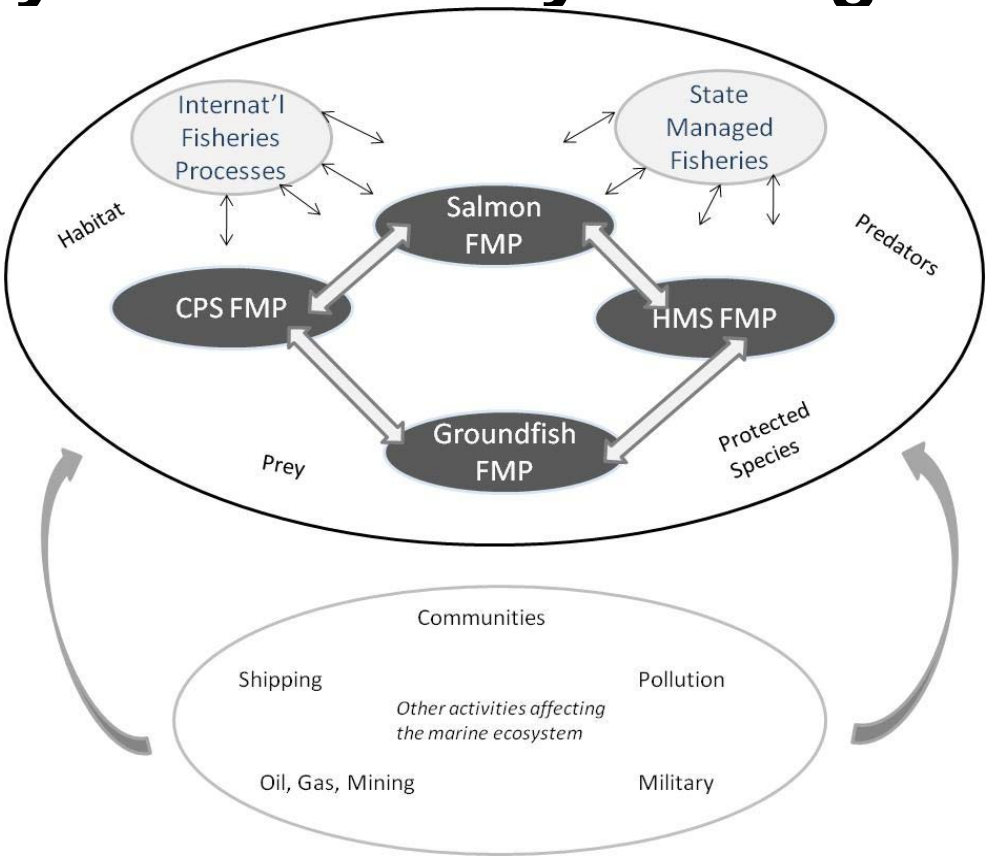
1. Agenda Item H.1.b, Attachment 1: *Ecosystem-Based Management Planning for U.S. West Coast Fisheries*.
2. Agenda Item H.1.b, Attachment 2: Summary Minutes of the July 21, 2010 meeting of the EPDT.
3. Agenda Item H.1.b, Supplemental EPDT Report.
4. Agenda Item H.1.c, Attachment 1: Summary Minutes of the May 4, 2010 meeting of the EAS.
5. Agenda Item H.1.c, Supplemental EAS Report.

Agenda Order:

a. Agenda Item Overview **Mike Burner**
b. Report and Recommendations of the Ecosystem Plan Development Team (EPDT) **Yvonne deReynier**
c. Reports and Comments of Advisory Bodies and Management Entities
d. Public Comment
e. **Council Action**: Review Recommendations of the EPDT and Provide Guidance for Further Development of the Ecosystem FMP

PFMC
08/20/10

H.1 Ecosystem Fishery Management Plan



September 13, 2010

2001 – 2006 Channel Islands Nat. Marine Sanctuary MPAs

- Council reviewed new and existing alternatives for fishing regulations for marine protected areas within the CINMS
- NOAA determination - “insufficient factual and scientific basis” exists for prohibiting fishing in the water column portion of CINMS “no take” MPAs to protect essential groundfish habitat

  Council authority limited to conservation and management of fish stocks in the four FMPs and the habitats they rely on

2001 – 2006 CINMS MPAs - Continued

•CINMS Decision Document amended to allow promulgation of fishing regulations under the NMSA

•Council action – (Nov. 2006) 1) (short term) Pursue MPA regulations via marine research reserves under MSA and CA State authority 2) (long term) initiate a new Ecosystem Fishery Management Plan (EFMP)

June 2006

The Council requested the Habitat Committee (HC) and the Scientific and Statistical Committee (SSC) review:

- Past Council actions that address Ecosystem-Based Fishery Management (EBFM) approaches
- EBFM efforts of other Regional Councils
- Current scientific literature on EBFM and the potential science available in support of a potential EBFM plan

November 2006

HC and SSC EBFM Subcommittee held a joint meeting

- Existing EBFM approaches around the nation and the world
- Role of science and economics in EBFM
- EBFM implementation in the Council process

April 2007

Council reviewed a staff white paper that outlined a programmatic approach to implementing an evolving EFMP to identify ecosystem principles and potential new authorities of interest to the Council

The Council passed a motion regarding the next steps in development of an Ecosystem FMP (contingent upon securing funding)

(1) a description of the purpose and need
(2) a list of goals and objectives of an Ecosystem FMP

National Marine Fisheries Service volunteered to provide support and informational presentations

2009

Council acquired funds to initiate EFMP development following a broad pursuit of financial support. The Council appointed members of an Ecosystem Plan Development Team and an Ecosystem Advisory Subpanel and assigned initial tasks for these two new advisory groups at its November 2009 meeting.

Requested Council Guidance

At this meeting

- Review and comment on the EPDT report, ***Ecosystem-Based Management Planning for U.S. West Coast Fisheries***
- Provide guidance on the draft purpose and need statements and goals and objectives of the EFMP
- Provide guidance on the format and regulatory scope of the initial EFMP
- Adopt a geographic range and scale for the EFMP

Next Steps

- Consider scheduling regular Council updates on the science of EBFM and the status of the ecosystem
- Provide guidance and tasks on the next steps, future work, and schedule on EFMP development

ECOSYSTEM FISHERY MANAGEMENT PLANNING FOR U.S. WEST COAST FISHERIES

August 2010

PREPARED BY:

PACIFIC FISHERY MANAGEMENT COUNCIL
ECOSYSTEM PLAN DEVELOPMENT TEAM
7700 NE AMBASSADOR PLACE, SUITE 101
PORTLAND, OREGON 97220-1384
(503) 820-2280

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Table of Contents

1 Introduction

At its November 2009 meeting, the Pacific Fishery Management Council (Council or Pacific Council) discussed ecosystem-based fishery management planning and assigned the following series of tasks to Council staff and to the Council's newly-formed Ecosystem Plan Development Team (EPDT) and Ecosystem Advisory Subpanel (EAS):

- Schedule presentations by scientists from the National Marine Fisheries Service (NMFS) Northwest and Southwest Fisheries Science Centers on the state of the science in support of ecosystem-based fishery management.
- Review the Council record of dialogue on ecosystem-based fishery management including statements by the Council, its advisory bodies, and the public.
- Review the existing Council fishery management plans (FMPs) to identify existing approaches and commonalities regarding ecosystem approaches to management.
- Inventory ecosystem-related management tools for their applicability to the ecosystem-based fishery management planning process.
- Review existing ecosystem-based fishery management efforts of other regional fishery management councils (FMCs).
- Prepare a report to the Council that includes statement of purpose and need; a list of initial goals and objectives; a range of options on the geographic range of an ecosystem-based fishery management planning document, the regulatory scope of the plan, and the management unit species within an Ecosystem FMP (EFMP); and list miscellaneous issues to be addressed by an EFMP.

This report is intended to be the EPDT's response to the final task on the Council's list, although it touches on some of the other tasks. The EPDT developed this report with substantial, and greatly appreciated, aid and comment from the EAS. This report is the EPDT's first product for Council and public review, and it concerns a subject that has a broad range of interpretations both within and beyond the Pacific Council process. The EPDT considers this report and any suggestions or recommendations herein as preliminary guidance intended to help and inform the Council as it initiates its discussions on ecosystem-based fishery management.

Note: Throughout this report, we use the term "EFMP" broadly, to include any kind of ecosystem planning document the Council might choose to develop. We recognize that the term "FMP" has a particular definition under the law, and that the Council has not yet chosen the format of the ecosystem planning document it wishes to develop. The Council may or may not choose to develop a document with the authorities and obligations of an FMP. The term "EFMP" is used herein for the sake of simplicity, because that is the term the Council process has used since it first began discussing these issues. No Council decision is implied in our use of the term.

2 Pacific Council Interests in Ecosystem Fishery Management Planning

In recent years, U.S. FMCs have expressed broad interest in ecosystem-based fishery management, with each council taking a different approach to incorporating ecosystem information into their fishery management processes. In keeping with published literature, the Pacific Council has discussed implementing ecosystem-based fishery management in a deliberative and iterative fashion, gradually adopting ecosystem goals, objectives and management actions, rather than a revolutionary upheaval to replace current management structures and objectives (EPAP 1999, Link *et al.* 2002, Pikitch *et al.* 2004, Field and Francis 2006, Francis *et al.* 2007, Murawski 2007, Marasco *et al.* 2007). The Council has implemented ecosystem-based fishery management principles through several existing actions, including a krill fishing ban, conservative harvest control rules for forage species, implementation of extensive area closures and marine protected areas, and the use of ocean survival indicators for determination of allowable fishery effects on coho salmon. The Council has also employed spatial management concepts for years and has recommended closed areas to rebuild overfished species, minimize bycatch, and preserve essential fish habitat.

In November 2006, the Council moved to begin development of an EFMP for waters off Washington, Oregon, and California. The Council saw an EFMP as providing the fishery management process with additional ecosystem information, and enabling comprehensive and coordinated fishery regulation in the exclusive economic zone (EEZ,) while also allowing more species-specific management to continue under the Council's four FMPs. The Council has expressed the intent to use an EFMP for long-term planning, particularly in improving and coordinating spatial management initiatives.

The Council maintains a detailed history of its EFMP considerations on its ecosystem-based management timeline website (http://www.pcouncil.org/ecosystem-based-management/ecosystem-management-timeline/). Since 2006, the Council has worked primarily through its Habitat Committee (HC) and with its Scientific and Statistical Committee (SSC) and that committee's Ecosystem Subcommittee to discuss bringing ecosystem science and ecosystem-based fishery management into the Council process. In the fall of 2009, the Council acquired funds to begin EFMP development and then appointed members of an EPDT and an EAS, providing initial tasks for these two new advisory groups.

The EPDT is a 13-member group of State, Federal, and Tribal scientists and policy analysts. The EAS is an 11-member multi-disciplinary group representing west coast industry, policy, and conservation interests. The EPDT and the EAS will apply their unique perspectives and broad expertise in close coordination to provide the Council with analyses and recommendations on science in support of ecosystem-based fishery management principles and to develop goals, objectives, and policy alternatives for Council consideration as the EFMP takes shape over the next few years.

The EPDT and the EAS held their first meeting as a joint session in Portland, Oregon on February 10-11, 2010. The meeting focused on the Council's initial tasks and ways the group could most effectively develop the requested report. The meeting also allowed some time to discuss the broad range of perspectives from members of the EAS and the EPDT on ecosystem-based fishery management planning and how it could be applied to the Council process. The EPDT developed its first draft of this report by April 2010, which was then reviewed and discussed by the EAS at its May 4, 2010 meeting in Portland, Oregon. The EPDT subsequently met, again in Portland, Oregon, on July 21, 2010 to review its report and EAS recommendations, and to make plans for revising the report in preparation for inclusion in the Council's September 2010 meeting's briefing book.

3 Consideration and Statement of Purpose and Need for Ecosystem-Based Fishery Management Planning and for a Planning Document

One of the Council-assigned tasks for the EPDT was a draft statement of purpose and need for an EFMP. Although purpose and need statements are required as part of National Environmental Policy Act (NEPA) analysis documents, the Council is not yet at a NEPA analysis stage in its process of considering EFMP development. Therefore, this section instead uses the discussion of purpose and need as an independent planning aid, not as it is more narrowly and formally used in NEPA analysis.

The purpose of and need for an ecosystem-based fishery management framework should come from the Council's mandates, authorities, and policy preferences and the general concepts and principles of ecosystem approaches to management. This section discusses the purpose of and need for ecosystem-based fishery management planning in general, and provides a potential draft statement on the purpose of and need for an ecosystem-based planning document within the Council process.

3.1 Ecosystem-Based Fishery Management Planning

In scientific literature, explorations of the purpose of and need for ecosystem-based fishery management often begin with a definition of what it is. Definitions of ecosystem-based fishery management use new terms —such as ecosystem services, biodiversity, resilience, etc.—yet these terms are just new labels on principles that have long been discussed as part of sustainable development or sustainability. In U.S. fisheries law, the 1976 Fishery Conservation and Management Act used these concepts to define conservation and management measures as assuring that: "a supply of food and other products may be taken and that recreational benefits may be obtained, on a continuing basis; irreversible or long-term adverse effects on fishery resources and the marine environment are avoided; and there will be a multiplicity of options available with respect to future uses of these resources" (FCMA 1976).

Ecosystem approaches to management are still about societal choice among competing objectives (Shepherd 2004). Fundamentally, ecosystem-based fishery management recognizes that fisheries both affect and are affected by the marine environment, and that what we do to address these effects via policy-making is a matter of societal choice. The purpose of the ecosystem approach is not to prescribe particular policy choices, but rather to promote better understanding of those policy choices. Ecosystem-based fishery management is meant to compliment current single-species approaches to fisheries management by providing additional information that may be used to expand the scope of these approaches into the future. Finally, ecosystem-based fishery management does not create additional mandates to protect the marine environment, but instead seeks to better understand fishery effects on the marine environment through improved information on ecosystem structure, processes and functions. As explained by Walters and Martell (2004), ecosystem-based fishery management aspires to:

> "provide a capability for fisheries scientists to respond to a broader set of policy questions and predictive demands than can single species analysis. These questions lead to a much broader set of options for future ecosystem management than might ever be imagined by thinking only of species populations one at a time."

With that broader set of policy options and the analytical tools to evaluate them, ecosystem-based fishery management should inform the policy process and provide for a transition from the setting of management targets only on individual components of the ecosystem to the setting of management targets on the ecosystem as a whole (NRC 2006). As explained in international guidance on ecosystem-based fishery management, it is intended:

> "to reflect the merging of two different but related and—it is hoped—converging paradigms. The first is that of ecosystem management, which aims to meet its goal of conserving the structure, diversity and functioning of ecosystems through management actions that focus on the biophysical components of ecosystems (e.g. introduction of protected areas). The second is that of fisheries management, which aims to meet the goals of satisfying societal and human needs for food and economic benefits through management actions that focus on the fishing activity and the target resource (FAO 2003)."

Ecosystem-based fishery management focuses both on "the impact of fisheries on the environment (including biodiversity, species interactions, and habitat), and the impact of the environment on fisheries (including natural variability and climate change)" (Garcia and Cochrane 2005). The end goal is to understand the linkages between ecosystem well-being and human well-being (FAO 2003; MEA 2005). Working toward this goal will involve difficult scientific and analytical challenges related to the measuring and monitoring of these linkages, the specification of ecosystem reference points for guiding management actions, and the identification and valuation on the full spectrum of policy choices associated with human well-being (Barbier 2010; Moore and Russell 2010; Quinn and Collie 2005; Link 2005; FAO 2003).

The widespread call for moving toward ecosystem-based fishery management arises out of a recognition that, when we do not explicitly weigh trade-offs, they will be resolved by default (Walters and Martell 2004). Our difficulty in quantifying and analyzing trade-offs and effects does not mean those trade-offs and effects are not occurring. Ecosystem-based fishery management can proceed without quantitative analysis and can be approached "more [as] an issue of context and mindset than of method." (Francis *et al.* 2007). At the same time, the call for ecosystem-based fishery management also recognizes that attempts to account for potential impacts and hidden tradeoffs without quantitative analysis can leave policy makers with uncertain choices and arbitrary bases for decisions (Hilborn 2009; Hilborn and Stokes 2010). The FMC process, where near- and long-term social goals and legal requirements are weighed through integrated scientific analyses, offers a unique venue for bringing together a large suite of interests and ideas for implementing ecosystem-based fishery management.

3.2 Ecosystem-Based Fishery Management Planning Within the Council Process

The purpose of an EFMP is to guide expansion of the Council process from species-specific management programs to include ecosystem science and broader ecosystem considerations and management policies that coordinate Council management across its FMPs and the California Current Ecosystem (CCE).

The needs for ecosystem-based fishery management within the Council process are: (1) to ensure that management of any one of the Council's fishery groups (coastal pelagic species, groundfish, halibut, highly migratory species, and salmon) does not negatively affect the management potential of the other species groups, non managed species, or their habitats; and (2) to keep the Council updated on current and potential effects on the CCE from human and natural causes (e.g., creation of dredge pile islands, industrial contamination, climate change, etc.). Council decisions on fisheries management throughout the CCE should benefit from more and better information on the biophysical and socio-economic systems that support West Coast fish and fisheries.

4 Consideration of Potential EFMP Goals and Objectives

Each of the Council's species group FMPs has a set of goals and objectives (see Appendix B). This section provides potential goals and objectives for a Council EFMP. As with the statement of purpose

and need, the Council's ultimate goals and objectives will depend on the format that the document takes. In providing these potential goals and objectives, we are both responding to one of the Council's directions from November 2009, and providing a basis for public discussion on directions Council planning might take.

The overarching goal of this EFMP is to bring a greater understanding of the CCE to the Council participants and the public, so as to provide broad consideration and analysis of social, economic, and ecological policy options across the Council's areas of responsibility. The EFMP and its associated scientific products are intended to support Council decision-making by more fully addressing the goals and objectives shared by all FMPs for a healthy ecosystem with productive and sustainable fisheries, and vibrant fishing communities.

The Council's four existing FMPs each have suites of goals and objectives that differ in their precise language, but have four common themes that are consistent with an ecosystem approach to fishery management: avoid overfishing, maintain stability in landings, minimize impacts to habitat, and accommodate existing fisheries sectors. (See Appendix B for details.) The Coastal Pelagics FMP also explicitly recognizes the role of the target species in the food web; this is the only FMP that specifies a need to "provide adequate forage for dependent species." The following potential EFMP objectives, in keeping with the potential goal, are intended to be served by a plan or dedicated effort to integrate management across all the FMPs:

- Provide a vehicle to better inform Council decision-making by improving and integrating information that may affect species from multiple FMPs, such as trends in climate conditions or indicator species.
- Identify and address gaps in ecosystem knowledge, particularly with respect to the cumulative effects of fishing on marine ecosystems, and provide recommendations to address such gaps.
- Provide an ecosystem context for Council decisions that may involve common management concerns or trade-offs among species-specific FMPs.
- Provide administrative structure and procedures for coordinating conservation and management measures that address inter-species relationships across FMPs and with ecosystem components not included in the FMPs.
- Provide a nexus to regional and national ecosystem-related endeavors, particularly with respect to the consequences of non-fishing activities.
- Provide a framework for the consideration of cooperative management strategies that might facilitate management actions at appropriate spatial scales.

5 Regulatory Scope and Management Unit Species

At its November 2009 meeting, the Council's direction to the EPDT included a team report on the potential regulatory scope of an EFMP and on potential management unit species within an EFMP. These two questions are strongly connected and are dealt with together in this section.

The Council's and NMFS's regulatory authority over fisheries and marine resources is granted and bounded by the MSA. Under the MSA, FMCs exercise authority over fish and fisheries by the development and amendment of FMPs and the adoption of fishery conservation and management measures. The MSA and its implementing regulations formally define the regulatory authorities within an FMP and define the types of regulatory actions that may be possible for management unit species. In this early stage of the Council's ecosystem based fishery management planning process, the Council can help itself and the public better understand its intent for the future by assessing:

- The particular management actions the Council wishes to recommend for living marine resources and their habitats within the West Coast EEZ, and whether those authorities may be exercised under the MSA;
- Whether there are species the Council wishes to manage or monitor under an EFMP that are not currently managed under a Council FMP, or if any of the current Council FMP species would be more appropriately managed under an EFMP;
- Whether the Council wishes to use the EFMP as a vehicle for the MSA-sanctioned regulatory activities that are not required to be tied to specific species or FMP species groups.

The MSA requires the Council to prepare an FMP "for each fishery under its authority that requires conservation and management" (MSA Section 302(h)(1)). An FMP provides a FMC and NMFS with regulatory authority over fishing activities for the species listed in that FMP's fishery management unit (FMU). Any species of fish within a council's geographic area of authority may be named as part of an FMP's FMU. The Pacific Council's geographic area of authority is the fisheries in the Pacific Ocean EEZ seaward of Washington, Oregon, and California (MSA Section 302(a)(1)(F)).

Section 3(13) of the MSA defines "fishery" as: (A) one or more stocks of fish which can be treated as a unit for purposes of conservation and management and which are identified on the basis of geographic, scientific, technical, recreational, and economic characteristics; and (B) any fishing for such stocks." The term "fish" includes "finfish, mollusks, crustaceans, and all other forms of marine animal and plant life other than marine mammals and birds" (MSA Section 3(12).) National Standard 3 directs that: "To the extent practicable, an individual stock of fish shall be managed as a unit throughout its range, and interrelated stocks of fish shall be managed as a unit or in close coordination" (MSA Section 301(a)(3)). The National Standard Guidelines connect these terms by clarifying that, "A fishery management unit (FMU) means a fishery or that portion of a fishery identified in an FMP relevant to the FMP's management objectives. The choice of an FMP's FMU depends on the focus of the FMP's objectives, and may be organized around biological, geographic, economic, technical, social, or ecological perspectives." National Standard 3, taken together with the Council's fish and fishery conservation and management authority means that, if the Council wishes its EFMP to have regulatory authority, the EFMP must have FMU species. Potential Council authority or influence over the management of fish and other marine species in ocean ecosystems may be broadly separated as:

- Fishing activities for FMU species within a Council FMP;
- Fishing activities for species not within a Council FMP;
- Non-fishing activities that may affect the essential fish habitat (EFH) of FMU species within a Council FMP, and;

- Non-fishing activities that may affect the ecosystem(s) of which Council-managed species are a part.

We next discuss each of these types of activities, the manners in which they may be addressed in a FMC process, and how an ecosystem planning or regulatory document may or may not be useful in addressing these activities.

5.1 Fishing Activities for Fishery Management Unit Species

When a FMC chooses the species within an FMP's FMU, it is essentially choosing to manage any directed or non-directed fisheries for those species. Which species this Council includes in its potential EFMP's FMU will depend on how the Council wishes to use the EFMP. For example, if the EFMP were to be used as the primary authority for managing all the fisheries under the Council's jurisdiction, then all those species and their fisheries would be designated as the EFMP's FMU. This approach would be similar to that taken by the Western Pacific Fishery Management Council, which has converted its former species group FMPs into geography-based Fishery Ecosystem Plans (FEPs), which have all the required characteristics of FMPs, yet are arranged by geography rather than taxonomy. However, if the regulatory authority of the EFMP is intended to address either species for which there is neither a current nor future-desired fishery, or to address only issues that cross several of the Council's current species group FMPs, then the EFMP's FMU will be much more limited. We provide a range of potential EFMP formats that address these uses of FMUs in Table 5.1, below.

5.2 Fishing Activities for Species Not Within a Council FMP

Ecosystem-based fishery management for the CCE will bring new information into the Council process on a broad range of marine species, including species not defined as fish under the MSA, and species for which there is no fishery. Some species may be of interest to the Council for their roles as indicators of CCE health and productivity, even if those species are neither under Council management (e.g. state-managed fisheries or lower trophic level species), nor under potential Council jurisdiction except as bycatch to be avoided (like marine mammals, turtles, and seabirds). In describing alternative potential FMUs for the EFMP, this document assumes that the Council may request and discuss information on any species and its ecosystem relationships with other species (or even recommend action by other entities outside MSA authority to conserve and manage those species), regardless of whether it has the authority or inclination to name that species to an FMU in any of its FMPs.

The 2006 revisions to the MSA changed the authorization for Councils to "designate zones where, and periods when, fishing shall be limited, or shall not be permitted, or shall be permitted only by specified types of fishing vessels or with specified types and quantities of fishing gear," to require that such closure (Section 303(b)(2)(C):

> (i) is based on the best scientific information available;
> (ii) includes criteria to assess the conservation benefit of the closed area;
> (iii) establishes a timetable for review of the closed area's performance that is consistent with the purposes of the closed area; and
> (iv) is based on an assessment of the benefits and impacts of the closure, including its size, in relation to other management measures (either alone or in combination with such measures), including the benefits and impacts of limiting access to: users of the area, overall fishing activity, fishery science, and fishery and marine conservation."

The 2006 MSA revisions also added authority for FMCs to designate fishery closure zones to protect deep sea corals from physical damage by or interactions with fishing gear (MSA at Section 303(b)(2)(B)).

In support of this provision, the 2006 reauthorizing act also added Section 408 to the MSA, which requires NOAA Fisheries to establish a deep sea coral research and technology program. The agency's 2007 report, The State of Deep Coral Ecosystems of the United States, discusses current scientific information on deep sea corals and includes a chapter on west coast deep sea corals (NMFS 2007).

The MSA authorizes FMCs to exercise these general authorities without specifying how they are to be organized within FMPs. The South Atlantic Fishery Management Council (SAFMC) has an FEP that informs their actions taken under the authorities of their species group FMPs. The SAFMC has recently used its FEP to recommend establishing Coral Habitat Areas of Particular Concern, but is implementing those recommendations through linked amendments to each of its species group FMPs (SAFMC 2009). In other words, the SAFMC retains its authority within its species group FMPs, while using its FEP process to facilitate discussions on issues that affect all their FMPs.

5.3 Non-Fishing Activities that may Affect the EFH of Fishery Management Unit Species

Under the MSA, FMCs have the authority to use FMPs to identify EFH for managed species and to identify any adverse effects on EFH. Councils are permitted to comment on and make recommendations to the Secretary of Commerce or any Federal or State agency "concerning any activity authorized, funded, or undertaken or proposed to be authorized funded or undertaken, by any Federal or State agency that, in view of the Council, may affect the habitat, including essential fish habitat, of a fishery resource under its authority" (Section 305(b)(3)(A)). Councils are required to comment on and make recommendations regarding activities that are likely to substantially affect the habitat of anadromous species, such as Pacific Coast salmon (Section 305(b)(3)(B)). If the Council chooses to pursue an FEP intended primarily to inform its work across species group FMPs, rather than an EFMP with regulatory authority, it could use that FEP to organize comments on non-fishing activities that may affect EFH in several of its FMPs or that may affect non-Council species that interact with Council-managed species from several FMPs. Alternately, an EFMP with regulatory authority could serve the same cross-FMP organizing function, plus add EFH designations for any species included as part of that EFMP's FMU. Any ecosystem planning process the Council undertakes, whether it results in an FEP, EFMP, or other document, will have the significant benefit of serving as a coherent and comprehensive public statement of the Council's priorities for conservation and management of marine resources in the CCE.

5.4 Non-Fishing Activities that may Affect the Ecosystem(s) of which Council-Managed Species are a Part

Under NEPA, the Council has the opportunity to comment on any federally-managed or -permitted activities that it believes may affect Council-managed species or any portion of the ecosystem or ecosystems of which those species are a part. Similar state environmental review laws also provide comment opportunity on state-managed or –permitted activities. Unfortunately, ensuring that the Council has a voice in NEPA and other environmental review discussions relevant to the CCE can be logistically challenging when mandated review periods for actions affecting the environment do not fit within the Council's meeting schedule. As with non-fishing activities that may affect EFH of Council-managed species, a Council-generated EFMP will help guide analysis by agencies looking at non-fishing activities within the CCE and connected ecosystems. Instead of the Council finding itself in the position of having to alert agencies addressing non-fishing activities that the Council might wish to comment on those activities, it will be able to point to its EFMP at the beginning of the analysis process and request that analyses of non-fishing activities assess the effects of those actions on the species, inter-species relationships, and natural processes of the CCE.

Under the Regulatory Flexibility Act, the Council has an opportunity to comment on any draft regulations that may affect small businesses (such as fishing businesses), small entities (usually non-profit), or small

government agencies (such as small coastal municipalities). The Council could use its EFMP as a basis for assembling more comprehensive information on the dependency of fishing communities on fishery resources, the vulnerability of those communities to changes in resource availability, and the resilience of those communities to economic change. Such an EFMP could help to strengthen the voices of fishing community members as they assess the potential future effects that non-fishing activities may have on the CCE and on their communities.

An EFMP could also have a role in national and West Coast governance of ocean resources. National and regional programs on coastal and marine spatial planning will require input from FMCs. An EFMP would articulate Council priorities for a healthy ocean ecosystem, and could improve the effectiveness of Council engagement with external entities that manage non-fishing activities that may affect the CCE.

5.5 Ecosystem Fishery Management Planning in Other Fishery Management Councils

Three FMCs (North Pacific, Western Pacific, and South Atlantic) have created FEPs for one or more of the ecosystems under their respective authorities. Each council has taken a different approach to the framing of and philosophy behind their FEPs. However, each FMC has also ensured that they have addressed their managed species under the MSA framework for FMP requirements.

North Pacific Fishery Management Council – Aleutian Islands FEP (2007)

> "The goal of this FEP is to provide enhanced scientific information and measurable indicators to evaluate and promote ecosystem health, sustainable fisheries, and vibrant communities in the Aleutian Islands region."
>
> "…the FEP was developed to provide the Council with an understanding of important relationships among ecosystem components, which are not always considered together by managers. The FEP also identifies areas of uncertainty, describes how the Council may currently be addressing the associated risk, and provides suggestions for other tools the Council may wish to consider."

The FEP provides background information and analyses on the Aleutian Islands ecosystem:

- describes and synthesizes the Aleutian Islands ecosystem processes and interactions,
- delineates the regulatory and bio-physical boundaries of the Aleutian Islands,
- conducts a qualitative risk assessment of Aleutian Islands interactions,
- uses management objectives of Aleutian Islands fisheries to identify Council priorities for the FEP,
- identifies ecological indicators appropriate to monitor key ecosystem interactions,
- identifies knowledge gaps and research needs,
- provides a framework by which ecosystem considerations identified herein could be implemented within the current Council structure and management practice.

The North Pacific Fishery Management Council (NPFMC) also completed an Arctic FMP in 2009 (NPFMC 2009), implemented at 50 CFR 679. Very little data or analyses are available on any fish species within the U.S. Arctic EEZ. The Arctic FMP provides an example of an FMP primarily intended to close a large geographic area to fishing for fish stocks about which little is known. The Arctic FMP

has three so-called target species for its FMU, none of which are subject to targeting beyond subsistence fishing, and a suite of ecosystem component (EC) species.[1]

South Atlantic Fishery Management Council – Fishery Ecosystem Plan (2009)

> "The FEP will serve as a source document that will, over time, present more detailed information describing the South Atlantic ecosystem and the impact of the fisheries on the environment. As a living document, the FEP will provide a greater degree of guidance on incorporation of fishery, habitat, or ecosystem considerations into management actions, such as bycatch reduction, prey-predator interactions, maintenance of biodiversity, and identification of spatial management needs."

The SAFMC has a history of detailed and FMP-spanning work on EFH issues. In their EFH work, the SAFMC had considered the effects of fishing and non-fishing activities on both the EFH of individual species in their FMPs and on the collective EFH of all of their FMPs taken together. The South Atlantic FEP grew out of their work on EFH and their desire to have a cross-FMP source of information about biophysical ecosystem of their managed species, and about the effects of fisheries and non-fisheries activities on that ecosystem. The FEP is a multi-volume document that includes, but is not limited to:

- oceanographic and climate features of the South Atlantic Bight,
- locations of South Atlantic Fishery Management Council (SAFC) management areas,
- descriptions of the species and habitats (Council-managed and not) within the South Atlantic Bight,
- the South Atlantic human and institutional environment,
- spiny lobster economics and social environment,
- maps of commercial fisheries catch in the South Atlantic management area, by latitude/longitude blocks,
- perceived threats to the South Atlantic ecosystem and recommendations for addressing those threats, and
- description of research and data needs.

Western Pacific Fishery Management Council – Fishery Ecosystem Plans by Geographic Area (2009)

> "The Magnuson-Stevens Fishery Conservation and Management Act (MSA) authorizes FMCs to create fishery management plans (FMP). The Western Pacific Regional Fishery Management Council developed this Fishery Ecosystem Plan (FEP) as an FMP, consistent with the MSA and the national standards for fishery conservation and management. The FEP represents the first step in an incremental and collaborative approach to implement ecosystem approaches to fishery management in [*the FEP area – same language used across FEPs*]."

In December 2009, the Secretary of Commerce approved five new geography-based FEPs that had been drafted by the Western Pacific FMC for: American Samoa, Hawaii, Mariana Archipelago, Pacific remote island areas, and western Pacific pelagic fisheries. These FEPS all meet the MSA requirements for FMPs and FMP species. The FEPs explicitly do not establish any new fishery management regulations, but are

[1] 50 CFR 600.310(d)(5)(i): *To be considered for possible classification as an EC species, the species should: (A) Be a non-target species or non-target stock; (B) Not be determined to be subject to overfishing, approaching overfished, or overfished; (C) Not be likely to become subject to overfishing or overfished, according to the best available information, in the absence of conservation and management measures; and (D) Not generally be retained for sale or personal use.*

intended to provide a place from which FMCs may address ecosystem-based management principles in the future.

5.6 Beyond Council Documents

As discussed throughout this report, ecosystem-based fishery management planning is not simply about adding a new document to the suite of FMPs that bound the Council's regulatory authority. Beyond an EFMP, there are numerous actions the Council can take to help itself and the public think more about how Council-managed species interact with each other and their environment, including:

- Review the Council's 2008 Research and Data Needs (PFMC 2008) Section 2.0, Ecosystem-Based Fisheries Management, to determine whether the highest priorities set in this document are being met and if not, whether they can be met.
- Through the SSC, develop recommendations on a desired suite of natural and socio-economic ecosystem science products that could be useful to the Council process.
- As new appointments to Council advisory bodies become available, consider whether those bodies have adequate representation from persons with cross-species or ecology expertise.
- During the Council's EFH review process for its four FMPs, ensure that the EFH, habitat areas of particular concern (HAPCs), and any EFH closed areas designated for all Council species or species groups can be mapped in compatible fashions so that the Council and the public can review EFH designations and other areas across all the Council's FMPs.
- Early in each Council meeting week, preferably on the first meeting day, schedule a presentation on science in support of ecosystem-based fishery management (11/09 Council recommendation). If the Council opens a tradition of scheduling ecosystem issues early in its meeting weeks, then ecosystem concerns can better frame subsequent Council discussions throughout each meeting week.

Table 5.1: Alternative Fishery Ecosystem Plan (FEP) and Ecosystem Fishery Management Plan Formats				
	Advisory FEP	**Umbrella EFMP with Selected FMU and EC Species**	**Regional Omnibus EFMP**	**Coastwide Omnibus EFMP**
Plan Format Summary	Similar to the NPFMC's Aleutian Islands FEP and the SAFMC's FEP, this FEP would provide information on the biophysical processes of and West Coast community ties to the CCE. The FEP would not be a framework for regulations, but would provide information that could be used to support regulations under the Council's species group FMPs.	Fishing activities for Council-managed species would continue to be managed under species group FMPs. Select species that are important to the CCE as a whole would be within the EFMP's FMU, and could be targeted (or not) according to Council management recommendations. Unless designated as an EFMP FMU species, all targeted and non-target bycatch species would continue to be managed under appropriate species group FMPs.	Similar to the WPFMC's FEPs, the West Coast EEZ would be split into several biogeographic provinces, with management frameworks for all the current Council-managed species merge into region-specific FMPs. Existing EC species and management frameworks for those species could be added to the appropriate FMPs under this EFMP format.	This omnibus EFMP would merge all the current FMPs to provide regulatory authority for all Council-managed species within the CCE within the same document. Existing EC species and management frameworks for those species could be added to the FMP under this EFMP format.
		All the ecosystem information available under the Advisory FEP would also be available under any of these EFMP formats. In addition, the existing FMPs could incorporate ecosystem information available under the Advisory FEP through FMP or regulatory amendment.		
Fishery Management Unit (FMU) Species	None. Because this format is informational, no species would be subject to management under this FMP.	FMU would include any species that does not now easily fit within one of the Council's species group FMPs, or is currently beyond any of those FMPs but in need of Council management. EC species, as a component of the fishery, may be included in the EFMP for any of the following reasons: For data collection purposes; for ecosystem considerations related to specification of OY for the Council-managed fisheries; as	All species from current Council FMPs for a given geographic region, plus any additional predators or prey species the Council may wish to add and that fall within the definition of "fish" under the MSA, including EC species.	All species from current Council FMPs, plus any additional predators or prey the Council may wish to add that fall within the definition of "fish" under the MSA, including EC species.

		considerations in the development of conservation and management measures for the Council-managed fisheries; or to address other ecosystem issues. Species that are vulnerable to Council-managed fisheries would continue to be included in the appropriate species group FMP.		
Potential activities regulated and range of authorities	No fishing activity would be regulated under the FEP format.	All fishing activity currently authorized for management under the MSA would continue to be authorized for FMU species.	All fishing activity currently authorized for management under the MSA would continue to be authorized for these regional omnibus EFMPs. EC species could be added to the appropriate EFMPs.	All fishing activity currently authorized for management under the MSA would continue to be authorized for this omnibus FMP. EC species could be added to the EFMP.

6 Geographic Range and Scale

In keeping with the Council's November 2009 direction, this section addresses the potential geographic range and scale of a Council EFMP.

The geographic range of an EFMP for U.S. West Coast fisheries may be evaluated using by three major concepts: management authority, physical and ecological characteristics, and socio- economic or political jurisdictions. The Council has management authority over fisheries within the U.S. West Coast EEZ, which ranges from the Canadian border to the Mexican border and from state marine boundaries (3 nautical miles) seaward to 200 nautical miles offshore. Council authority also includes U.S. vessels fishing for FMP-managed species, when those vessels fish within or seaward of the EEZ and land their fish in California, Oregon, or Washington. Landward of the EEZ, Council authority is seated in EFH designation, and in its responsibility to comment on and make recommendations regarding activities that may affect habitats of fishery resources under its authority.

The U.S. defines the biophysical realm of the CCE using the Large Marine Ecosystem (LME) concept, based on four linked ecological criteria: bathymetry, hydrography, productivity, and tropic relationships. Globally, the California Current LME is one of 64 distinct LMEs (UNEP 2008.) Like most ecosystems, the boundaries of the California Current LME are not strictly delineated, but it can be generally defined as extending from north-central Vancouver Island southward to southern tip of the Baja California. Physically, the California Current is one of four major global "eastern boundary currents," consisting of strong southward flow in the offshore region, and dominated by strong upwelling in the nearshore coastal areas. The ecosystem is characterized by its high productivity, due primarily to nutrient enrichment via upwelling. The system is heavily influenced by basin-scale climate signals, such as the El Niño Southern Oscillation and the Pacific Decadal Oscillation, resulting in highly variable inter-annual and inter-decadal ecosystem productivity. Thus, oceanographic forces play a large role in regulating the CCE's biological populations and communities, and its energy flow and ecological dynamics.

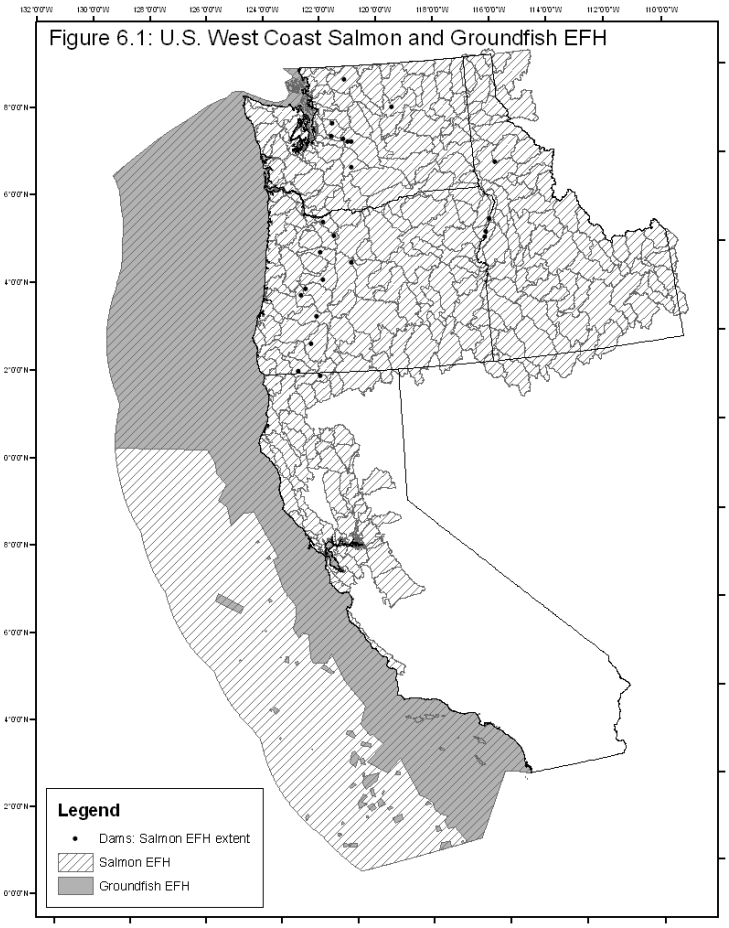

Figure 6.1: U.S. West Coast Salmon and Groundfish EFH

The socioeconomic boundaries of interest to the Council are shaped by the large and small coastal communities and fisheries of California, Oregon, Washington and Idaho. These include the economies of major estuaries, such as the San Francisco Bay, the Columbia River and the Puget Sound, but also those of smaller ports and economies of the four states.

In developing the geographic range of an

EFMP, the Council should consider the dynamic relationship between the three major interacting elements of the ecosystem: the geographic scope and spatial scale of management, biophysical processes, and socioeconomic regions. As with the EFMP's potential management unit species, there are geographic areas that are not under Council authority or influence, but which are of interest to the Council for informational purposes. Two examples are the biophysical boundaries of the ecosystem, including the EEZ itself, plus upland watersheds for Council-managed salmon stocks, and marine waters beyond the U.S. EEZ for highly migratory species. If the EFMP is to be an evolutionary and living document, the Council might limit the initial geographic scope of the EFMP to the U.S. EEZ, with the intent that later EFMP iterations include marine and terrestrial systems beyond the EEZ. As shown in Figure 6.1, the Council's salmon and groundfish EFH together cover the entire West Coast EEZ plus significant upland territory.

In addition to beginning with the EEZ and anticipating later expansion outward, the Council might also consider subdividing the EEZ into smaller biogeographic regions. Based on overall air-sea climate and rainfall patterns, the CCE can be divided into three major regions from north to south: the Pacific Northwest (including northern California), central California, and the Southern California Bight (Lester et al, 2010). Hydrographically, these regions can be further subdivided in the onshore-offshore direction into three major zones: the nearshore zone characterized by strong upwelling, the offshore zone characterized by the strongly southward flowing core of the California Current, and the furthest offshore zone characterized by either downwelling or weak curl-driven upwelling (Rykaczewski and Checkley, 2008). The CCE can also be further divided, based on the Cape to Cape concept (Francis *et al.*, 2008); due to topography, several major (and several more minor) capes along the coast exert substantial influence on both upwelling and the path of the California Current, leading to more localized regions of enhanced upwelling, "upwelling shadow" areas, areas of enhanced retention, and spawning points for meanders, eddies, and jets of the California Current itself. A nested approach to defining smaller, cohesive, segments of the CCE may help the Council to best match the spatial scales of biological populations, ecological communities and human communities for particular management issues.

7 The State of Ecosystem Science

Comprehensive reviews of ecosystem philosophies, principles, modeling approaches and other strategies abound in the scientific literature, as well as in the grey literature of management documents and records. This short review of the state of science for ecosystem-based management is not comprehensive, but is intended to briefly illustrate the general scope of ecosystem science by discussing: (1) philosophical guidelines or principles for implementing an ecosystem approach to fishery management, (2) the role and availability of multispecies and ecosystem models to provide strategic management advice with respect to ecosystem issues and trade-offs among policy objectives, (3) the development and role of ecosystem indicators, including reports on ocean and climate conditions and integrated ecosystem assessments, (4) the potential role of integrated ecosystem assessments, and (5) ecosystem-based management in practice. There is overlap among these broad and general types of tools, but they are distinct enough to frame a short review of how such tools have evolved and could be used by managers.

7.1 Philosophical guidelines or principles for implementing Ecosystem based management

Throughout the published literature it is commonly stated that ecosystem-based fisheries management will require a suite of research efforts and products before it can be successfully implemented. However, many of the more philosophical research efforts and associated publications on ecosystem-based management have addressed management more broadly, rather than on a laundry list of data sources, methodologies and models. This literature argues that broad principles could be adopted to guide management decisions regardless of the quantity and quality of data available to managers. In principle, an ecosystem-based approach to management could be adopted without abundant information, data and precise knowledge of ecosystem interactions, by simply making management decisions in the context of those principles.

One guiding principle addresses the issue of poor knowledge of ecosystem interactions directly, by recommending that management "be cognizant of the levels of ignorance in which it is working" (Mangel *et al.* 1996). This comment recognizes the common criticism that it would be folly to adopt an ecosystem based approach to management because of the presumed immaturity of the science. All management actions involve making decisions in the face of uncertainty, ecosystem-based management simply expands the scope of the uncertainty and trade-offs to a broader scale. Thus, successful implementation of ecosystem-based fishery management may be seen as management within the existing legal and institutional structure, but with additional guiding principles for decision-making.

Examples of Ecosystem Principles and Guidelines for Management (paraphrased) from Scientific Literature

Grumbine's (1994) five goals for sustaining ecological integrity:

- Maintain viable populations of all native species in situ.
- Represent, within protected areas, all native ecosystem types across their natural range of variation.
- Maintain evolutionary and ecological processes (disturbance regimes, hydrological processes, nutrient cycles, etc.).
- Manage over periods of time long enough to maintain the evolutionary potential of species and ecosystem.
- Accommodate human use and occupancy within these constraints.

The Ecosystem Principles Advisory Panel's (EPAP 1999) eight guiding principles for marine ecosystem management:

- The ability to predict ecosystem behavior is limited.
- Ecosystems have real thresholds and limits that, when exceeded, can affect major system restructuring.
- Once thresholds and limits have been exceeded, changes can be irreversible.
- Diversity is important to ecosystem functioning.
- Multiple scales interact within and among ecosystems.
- Components of ecosystems are linked.
- Ecosystem boundaries are open.
- Ecosystems change with time.

Pikitch *et al.* (2004) propose that the overarching objective of ecosystem-based fishery management is to sustain healthy marine ecosystems and the fisheries they support, under these guidelines:

- Avoid degradation of ecosystems, as measured by indicators of environmental quality and system status.
- Minimize the risk of irreversible change to natural assemblages of species and ecosystem processes.
- Obtain and maintain long-term socioeconomic benefits without compromising the ecosystem.
- Generate knowledge of ecosystem processes sufficient to understand the likely consequences of human actions.

Francis *et al.* (2007) ten "commandments" for implementing ecosystem-based fishery management:

- Keep a perspective that is holistic, risk-averse, and adaptive.
- Question key assumptions, no matter how basic.
- Maintain old-growth age structure in fish populations.
- Characterize and maintain the natural spatial structure of fish stocks.
- Characterize and maintain viable fish habitats.
- Characterize and maintain ecosystem resilience.
- Identify and maintain critical food web connections.
- Account for ecosystem change through time.
- Account for evolutionary change caused by fishing.
- Implement an approach that is integrated, interdisciplinary, and inclusive.

These guiding principles provide a holistic approach to fisheries management by emphasizing the relationships between the parts of ecosystem and the whole, informed by data, models and formal quantitative evaluation of tradeoffs and uncertainty that are a part of most management decisions.

While the literature on ecosystem principles is voluminous, key themes emerge. Grumbine (1994) highlighted the need to maintain viable populations and ecosystem types, and evolutionary and ecological processes. Similarly, the Ecosystem Principles Advisory Panel (EPAP 1999) highlighted the importance of diversity to ecosystem function and recognized that exceeding ecosystem thresholds or limits can lead to ecosystem reorganization. Pikitch *et al.* (2004) and Francis *et al.* (2007) list sets of guiding principles, and also recommend the use of indicators to evaluate environmental quality and status. Indicators are recommended so that scientists and managers may use them to consider ecosystem changes through time and evolutionary changes caused by fishing, and to constantly question key assumptions, no matter how basic they might seem. See accompanying text box for details.

Lists of ecosystem principles can provide meaningful guidance and insight for managing with an ecosystem context. These principles might also be reduced into a key overarching principle, for example Holling and Meffe (1996) described the "golden rule" of ecosystem management as "management should strive to retain critical types and ranges of natural variation in resource systems in order to maintain ecosystem resiliency." That golden rule is based on the observation that ecosystems have thresholds and can flip between alternative states when thresholds are breached – such states may or may not be reversible. Given a more socioeconomic perspective, McEvoy (1996) contends that the most important target for achieving sustainability is the "long-term health of the interaction between nature, the economy, and the legal system," recognizing the importance of evaluating the social and economic needs while maintaining ecological structure and dynamics.

7.2 Multispecies and ecosystem models

Typically, the role of all fisheries models, whether single or multispecies, is to understand and inform decision-makers of the consequences of fishing or other human activities to living resources and the ecosystem in which they exist (Hollowed *et al.* 2000). While there have been attempts to model the inter-specific and community dynamics of ecosystems, the complexity of these interactions, coupled with the data requirements needed for model validation and the computing power needed to run complex models, have historically been limiting factors in the development of models for use by managers. However, in recent decades, the science of modeling ecosystem interactions has advanced tremendously and monitoring efforts have assembled data appropriate for developing relatively data rich single and multispecies models for many ecosystems.

A wide range of multispecies and ecosystem models have been developed and published in peer-reviewed literature, and a limited, but growing, number have been used to help inform marine resource management decisions. Comprehensive reviews of the multispecies and ecosystem modeling tools available to marine researchers, with detailed consideration of their strengths, drawbacks, and best practices for developing such models, are available from both NMFS (Townsend *et al.* 2007, Link *et al.* 2009) and the United Nations Food and Agriculture Organization (Plagyani 2007). In short, ecosystem models are complex, predictability is limited, and formally addressing uncertainty poses a unique set of challenges. Yet the science behind such models has significantly improved in recent years, and many regions now have sufficient data to begin applying these models in resource management. Given the increasing number of ecosystem modeling approaches, clearly defined management goals and questions are important. As Hill *et al.* (2007) state, "Predictive models, especially in ecology, are rarely intended to provide an all-encompassing description of how a system actually works, but they are intended to forecast how certain characteristics of the system respond to a specific set of conditions." Models can also serve

as a stimulus and focus for initiating dialogues and discussions on future ecosystem trade-offs among management decisions.

Several published models are available for resources managed by the Pacific Council; an Ecopath with Ecosim model of the Northern California Current (north of Cape Mendocino) developed by Field *et al.* (2006), a seasonal model of the Oregon shelf ecosystem to evaluate the role of jellyfish (Ruzicka *et al.* 2007), and an Atlantis model of the California Current north of Point Conception documented in Brand *et al.* (2007). Some recent model applications include informing decisions such as the krill harvest ban (PFMC 2008), exploration of the role of Humboldt (jumbo) squid in the California Current (Field *et al.* 2007), analyses of potential ecosystem indicators (Samhouri *et al.* 2009), and comparative evaluations of ecosystem status from both single and multispecies perspectives (Worm *et al.* 2009). The Atlantis model in particular is likely to play a central role in quantifying trade-offs in future efforts to develop Integrated Ecosystem Assessments (IEAs) for the California Current (Levin *et al.* 2009).

Ecosystem models have also been used to formally evaluate tradeoffs between Pacific sardine as a directed fishery target and as forage for other commercially and ecologically important species (Hannesson et al 2009; Hannesson and Herrick, 2010). The sardine example represents a growing body of efforts to develop models that account for ecological and economic interactions (Finnoff and Tschirhart, 2003, 2004; Eichner and Tschirhart 2007). Such models consider the benefits and costs related to the use of fishery resources: (1) consumptive use; (2) non-consumptive use; and (3) indirect use of the resource in its natural state, and explore the consequences of alternative management actions to facilitate comparisons and trade-offs among management decisions. Extending this framework to more complex situations (e.g. multiple ecosystem functions, uncertainty, and dynamics) will require a great deal of detailed economic and ecological data, a commonality among all ecological and socioeconomic modeling approaches.

7.3 Ecosystem indicators, status reports, and integrated ecosystem assessments

The third type of ecosystem information for potential Council consideration includes ecosystem status reports, ecosystem indicators, and the results of IEAs. There are several products that could be adopted or otherwise incorporated into the Council ecosystem-based fishery management framework to inform decision making on the significance of environmental conditions to productivity and possible risk, as well as possible trade-offs among competing management objectives.

The State of the California Current (e.g., McClatchie *et al.* 2009) report is a comprehensive summary of physical climate and oceanographic trends (e.g. ocean temperatures, upwelling, basin scale indices such as El Nino) and biological productivity (zooplankton abundance, forage fish abundance, seabird and marine mammal productivity) taken from a wide range of monitoring and research efforts throughout the CCE. While the report is technical in nature, it provides an example of a publication that distills trends in ocean conditions and productivity in a way that may be informative for decision-makers. Similar documents are prepared for the North Pacific Fishery Management Council (The NPFMC Ecosystem Considerations Chapter, Boldt and Zador 2010), for the Department of Fisheries and Oceans in Canada (DFO 2009), and for the entire suite of ecosystems that constitute the North Pacific Ocean (PICES 2005). The Council has already begun to consider a summary of indicators for Pacific salmon management, based on work by Peterson *et al.* (2008) linking a suite of productivity metrics (ocean temperatures, timing of the spring transition, species composition and abundance of zooplankton communities). While these indicators are qualitative, they provide general guidance on the relative degree of productivity to be expected by salmon in the coastal ocean. Similarly, Wells *et al.* (2008) developed a statistical model that relates physical ocean and climate conditions with the productivity of lower, middle and higher trophic level species off of Central California, which could be used as an indicator of ecosystem productivity.

In addition to empirical indices or indicators of ocean conditions and productivity, both single and multispecies models provide estimates of resource productivity and status. The Council is familiar with single species reference points for stock status and trends. Ecosystem models are increasingly being used to develop indicators of ecosystem status, state or health, with one of the most cited criteria for useful indicators being that they can characterize the effects of fishing relative to standing biomass and productivity in an unambiguous and quantifiable manner (Murawski 2000). While the development of meaningful indicators remains a focal area of research, particularly through the use of simulation testing, suites of indicators may provide the most robust results. In general, it seems that indicators of key functional groups or at the level of community organization, such as zooplankton, forage fish and jellyfish, are most likely to characterize ecosystem state most reliably, possibly due to their rapid response to both direct and indirect changes in fishing pressure (Fulton *et al.* 2005; Samhouri *et al.* 2009). By contrast, indicators such as seabird biomass, or trophic level of the (fisheries) catch and total catch perform relatively poorly in simulation studies, although it remains necessary to validate these indicators with empirical data. Socio-economic indicators could represent the varied benefits that society derives from ecosystem services. Evaluating stakeholder interests will define these benefits, which in ecosystem-based fisheries management can be broadly categorized as: commercial fishing, recreation, and the environment. Each group benefits from better commercial fishing, better recreational fishing, bird watching, and other activities, and better stewardship, respectively. These indicators can provide practical and defensible measures of relative ecosystem value that can then be used to evaluate ecosystem-based fishery management planning alternatives.

7.4 Integrated Ecosystem Assessments

In recent years, the concept of IEAs has been promoted as a means to provide an appropriate interface between ecosystem science and the management community. The IEA approach builds upon risk analysis methods, and is best described as "A formal synthesis and quantitative analysis of information on relevant natural and socioeconomic factors, in relation to specified ecosystem management objectives" (Levin *et al.* 2008, Levin *et al.* 2009, deReynier *et al.* 2010). IEAs are not meant to replace current management approaches, but rather to highlight the tradeoffs and conflicts among competing objectives that are associated with management decisions. IEAs would likely draw upon both ecosystem models and model-based or empirical ecosystem indicators, by using risk analysis approaches to determine the probability that a given indicator may shift to, or stay in, an undesirable state in response to human activities and/or natural processes. IEAs could also use a management strategy evaluation approach to simulate ecosystem behavior and allow the ability to forecast changes in ecosystem state in response to management scenarios or decision rules, simultaneous with assessment of the empirical indicators based on in-situ ecosystem monitoring efforts. Recently, the Northwest Fisheries Science Center (NWFSC) and the Southwest Fisheries Science Center (SWFSC) have together secured funding to support preliminary development of IEA products for west coast marine resources, which should provide opportunities for the Council and its advisory bodies to become exposed to and provide feedback upon such initiatives.

7.5 Ecosystem based management in practice

While the science and the literature regarding ecosystem-based management are broad, examples of these products being applied in practice are limited (Tallis *et al.* 2010, Lester *et al.* 2010). The Alaska Fishery Science Center (AFSC) is a world leader in both compiling the necessary data and in developing quantitative food web models using those data (e.g., Aydin and Mueter 2007, Gaichas *et al.* 2009, Kinsey and Punt 2009). Results from AFSC ecosystem research are regularly brought before the NPFMC, and have been used to qualitatively guide decisions in conjunction with the results of traditional single species assessments. For example, in 2006 the NPFMC SSC recognized that while the Eastern Bering Sea Pollock stock was above the target (MSY) level, the stock had been declining due to poor recruitment, and ecosystem indicators suggested declines in zooplankton (prey), while an ecosystem model indicated

an increase in juvenile predation by arrowtooth flounder (predators). The NPFMC SSC consequently recommended adopting a reduction in the maximum permissible ABC to account for these concerns.

Ecosystem advice has also been developed to inform management of Antarctic krill, by the Commission for the Conservation of Antarctic Marine Living Resources. Key management questions for Antarctic krill revolve around how to spatially allocate the allowable catch in a manner that minimizes the potential effects on krill-dependent predators. As the key uncertainties in this question relate to krill movement and advection rates, and the functional relationships between krill and their predators, several biophysical models have been developed to address these questions, and with which to explore competing hypotheses regarding krill movement and advection. As resource managers continue to be confronted with complex issues and trade-offs related to managed species and their complex interactions with climate conditions, other elements of the food web, and direct and indirect human activities, there is clearly a role for greater application of ecosystem principles, models, indicators and assessments of many flavors. Among the greatest challenges now is how to incorporate such guidance into the existing and continually evolving management framework to better understand the tradeoffs associated with management decisions.

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9 Appendix A: Example Practical Considerations for EFMP Alternatives

Need	Status Quo + (Do we need an EFMP?)	Advisory FEP	Umbrella EFMP with Selected FMUs	Regional Omnibus EFMP	Coastwide Omnibus EFMP
Meet PFMC Mission for Sustainable Fisheries Mgmt. **<u>Some Potential Benefits:</u>** 1) Improve information and decision-making 2) Identify information gaps 3) Integrate across species-specific FMPs 4) Provide a nexus with other ecosystem efforts 5) Establish a framework that enables mgmt. at the appropriate ecosystem scale for a species or species complex 6) Create incentives for improved stewardship 7) Encourage innovation by offering alternatives to achieve a more robust portfolio of fishing opportunities	Information and PFMC process improvements are limited and made on a case-by-case basis: Qualify some effects of management decisions and risks for one species on other ecosystem species, habitat, fisheries, communities, etc. Monitor and report other (non-PFMC) ecosystem efforts and provide input, as determined necessary and useful.	Non-regulatory plan provides a cohesive framework: Quantify effects of management decisions and risks for one species on another ecosystem species, habitat, fisheries, community, etc. Coordinated, organized and prioritized focus with identifiable goals for input to other ecosystem efforts.	Adds some regulatory authority/responsibility while maintaining current basic PFMC and FMP organization, structure and decision-making processes.	Revises PFMC and FMP organization, structure and decision-making processes to correspond to relevant ecological relationships. Adopt FMPs with specific FMUS for ecoregions. Some spp. may be included in a single FMP (e.g. cowcod), others in multiple FMPs (e.g. arrowtooth flounder, or northern lingcod) and some in all FMPs (e.g. thresher shark)	Consolidates all existing FMPs into a single FMP. Provides for simultaneous decision-making appropriate for the suite of ecosystem impacts. Provides greater consistency in goals, objectives, & processes across all current FMPs. Flexible FMP structure allows for changes in ecosystem understanding and information without requiring development of new FMPs. Allows for maintenance or revisions to PFMC and advisory group structure, as necessary.

Need	Status Quo + (Do we need an EFMP?)	Advisory FEP	Umbrella EFMP with Selected FMUs	Regional Omnibus EFMP	Coastwide Omnibus EFMP
Some PFMC Examples:					
Species, such as forage species	Qualitatively address forage fish issues: identify suite of spp. affected by anchovy harvests and nature of impacts on FMP species and fisheries, and non-FMP species. Will the salmon resource be affected (harmed) by the proposed anchovy harvest?	Explicitly address forage fish issues: Quantitatively assess sardine harvests on other FMP spp. and fisheries, and non-FMP spp. What are the effects on the salmon resource (and fisheries & communities) of the proposed anchovy harvest? How certain is it that these effects will occur (probabilities)?	Regulatory management for species like krill May selectively add new non-FMP managed species to an FMP	What are the impacts of the harvest of anchovies on other relevant resources, fisheries, habitats, and communities within Region X? What are the probabilities that these impacts will occur?	What are the impacts of the harvest of forage species on all other relevant resources, fisheries, habitats and communities on the West Coast? Make simultaneous management decisions for salmon, whiting, anchovy, sardine, smelt, albacore, etc. based on integrated ecosystem information.
Fisheries	Identify potential effort shifts among fisheries due to harvest opportunities for several target species: Will fishers for albacore tuna switch to fish more for salmon at the proposed salmon harvest level?	Quantify effort shifts among fisheries: To what degree will albacore fishers switch to/from salmon fishing as a result of the proposed salmon harvest level?	Explicitly account for harvest opportunities for FMU species in different FMPs, when setting management measures for these FMU species: Adjust salmon management measures and albacore management measures, as needed, to account for potential	When setting management measures in Region X, explicitly account for harvest opportunities for multiple FMU species within the regional FMP: Within Region X, account for potential efforts shifts between	Simultaneously set management measures that explicitly account for potential effort shifts among fisheries due to harvest opportunities for all FMU species.

Need	Status Quo + (Do we need an EFMP?)	Advisory FEP	Umbrella EFMP with Selected FMUs	Regional Omnibus EFMP	Coastwide Omnibus EFMP
			effort shifts between these fisheries.	salmon and albacore fisheries.	
Habitats	Identify how oceanographic processes may affect FMP fisheries: How does ocean acidification affect the food chain, and ultimately, the abundance of target FMU species?	Update and integrate information on EFH for all FMP species: Assemble available information to quantify areal extent and locations of habitat types important to each FMP species.	When setting harvest levels and management measures, assess and consider the effects of site development (e.g., energy facility), if any, on each FMP species and fishery.	Provide effective input to non-PFMC regarding activities potentially affecting PFMC mission: Within an FMP region, what are the kinds and level of impacts a proposed energy facility may have on the FMP species and fisheries?	For all FMU species, include oceanographic conditions in stock assessments and decision-making processes: Incorporate oceanographic information on the CCE into all stock assessments for FMU species on the West Coast.
Socio-Economic	For various fishing portfolio strategies, identify the annual revenue effects of proposed harvest levels and management measures for multiple FMU species: For small trollers, will they likely to receive more revenue if they switch to a different portfolio, e.g., target lingcod and salmon rather than other nearshore species?	For various fishing portfolio strategies, quantify the effects of proposed harvest levels and management measures for multiple FMU species on annual revenue: How much (more/less) annual income will large trollers receive if they primarily target albacore rather than salmon or groundfish ?	Evaluate socio-economic trade-offs among fishing portfolio strategies, and explicitly consider these when setting harvest levels and management measures for FMU species in different FMPs.	For a regional FMP, evaluate socio-economic trade-offs among fishing portfolio strategies, and explicitly consider these when setting harvest levels and management measures for all FMU species in the FMP.	For the West Coast, evaluate socio-economic trade-offs among fishing portfolio strategies, and explicitly consider these when simultaneously setting harvest levels and management measures for all FMU species and FMP fisheries.

Need	Status Quo + (Do we need an EFMP?)	Advisory FEP	Umbrella EFMP with Selected FMUs	Regional Omnibus EFMP	Coastwide Omnibus EFMP
Some PFMC Implementation Considerations	Within existing PFMC structure, focus more resources to: Acquire, organize, analyze and disseminate relevant ecological information (e.g., multi-species biology, oceanography, habitat, fisheries, socio-economics and their interrelationships) Improve utilization of relevant efforts (summaries, information, analyses) by non-PFMC entities Identify key non-PFMC ecosystem efforts to monitor or engage in. Implements priority revisions to PFMC structure and function (e.g., recommendations from EPDT and other advisory bodies)	Develop Terms of Reference for the delivery and review of ecosystem science to the PFMC PFMC adopt FEP (developed by EPDT)	If non FMP-managed species are included in the EFMP, then PFMC must set ACLs, OFLs, etc. for these new FMU species.	Reorganize information and decision-making from coastwide (generally fishery-related) to a regional basis (ecologically related). Set ACLs, OFL,s etc. for FMU species on a regional basis (e.g., like for fishery sectors in NS1 guidelines). Reorganize and potentially broaden advisory groups to correspond to regional FMPs. May need to revise existing rebuilding plans to account for different geographic scopes and FMU species in regional FMPs.	Provide significant resources and revise PFMC structure and operations to support very complex analytical and decision-making processes Provide for broad and timely communication among all relevant parties for information acquisition, analysis, and decision-making.

Need	Status Quo + (Do we need an EFMP?)	Advisory FEP	Umbrella EFMP with Selected FMUs	Regional Omnibus EFMP	Coastwide Omnibus EFMP
Some Potential Costs and Consequences: a) Resource costs for personnel, meetings, etc. b) Additional technical expertise c) Changes to Council organization or decision-making processes d) More complex decision-making e) Consultation with additional affected constituencies f) Effects on other entities (time, decisions and actions): governments, industry, NGOs, constituents, public g) Evaluation of EFMP performance h) Workload and time commitment from Council family to develop and implement EFMP while continuing current PFMC activities. Others?	Resources to assemble, organize, analyze and disseminate key information. Increase coordination among current advisory bodies.	Add resources and expertise to assemble, organize, analyze and disseminate all relevant information EPDT activities to draft plan PFMC and advisory bodies to review and approve plan SSC develop Terms of Reference for the delivery and review of ecosystem science to the PFMC	Add expertise and stakeholders to advisory panels. May inadvertently affect state-managed fisheries and resources.	Re-form and add advisory panels: likely broaden the range of scientific expertise needed and stakeholders affected. May take much more time to fully transition to new regional approach, for PFMC process adjustments and for developing new regional FMPs.	Timing of decision-making may be disadvantageous for some actions and advantageous for others. Evaluation of the outcomes of PFMC decisions could be more challenging and less timely.

10 Appendix B: Pacific Fishery Management Council Goals and Objectives from Each of its Four Species Group FMPs

This appendix provides the assembled goals and objectives from the Council's four species group FMPs: coastal pelagic species, groundfish, highly migratory species, and salmon. The goals and objectives of the four FMPs share four common themes that are consistent with an ecosystem approach to fishery management: avoid overfishing, maintain stability in landings, minimize impacts to habitat, and accommodate existing fisheries sectors. Those four larger themes emerge in a variety of ideas that are common across the FMPs, divided roughly in this table:

Pacific Council FMP Shared Goals and Objectives, by FMP Objective/Goal Number

Ecological	CPS	Gr. Fish	Salmon	HMS
Prevent overfishing and rebuild depleted stocks.	7	3	1	10
Provide adequate forage for dependent species.	6			
Describe, identify and minimize adverse impacts on essential fish habitat		5		14
Minimize bycatch (incl. protected species) and encourage full utilization of resources	5	9, 11	4	9, 17
Economic				
Achieve greatest possible net benefit (economic or OY) from resource	2	6	5	5
Promote efficiency and profitability in the fishery, including stability of catch	1	2, 7, 14	6	2
Accommodate existing fishery sectors	4	12	2, 3	4, 18
Minimize gear conflicts.	11	13		13
Minimize adverse impacts on fishing communities and other entities		15, 16	2, 3	3
Use gear restrictions to minimize need for other management measures wherever practicable		8		
Management				
Acquire biological information and develop long term research	8			11
Foster effective monitoring and enforcement.	9	1		12
Establish management measures to control fisheries impacts, use management resources effectively	10	4, 10		3, 15
Encourage cooperative international and interstate management	3		8	1, 6, 7, 8
Promote the safety of human life at sea		17	9	
Support enhancement of stock abundance			7	
Promote outreach and education efforts				16

All four FMPS are currently being amended to meet the new requirements of the MSA and its National Standard 1 guidelines and for other purposes, and are subject to change. The following list of FMP goals and objectives is a snapshot of those goals and objectives that were in place as of August 2010, and is provided herein to help the Council and the public consider the Council's management philosophy across its four FMPs and how that philosophy might be translated into goals and objectives for an EFMP.

10.1 Coastal Pelagic Species

Goals and objectives for the CPS FMP (not listed in order of priority):

1. Promote efficiency and profitability in the fishery, including stability of catch.
2. Achieve OY.
3. Encourage cooperative international and interstate management of CPS.
4. Accommodate existing fishery segments.
5. Avoid discard.
6. Provide adequate forage for dependent species.
7. Prevent overfishing.
8. Acquire biological information and develop long term research program.
9. Foster effective monitoring and enforcement.
10. Use resources spent on management of CPS efficiently.
11. Minimize gear conflicts.

10.2 Groundfish

The Council is committed to developing long-range plans for managing the Washington, Oregon, and California groundfish fisheries that will promote a stable planning environment for the seafood industry, including marine recreation interests, and will maintain the health of the resource and environment. In developing allocation and harvesting systems, the Council will give consideration to maximizing economic benefits to the United States, consistent with resource stewardship responsibilities for the continuing welfare of the living marine resources. Thus, management must be flexible enough to meet changing social and economic needs of the fishery as well as to address fluctuations in the marine resources supporting the fishery. The following goals have been established in order of priority for managing the West Coast groundfish fisheries, to be considered in conjunction with the national standards of the Magnuson-Stevens Act.

Management Goals

Goal 1 - Conservation. Prevent overfishing and rebuild overfished stocks by managing for appropriate harvest levels and prevent, to the extent practicable, any net loss of the habitat of living marine resources.
Goal 2 - Economics. Maximize the value of the groundfish resource as a whole.
Goal 3 - Utilization. Within the constraints of overfished species rebuilding requirements, achieve the maximum biological yield of the overall groundfish fishery, promote year-round availability of quality seafood to the consumer, and promote recreational fishing opportunities.

Objectives. To accomplish these management goals, a number of objectives will be considered and followed as closely as practicable:

Conservation

Objective 1. Maintain an information flow on the status of the fishery and the fishery resource which allows for informed management decisions as the fishery occurs.

Objective 2. Adopt harvest specifications and management measures consistent with resource stewardship responsibilities for each groundfish species or species group. Achieve a level of harvest capacity in the fishery that is appropriate for a sustainable harvest and low discard rates, and which results in a fishery that is diverse, stable, and profitable. This reduced capacity should lead to more effective management for many other fishery problems.

Objective 3. For species or species groups that are overfished, develop a plan to rebuild the stock as soon as possible, taking into account the status and biology of the stock, the needs of fishing

communities, recommendations by international organizations in which the United States participates, and the interaction of the overfished stock within the marine ecosystem.

Objective 4. Where conservation problems have been identified for non-groundfish species and the best scientific information shows that the groundfish fishery has a direct impact on the ability of that species to maintain its long-term reproductive health, the Council may consider establishing management measures to control the impacts of groundfish fishing on those species. Management measures may be imposed on the groundfish fishery to reduce fishing mortality of a non-groundfish species for documented conservation reasons. The action will be designed to minimize disruption of the groundfish fishery, in so far as consistent with the goal to minimize the bycatch of non-groundfish species, and will not preclude achievement of a quota, harvest guideline, or allocation of groundfish, if any, unless such action is required by other applicable law.

Objective 5. Describe and identify essential fish habitat (EFH), adverse impacts on EFH, and other actions to conserve and enhance EFH, and adopt management measures that minimize, to the extent practicable, adverse impacts from fishing on EFH.

Economics

Objective 6. Within the constraints of the conservation goals and objectives of the FMP, attempt to achieve the greatest possible net economic benefit to the nation from the managed fisheries.

Objective 7. Identify those sectors of the groundfish fishery for which it is beneficial to promote year-round marketing opportunities and establish management policies that extend those sectors fishing and marketing opportunities as long as practicable during the fishing year.

Objective 8. Gear restrictions to minimize the necessity for other management measures will be used whenever practicable. Encourage development of practicable gear restrictions intended to reduce regulatory and/or economic discards through gear research regulated by EFP.

Utilization

Objective 9. Develop management measures and policies that foster and encourage full utilization (harvesting and processing), in accordance with conservation goals, of the Pacific Coast groundfish resources by domestic fisheries.

Objective 10. Recognizing the multispecies nature of the fishery and establish a concept of managing by species and gear or by groups of interrelated species.

Objective 11. Develop management programs that reduce regulations-induced discard and/or which reduce economic incentives to discard fish. Develop management measures that minimize bycatch to the extent practicable and, to the extent that bycatch cannot be avoided, minimize the mortality of such bycatch. Promote and support monitoring programs to improve estimates of total fishing related mortality and bycatch, as well as those to improve other information necessary to determine the extent to which it is practicable to reduce bycatch and bycatch mortality.

Social Factors.

Objective 12. When conservation actions are necessary to protect a stock or stock assemblage, attempt to develop management measures that will affect users equitably.

Objective 13. Minimize gear conflicts among resource users.

Objective 14. When considering alternative management measures to resolve an issue, choose the measure that best accomplishes the change with the least disruption of current domestic fishing practices, marketing procedures, and the environment.

Objective 15. Avoid unnecessary adverse impacts on small entities.

Objective 16. Consider the importance of groundfish resources to fishing communities, provide for the sustained participation of fishing communities, and minimize adverse economic impacts on fishing communities to the extent practicable.

Objective 17. Promote the safety of human life at sea.

10.3 Highly Migratory Species

The general goals and objectives of this FMP are listed below to provide context for [management] actions. They are not listed in order of priority:

1. Promote and actively contribute to international efforts for the long-term conservation and sustainable use of highly migratory species fisheries that are utilized by West Coast-based fishers, while recognizing these fishery resources contribute to the food supply, economy, and health of the nation.
2. Provide a long-term, stable supply of high-quality, locally caught fish to the public.
3. Minimize economic waste and adverse impacts on fishing communities to the extent practicable when adopting conservation and management measures.
4. Provide viable and diverse commercial fisheries and recreational fishing opportunity for highly migratory species based in ports in the area of the Pacific Council's jurisdiction, and give due consideration for traditional participants in the fisheries.
5. Implement harvest strategies which achieve optimum yield for long-term sustainable harvest levels.
6. Provide foundation to support the State Department in cooperative international management of highly migratory species fisheries.
7. Promote inter-regional collaboration in management of fisheries for species which occur in the Pacific Council's managed area and other Councils' areas.
8. Minimize inconsistencies among federal and state regulations for highly migratory species fisheries.
9. Minimize bycatch and avoid discard and implement measures to adequately account for total bycatch and discard mortalities.
10. Prevent overfishing and rebuild overfished stocks, working with international organizations as necessary.
11. Acquire biological information and develop a long-term research program.
12. Promote effective monitoring and enforcement.
13. Minimize gear conflicts.
14. Maintain, restore, or enhance the current quantity and productive capacity of habitats to increase fishery productivity for the benefit of the resource and commercial and recreational fisheries for highly migratory species.
15. Establish procedures to facilitate rapid implementation of future management actions, as necessary.
16. Promote outreach and education efforts to inform the general public about how West Coast HMS fisheries are managed and the importance of these fisheries to fishers, local fishing communities, and consumers.
17. Manage the fisheries to prevent adverse effects on any protected species covered by MMPA and MBTA and promote the recovery of any species listed under the ESA to the extent practicable.
18. Allocate harvest fairly and equitably among commercial, recreational and charter fisheries for HMS, if allocation becomes necessary.

10.4 Salmon

The following objectives guide the Council in establishing fisheries against a framework of ecological, social, and economic considerations.

1. Establish ocean exploitation rates for commercial and recreational salmon fisheries that are consistent with requirements for stock conservation objectives within Section 3.1, specified ESA consultation or recovery standards, or Council adopted rebuilding plans.
2. Fulfill obligations to provide for Indian harvest opportunity as provided in treaties with the United States, as mandated by applicable decisions of the Federal courts, and as specified in the October 4, 1993 opinion of the Solicitor, Department of Interior, with regard to federally recognized Indian fishing rights of Klamath River Tribes.
3. Seek to maintain ocean salmon fishing seasons which support the continuance of established recreational and commercial fisheries while meeting salmon harvest allocation objectives among ocean and inside recreational and commercial fisheries that are fair and equitable, and in which fishing interests shall equitably share the obligations of fulfilling any treaty or other legal requirements for harvest opportunities.
4. Minimize fishery mortalities for those fish not landed from all ocean salmon fisheries as consistent with optimum yield and the bycatch management specifications of Section 3.4.
5. Manage and regulate fisheries so that the optimum yield encompasses the quantity and value of food produced, the recreational value, and the social and economic values of the fisheries.
6. Develop fair and creative approaches to managing fishing effort and evaluate and apply effort management systems as appropriate to achieve these management objectives.
7. Support the enhancement of salmon stock abundance in conjunction with fishing effort management programs to facilitate economically viable and socially acceptable commercial, recreational, and tribal seasons.
8. Achieve long-term coordination with the member states of the Council, Indian tribes with federally recognized fishing rights, Canada, the NPFMC, Alaska, and other management entities which are responsible for salmon habitat or production. Manage consistent with the Pacific Salmon Treaty and other international treaty obligations.
9. In recommending seasons, to the extent practicable, promote the safety of human life at sea.

11 Appendix C: Acronyms Used

Acronym	Term
CCE	California Current Ecosystem
EAS	Ecosystem Advisory Subpanel
EC Species	Ecosystem Component Species
EFH	Essential Fish Habitat
EFMP	Ecosystem Fishery Management Plan
EPAP	Ecosystem Principles Advisory Panel
EPDT	Ecosystem Plan Development Team
FEP	Fishery Ecosystem Plan
FMP	Fishery Management Plan
HAPC	Habitat Area of Particular Concern
HC	Habitat Committee
IEA	Integrated Ecosystem Assessment
MSA	Magnuson-Stevens Fishery Conservation and Management Act
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
SSC	Scientific and Statistical Committee

DRAFT SUMMARY MINUTES
Ecosystem Plan Development Team

Pacific Fishery Management Council
Large Conference Room
7700 NE Ambassador Place, Suite 101
Portland, Oregon 97220
503-820-2280

July 21, 2010

Members in Attendance

Ms. Yvonne deReynier, Acting Chair, NMFS, Northwest Regional Office.
Dr. John Field, Acting Vice-Chair, NMFW, Southwest Fisheries Science Center
Mr. Josh Lindsay, NMFS, Southwest Regional Office
Mr. Corey Niles, Washington Department of Fish and Wildlife
Ms. Cyreis Schmitt, Oregon Department of Fish and Wildlife
Mr. Richard Scully, Idaho Department of Fish and Game

Members Absent

Dr. Melissa Haltuch, NMFS, Northwest Fisheries Science Center
Dr. Sam Herrick, NMFS, Southwest Fisheries Science Center
Dr. Andrew Leising, NFMS, Southwest Fisheries Science Center
Dr. Mary Ruckleshaus, NFMS, Northwest Fisheries Science Center
Dr. Lisa Wooninck, NOS, Monterey Bay National Marine Sanctuary

Others in Attendance

Mr. Mike Burner, Pacific Fishery Management Council Staff
Ms. Alison Dauble, Oregon Department of Fish and Wildlife
Mr. Ben Enticknap, EAS Member, Oceana
Dr. Selina Heppell, SSC Member, Oregon State University
Ms. Lia Protopapadakis, Santa Monica Bay Restoration Commission
Mr. Dan Waldeck, EAS Chair, Pacific Whiting Conservation Cooperative
Mr. Erick Wilkins, Northwest Indian Fisheries Commission

Call to Order and Administrative Matters

Ms. DeReynier called the meeting to order and asked for introductions. The group reviewed the agenda and made plans to discuss a draft table by Ms. Schmitt that displays ecosystem plan alternatives, their benefits, costs, and implementation needs. The group noted the July 19, 2010 recommendations of the Ocean Policy Task Force and their relevance to the meeting topic and considered adding a discussion topic to the agenda. Given the limited time available and the fact that few in the room had been able to thoroughly review the new recommendations the group decided to table the discussion for a future meeting.

Election of Officers: Several Ecosystem Plan Development Team (EPDT) members commended Ms. DeReynier for her role as Acting Chair since February and were supportive of her continuing as Chair. Although the EPDT may have only just had a quorum at this meeting, the group decided to forego formal elections until a future date. Ms. DeReynier agreed to continue in

her current capacity and will represent the EPDT at the September Council meeting. She asked for a volunteer for an acting Vice-Chair as a backup. Dr. Field agreed to serve in this capacity.

Review of Council Guidance and Assignments

Mr. Burner reviewed the following Council guidance and requests from the November 2009 Council meeting.

- Schedule presentations by the Northwest and Southwest Fisheries Science Centers on the state of the science in support of ecosystem-based fishery management.

The group discussed the recent recommendations by Mr. Frank Lockhart to the Council regarding regularly scheduled, short presentations to the Council. The Council has tentatively scheduled such a session on their draft agenda for November 2010.

- Review the Council record of dialogue on ecosystem-based fishery management including statements by the Council, its Advisory Bodies, and the public.
- Review the existing Council fishery management plans (FMP) to identify existing approaches and commonalities regarding ecosystem approaches to management.

The EPDT has done some initial reviews, but noted that the expertise regarding the Council's existing Fishery Management Plans (FMPs) is in the Advisory Bodies in support of those FMPs and the EPDT is interested in getting broader input in the future.

- Inventory ecosystem-related management tools for their applicability to the ecosystem based FMP (E-FMP) process.
- Review existing ecosystem-based management efforts of other regional fishery management councils.

This was first done back in 2006 by the Habitat Committee for their joint session with the Scientific and Statistical Committee. Also the NWRO provided a similar overview at the November 2009 Council meeting. The EPDT will look into including a summary of this information at the September 2010 Council meeting.

- Prepare a report to the Council that includes
    1) Draft statement of purpose and need,
    2) draft list of possible initial goals and objectives,
    3) Draft range of options on a) the geographic range of the E-FMP, b) the regulatory scope of the E-FMP, c) the management unit species within the E-FMP, and
    4) Draft list of miscellaneous issues to be addressed by an E-FMP.

Review and Discussion of Ecosystem Advisory Subpanel (EAS) Comments

Mr. Waldeck thanked the EPDT for its commendable first draft of the report and characterized the May 4th EAS meeting as productive both in terms of providing comments on the draft and in helping the EAS work through some complex discussions leading to a better understanding of what ecosystem-based fishery management (EBFM) could entail. Mr. Waldeck summarized EAS comments by the following major topics.

Overarching statement on EFMP versus and FEP: The Council has expressed interest in a regulatory mechanism under an ecosystem plan, but the question is really whether that could be achieved with an FEP. The EAS is interested in the issue as well and recommends the EPDT move forward with a fleshed-out set of alternatives on this topic.

Review of Existing Council FMPs: The EAS felt that this is seems important step in the

identification of gaps in existing management. The exercise would logically lead to needs or goals for an ecosystem plan. The EAS recommends that the EPDT consider the following recommendations of the SSC from November of 2009.

- *Catalog aspects of ecosystem management that are already taking place under the current FMPs (e.g., habitat protection and protected species).*
- *Examine what gaps within or between the FMPs need to be filled by ecosystem based management.*
- *Analyze the goals and objective across the current FMPs and see if they can be more consistent.*
- *Analyze why it is important to augment single species management. What are the outcomes ecosystem based management may achieve that are not possible through single species management?*
- *Document the approaches to ecosystem management that have been used in other regions.*

Purpose and Need for an Ecosystem Plan: The EAS spent a lot of time on the question of need and developed the following matrix as a means of working through what the plan is envisioned to be and indentifying the best direction to take. The discussion led to a straw definition of EBFM that the EAS felt is good conceptually, lacks the nuts and bolts required for practical application. Ms. DeReynier attended the May 4th EAS meeting and concurred that this EAS discussion was valuable and represents the kind of "think tank" exercise that the Council process relies on, but that the Council rarely has the luxury of doing on the Council floor.

EAS Working table for the purpose of developing an EBFM definition and purpose.			
Topic	**Need**	**What Works**	**What to do**
What is EBFM and its value?	What are the shortcomings of existing mgmt. approaches?	What approaches and tools will effectively access the value?	What decision and approach and implementation?
EBFM is a systems approach that looks at interactions of habitats and species to optimize ecosystem services in ways that encourage sustainability of the broader marine ecosystem and the health and resilience of fisheries, fish stocks, fishing communities. **/1**	What is EBFM's worth or what is the value of the needs?	What can we learn from other EBFM approaches?	

/1 Biodiversity (species, genetic, age, etc.) and the human component (viable communities, seafood supply, etc.) were discussed as example criteria for assessing ecosystem sustainability.

Dr. Heppell felt that the Council will have a strong interest in understanding how the EFMP will affect the specific decisions and management action the Council is charged with, in other words, what are the practical implications of EBFM.

Dr. Field noted that the "holy grail" would be a broad assessment of the the cumulative effects of a wide variety of ecosystem impacts, harvesting at MSY across species in all four FMPs in combination with other extractive and non-extractive impacts. He stated that this is a foreseeable assessment, but not in the near future.

The EAS recommended some summarization of the purpose and need and goals and objectives sections of the document. The EBFM document provides a vehicle to (1) improve information and improve decision making; (2) identify gaps in information; (3) integrate across species-specific FMPs; and (4) provide a nexus to regional and national ecosystem-related endeavors. The EAS recommended the following items also be considered in the purpose and need statement (5) establish a platform or framework that enables management at the appropriate ecosystem scale for a species or complex of species, (6) create incentives for improved stewardship and (7) encourage innovation by offering an alternative pathway for management of a complex of species that might yield a more robust portfolio of fishing opportunities.

Graphic Representation of Concepts: The group reviewed a graphic the EAS adapted from the North Pacific Fishery Management Council's FEP. The graphic displays the types of interrelationships that Dr. Field alluded to when talking about an overall assessment of ecosystem impacts and services. The EAS also had a good conversation with Ms. Schmitt regarding a tabular display of benefits and tradeoffs of EBFM.

Goals and Objectives: The EAS felt that the EPDT goals for an ecosystem plan seemed too narrow because they focus only on providing information on the ecosystem. The plan should set out to do more, namely advising management on a variety of topics (e.g. forage protection, area management, protected species, etc.). There may not be enough info at this time to answer all of the specific management questions, but the plan should be evolutionary.

Stakeholder Involvement: The EAS felt that public outreach and coordination with other Council Advisory Bodies will be important aspects of the development of an ecosystem plan. The EAS recommended that Council staff incorporate the ecosystem agenda item at the September Council meeting into the agendas of as many Advisory Bodies as possible.

Review of Draft Report and Discussion of Revisions

Mr. Scully noted that as a new reader of the draft, he felt a summary of other Council efforts in EBFM would be helpful. Ms. DeReynier suggested the incorporation of the NMFS report that was provided at the November of 2009 Council meeting.

The EPDT highlighted the issue of the regulatory scope of the ecosystem plan as a topic that would benefit from additional Council clarification on what is desired and legal clarification on what is possible under the variety of plans discussed in the report.

Mr. Niles felt that there really wasn't an existing ecosystem plan in the nation that would fit current expectations for the West Coast. The first thing that needs to be decided is what is desired from the plan, and second, is regulatory authority under a broader plan needed to achieve the desired outcomes. One evolutionary approach would be to start with a list of things an EFMP could do, start with informative pieces that inform existing authorities and move to concepts that could broaden authority. The merging of natural resource conservation and the services that humans desire from those resources is something a broad plan could potentially assess cumulatively.

The EPDT briefly discussed existing ecosystem plans. The geographically-based ecosystem plans in the Western Pacific Fishery Management Council seem to function like a place-based traditional FMPs and are tailored to the specific needs of their broad geographic management

needs. Perhaps at the other end of the spectrum is the North Pacific Fishery Management Council's FEP for the Aleutian Islands. This plan is not regulatory vehicle but rather informs decisions that are implemented under other plans or authorities.

The South Atlantic Fishery Management Council completed a comprehensive FEP that seems to both inform decisions in other FMPS, but also takes broad actions that cross FMPS, namely geographic closed areas. This has simplified their Council process because it takes a common issue, deals with it in one place, and implements it across all FMPs, This plan seems to have potential as one to draw from as the Pacific Council process moves forward.

Ms. DeReynier reported that NMFS has questions about what an EFMP is and what it does. It is often noted that if the plan takes the form of an FMP, it will likely have to meet all of the provision of an FMP as specified by the Magnuson-Stevens Fishery Conservation and Management Act (MSA), provisions that have been developed over years with a more traditional species-based approach. These provisions are not likely to conform well to the broader perspective of an ecosystem-based approach.

Mr. Burner noted that although NMFS has made EBFM a high priority for ocean resource management, there is very little guidance on how it could be done. The last MSA reauthorization provided few specifics and there may need to be considerable flexibility in how an EFMP is developed and how it is reviewed under current statutes and guidelines that were largely not developed with EBFM in mind.

Ms. Schmitt reviewed a table or matrix of practical considerations and applications across a variety of management approaches (first draft included at the end of this document).. The table is not intended as a guide or to limit Council decisions making. In other words, the ideas presented are just examples of some of the potential tradeoffs not a guide to EBFM that must be followed. The table was well received and, when completed, will be included in the final report.

The discussion turned to the interrelation between fisheries and FMPs. The cyclical nature of fish stocks and fisheries causes many shifts in fishing patterns and exploitation. These shifts or changes in regimes are the type of thing an ecosystem approach could help identify or predict. But just how this broad perspective is achieved is unclear. Would each management team in the Council process be charged with ectype consideration with new expertise added to teach team or would the EFMP team be responsible for evaluating the management measure and harvest specifications under each FMP in relation to each other?

Purpose and Need Section:

One way to illustrate a need for EBFM would be to look at historic examples of where ecosystem considerations could have averted a problem (sardine collapse, groundfish overfishing). It was noted that EBFM will not likely ever be entirely quantitative. Just because we cannot quantify all of the impacts to a stock does not mean those interactions are not happening. There are qualitative analyses that could inform the process as the state of the science and the details within the scientific advice improve. The group agreed to again look at the November recommendations of the SSC regarding the identification of the need for EBFM.

Goals and Objectives Section:

The goals of the plan should include the goal of attaining a better understanding of long-term cumulative effects of fishing and the relationship of the species between FMPs. Mr. Burner provided a summary of the goals and objectives of each of the Council's four FMPs. None of the existing FMPs have such a broad perspective as a goal, but many goals are shared by more than one plan. The EPDT felt it would be important to consult with the other Council Advisory Bodies when determining all of the interrelations between the Council fisheries.

The cumulative effect of the optimum removal of all harvested species is not currently assessed. There is evidence that attaining OY at the single species level is not optimum for ecosystem health when practiced across species. The report should highlight the concept of added efficiencies. There is an opportunity to streamline the Council process by combining analyses across FMPs.

Regulatory Scope and Management Unit Species:

This section would make more sense if reorganized. Organize by areas of Council authority; fishing activities for FMU species, fishing activities for species outside FMUs, non-fishing activities that impact EFH, and non-fishing impacts that effect the ecosystem. This section also seems like a logical place to put some examples from other regional fishery management councils.

Geographic Range and Scale Section:

Mr. Lindsay noted that the Council's jurisdiction is limited to the EEZ, but that the California current large marine ecosystem (CCE) is a scientific rather than political concept and extend beyond the EEZ. The plan should be reference appropriately. A map of the EEZ and the accepted scale of the CCE might be helpful.

Essential fish habitat (EFH) is an issue that reached across FMPs and may benefit from a EBFM approach. However, EFH is defined very differently for salmon versus coastal pelagic, versus groundfish and mapping them all would get difficult and would end up covering the full extent of the EEZ.

A map of biogeographic regions was suggested, but varying scientific opinions exist on how many there are within the CCE. The GLOBEC process has identified four regions that could be used as an example.

Because of the close link between EBFM, spatial management, and marine sanctuaries, the group decided that a map of the EEZ and the west coast National Marine Sanctuaries would be useful

State of Ecosystem Science Section:

The EPDT agreed that this section could mention National Standard 2 regarding the use of the best available science. As the science behind EBFM improves, the appropriate application of it to fishery management will be of interest. The process of implementing EBFM and introducing new concepts and science will likely evolve with or without an ecosystem plan, but surely the process would benefit from a developed framework .

Work Assignments and Scheduling

Dr. Field agreed to update the Goals and Objectives and State of the Science sections. Ms. DeReynier will work on the Regulatory Scope section. Ms. Wooninck and Mr. Lindsay will put some maps together for the Geographic Range section. Mr. Scully will consider the EAS and SSC comments and work on the Purpose and Need section. Mr. Niles will provide additional material on the need for EBFM to augment single species management. Ms. Schmitt will complete the table on benefits, costs, and tradeoff to EBFM implementation.

Ms. DeReynier will continue to serve as overall document compiler and will work on transitional paragraphs and document organization.

Appendices:

A. Table of costs, benefits, and tradeoffs across EBFM approaches (Schmitt)
B. The existing appendix
C. Goals and objectives of the four FMPs
D. Acronyms

Schedule:
August 3 – all submissions to Ms. DeReynier.
August 5 – Full report draft sent out to EPDT for review.
August 10 – All comments back to Ms. DeReynier.
August 17 – Final draft done and sent out to the EAS and other Advisory Bodies.

The EPDT finished the meeting with a discussion of developing an EPDT statement to the Council for September that compliments the full report by providing recommendations for future work, EPDT preferred alternatives, and recommendations on future presentations. Mr. Burner will send out a draft outline of a statement by July 23rd and the EPDT agreed to get comments back to Ms. DeReynier by August 3rd.

ADJOURN
PFMC
08/06/10

Need	Status Quo + (Do we need an Ecosystem Plan?)	Advisory FEP	Umbrella EFMP with Selected FMUs	Regional Omnibus EFMP	Coastwide Omnibus EFMP
PFMC Mission: Sustainable Fisheries … **Benefits:** 1) Improve information and decision-making 2) Identify information gaps 3) Integrate across species-specific FMPs 4) Provide a nexus with other ecosystem efforts More….	Information and PFMC process improvements made are limited and made on a case-by-case basis: Qualify some effects of management decisions and risks for one species on another ecosystem species, habitat, fisheries, community, etc. Monitor and report other ecosystem efforts and provide input, as determined necessary and useful	Non-regulatory plan provides a cohesive framework: Quantify effects of management decisions and risks for one species on another ecosystem species, habitat, fisheries, community, etc. Coordinated, organized and prioritized focus with identifiable goals for input to other ecosystem efforts.	Adds some regulatory authority/responsibility while maintaining current basic PFMC and FMP organization, structure and decision-making processes.	Revises PFMC and FMP organization, structure and decision-making processes to correspond to relevant ecological relationships. Adopt FMPs with specific FMUS for ecoregions. Likely ecoregions include: So. CA Bight …. Coastwide (eg. FMUS include sardine) HMS (e.g., albacore) Manage spp. as FMP spp in one or more FMPs: eg., a) cowcod only under FMP for the Southern CA Bight, b) northern lingcod stock in northern FMP, and c) albacore in a pelagic (HMS?) FMP	Consolidates all existing FMPs into a single FMP. Provides for simultaneous decision-making appropriate for the suite of ecosystem impacts. Provides greater consistency in goals, objectives, processes across all current FMPs. Flexible FMP structure allows for changes in ecosystem understanding and information without requiring development of new FMPs. Allows for maintenance or revisions to PFMC and advisory group

Need	Status Quo + (Do we need an Ecosystem Plan?)	Advisory FEP	Umbrella EFMP with Selected FMUs	Regional Omnibus EFMP	Coastwide Omnibus EFMP
					structure, as necessary.
PFMC Examples	Qualitatively address forage fish issues: identify suite of spp. affected by anchovy harvests and nature of impacts on FMP spp and fisheries, as well as non-FMP spp. Will salmon resource be harmed by the proposed anchovy harvest?	Explicitly address forage fish issues: Quantitatively assess sardine harvests on other FMP spp. and fisheries, as well as non-FMP spp. How much will the salmon resource (and fisheries and communities) be harmed by the proposed anchovy harvest? How certain is it that these impacts will occur (probabilities)?	Regulatory management for species like krill	What are the impacts of the harvest of species Y on other relevant resources, fisheries, habitat, and communities in ecoregion X? What are the probabilities that these impacts will occur?	What are the impacts of the harvest of species A, B, C, etc., on all relevant resources, fisheries, habitat and communities on the west coast? Can make simultaneous management decisions for salmon, whiting, anchovy, and albacore, based on integrated ecosystem information.
PFMC Implementation	Within existing PFMC structure, focus more resources to: Acquire, organize, analyze and disseminate relevant ecological information (e.g., multi-species biology, oceanography, habitat, fisheries, socio-economic and interrelationships)	Revise STAR TORs to focus on ecosystem considerations (data, analysis, decision-making tools) PFMC adopt FEP (developed by EPDT)	Set ACLs, OFLs, etc. for FMUS	Reorganize information and decision-making from coastwide to regional basis Set ACLs, OFL,s etc. for FMUS on a regional basis (eg., like for fishery sectors in NS1 guidelines).	

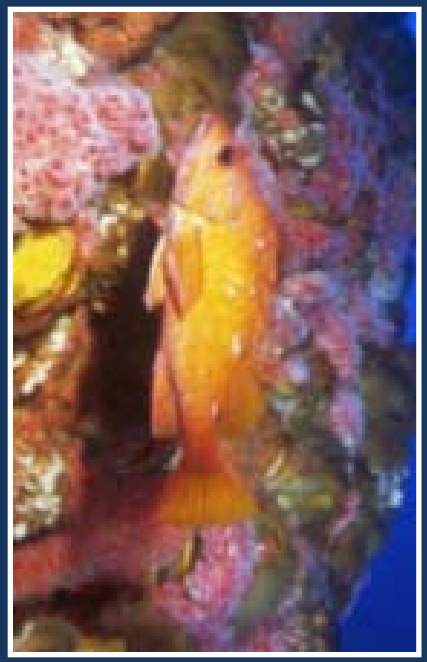
Need	Status Quo + (Do we need an Ecosystem Plan?)	Advisory FEP	Umbrella EFMP with Selected FMUs	Regional Omnibus EFMP	Coastwide Omnibus EFMP
	Identify key non-PFMC ecosystem efforts to monitor or engage in. PFMC implement priority revisions to its structure and function (EPDT develop recommendations)			Reorganize and potentially broaden advisory groups to correspond to regional FMPs	
Costs and Consequences	Resources to assemble, organize, analyze and disseminate key information. Increase coordination among current advisory bodies.	Add resources and expertise to assemble, organize, analyze and disseminate all relevant information EPDT activities to draft plan PFMC and advisory bodies to review and approve plan SSC revise STAR TORs	Add expertise and stakeholders to advisory panels. May inadvertently affect state-managed fisheries and resources.	Re-form and add advisory panels: Potentially broaden the range of scientific expertise needed and stakeholders affected	

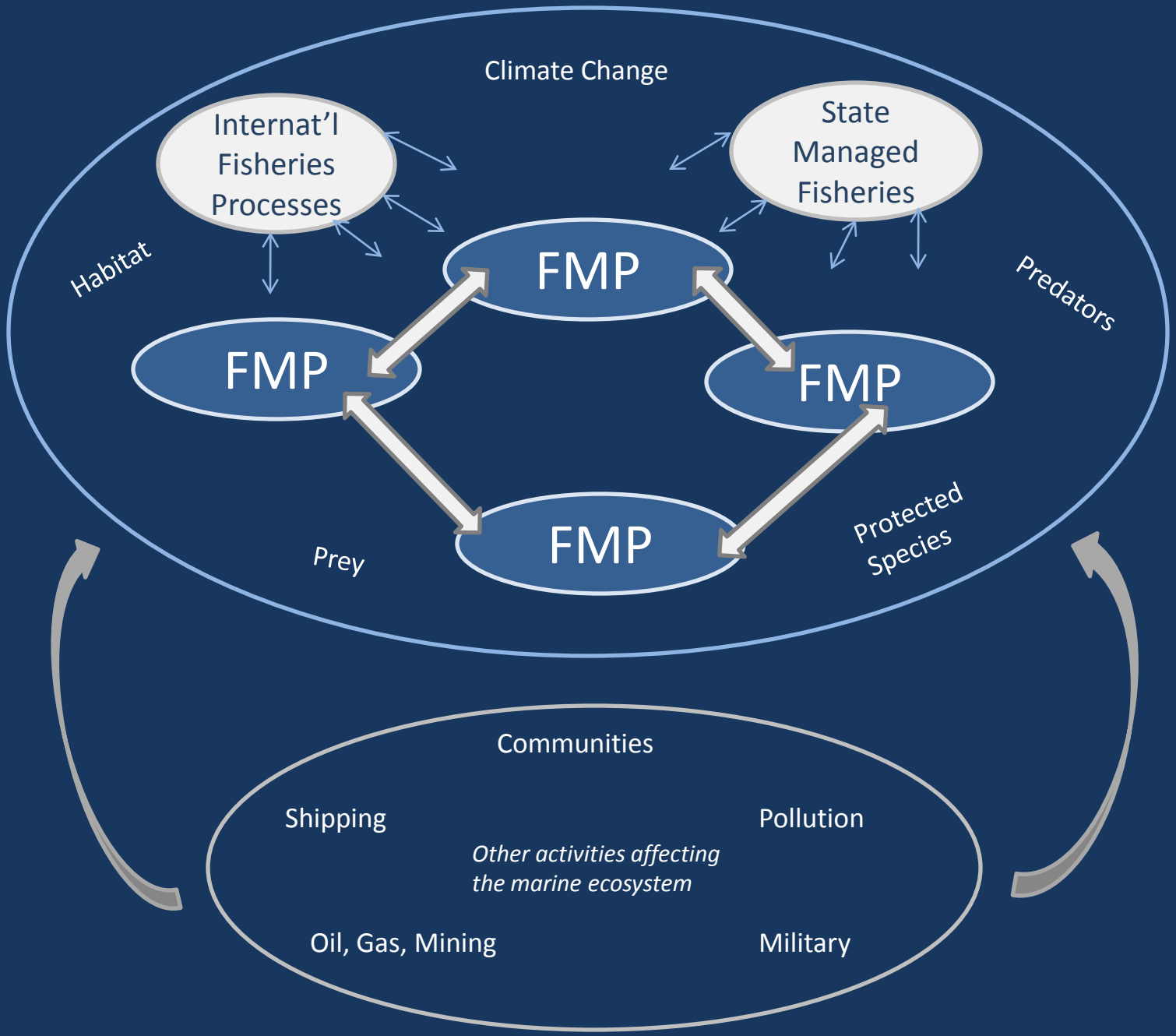
Ecosystem Plan Development Team Initial Report

Ecosystem Fishery Management Planning within the Pacific Fishery Management Council Process

Proposed Agenda Summary

Friday October 30	*Saturday October 31*	*Sunday November 1*	*Monday November 2*	*Tuesday November 3*	*Wednesday November 4*	*Thursday November 5*
Advisory Body Meetings begin as listed in the Schedule beginning on page 9	11:00 am Closed Executive Session	9:30 am Highly Migratory Species Management	8:00 a.m. Groundfish Management	8:00 am Coastal Pelagic Species Management	8:00 a.m. Groundfish Management	8:00 a.m. Groundfish Management
	1:00 pm Call to Order					
	Open Comment	Groundfish Management		Groundfish Management		
	Pacific Halibut Management					
	Ecosystem Management	Salmon Management				Administrative Matters
	Habitat Issues					




Climate Change
Internat'l Fisheries Processes
State Managed Fisheries
Habitat
Predators
FMP
FMP
FMP
FMP
Prey
Protected Species
Communities
Shipping
Pollution
Other activities affecting the marine ecosystem
Oil, Gas, Mining
Military

Report back to PFMC with:

- statement of purpose and need
- list of initial goals and objectives
- range of options on EFMP

geographic range, regulatory scope, and management unit species.


based
smaller
participate
agencies
foodweb
reduce
sustainability
identify
regional
programs
spatial
shifts
moving
costs
fishery
understand
protect
Council
concerns
Common
targets
FMP
fish
across
conflicts
Predator-prey
assess
Fishery
strengthen
management
gaps
multi-species
science
habitat
engagement
resolve
single
resources
Ecologically
external
processes
population
CCE
fishing
voice
precautionary
FMPs
forage
affect
fisheries
improve
decision-making
Inform
areas
anticipate
Longer-term
available
planning
ocean
communities
coastal
access
community
global
appropriate
Inter-FMP
Coordinate
information
rates
relationships
ecosystem
advance
comment
integrate
impacts
forward
analyses
EFH
species
coordinate
boom-and-bust
vulnerability
climate
predator-prey
needs
non-fisheries
environment
actions
marine
approaches
harvest
expertise
transition
trade-offs
biodiversity
promote
articulate
dynamics
trends
long-term
priorities
establish
interactions
economic
effective
value
bycatch
change
vibrant
effects
participants
acidification
challenges
sectors
resilient
fishermen
practice
Fisheries
entities
scientific
Economic
accessible
setting
Coastal
Health
different
abundant
humans
factors

REPORT TO CONGRESS

The State of Science to Support an Ecosystem Approach to Regional Fishery Management

Pursuant to the Magnuson-Stevens Fishery Conservation and Management Act, Section 406(f)

National Marine Fisheries Service

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service

NOAA Tech. Memo. NMFS F/SPO-96
April 2009


STOP
HALF MOON BAY
SPORTFISHING AND TACKLE
CRAB POTS!

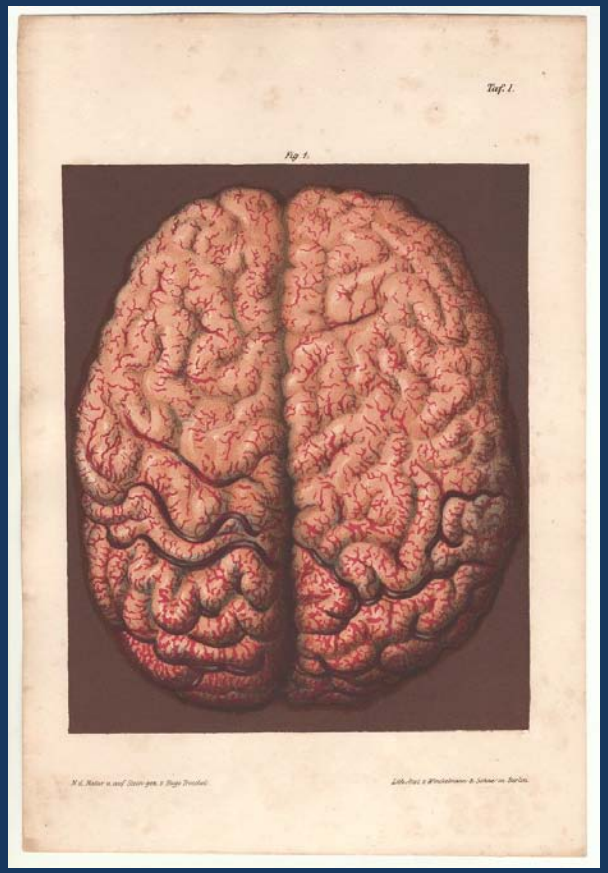

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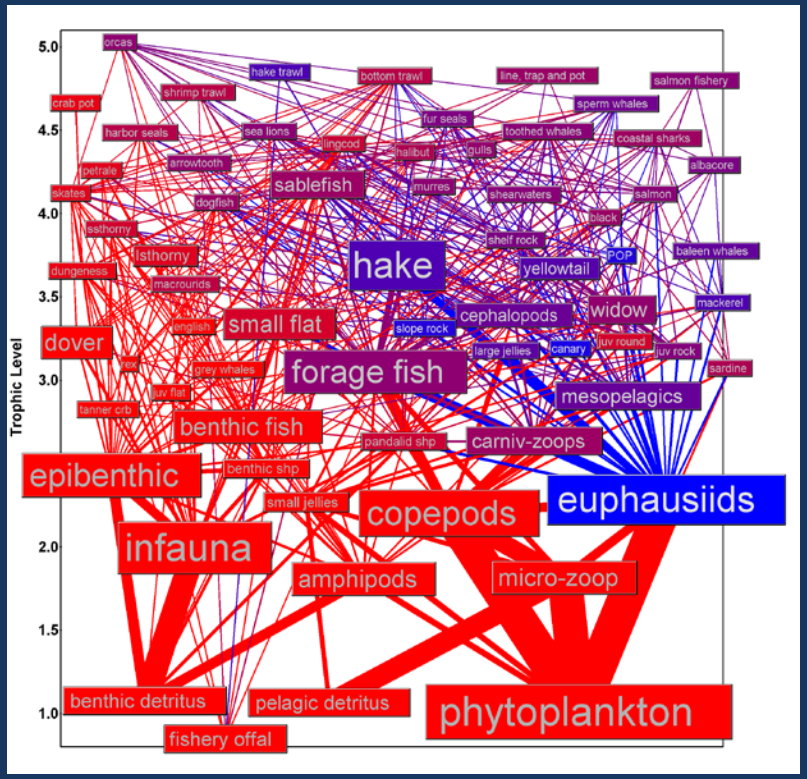
Fig. 1.


Trophic Level
5.0
4.5
4.0
3.5
3.0
2.0
1.5
1.0
orcas
hake trawl
bottom trawl
line, trap and pot
salmon fishery
crab pot
shrimp trawl
sperm whales
fur seals
harbor seals
sea lions
toothed whales
coastal sharks
lingcod
halibut
gulls
albacore
arrowtooth
petrale
sablefish
murres
skates
dogfish
shearwaters
salmon
black
sthorny
shelf rock
hake
POP
yellowtail
baleen whales
dungeness
macrourids
mackerel
small flat
cephalopods
widow
dover
slope rock
large jellies
canary
juv round
juv rock
sardine
forage fish
grey whales
mesopelagics
tanner crb
benthic fish
pandalid shp
carniv-zoops
epibenthic
benthic shp
euphausiids
small jellies
copepods
infauna
amphipods
micro-zoop
benthic detritus
pelagic detritus
phytoplankton
fishery offal

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March – April 2010 → Team 1st Draft

May 2010 → EAS Meets, Comments (H1c, Att 1)

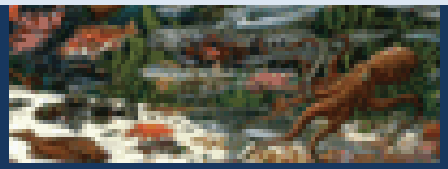
June – August 2010 → Team Re-drafts, Meets (H1b, Att 2), then Finalizes Reports (H1b, Att 1, Suppl. Report)

H1b, Attachment 1:

- ✓ statement of purpose & need (Sxn 3)
- ✓ list of initial goals & objectives (Sxn 4)
- ✓ options on EFMP geographic range (Sxn 6), regulatory scope (Sxn 5), and management unit species (Sxn 5).
- + background on PFMC interest in ecosystem-based fishery management (Sxn 2)
- + state of ecosystem science (Sxn 7)
- + practical considerations for alternative EFMP formats (App A)
- + collected goals & objectives of PFMC's 4 FMPs (App B)

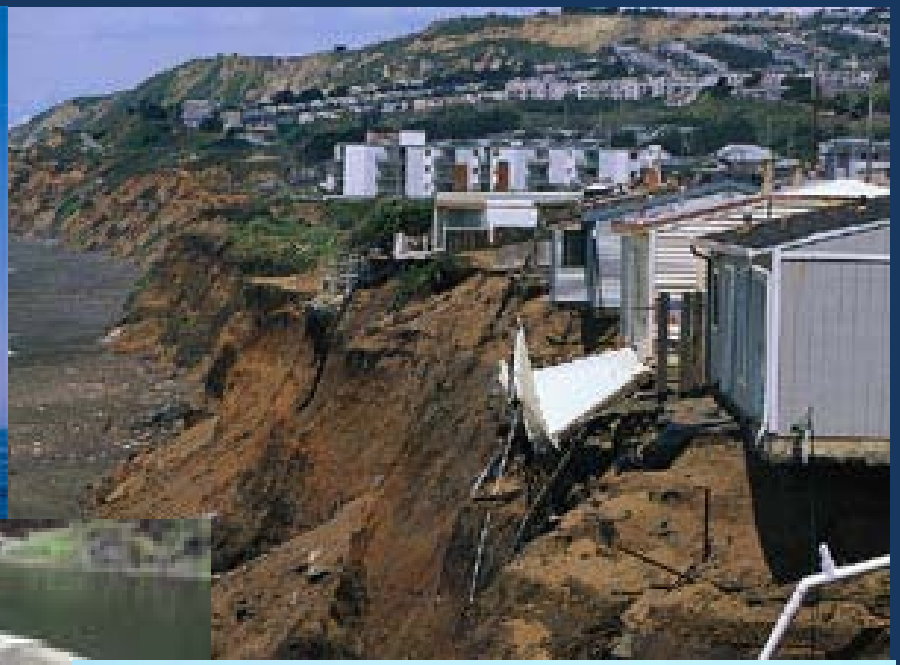
3.2, at p. 4 of H.1.b., Attachment 1

The purpose of an EFMP is to guide expansion of the Council process from species-specific management programs to include ecosystem science and broader ecosystem considerations and management policies that coordinate Council management across its FMPs and the California Current Ecosystem (CCE).



4, at p. 5 of H.1.b., Attachment 1

The overarching goal of this EFMP is to bring a greater understanding of the CCE to the Council participants and the public, so as to provide broad consideration and analysis of social, economic, and ecological policy options across the Council's areas of responsibility. The EFMP and its associated scientific products are intended to support Council decision-making by more fully addressing the goals and objectives shared by all FMPs for a healthy ecosystem with productive and sustainable fisheries, and vibrant fishing communities.



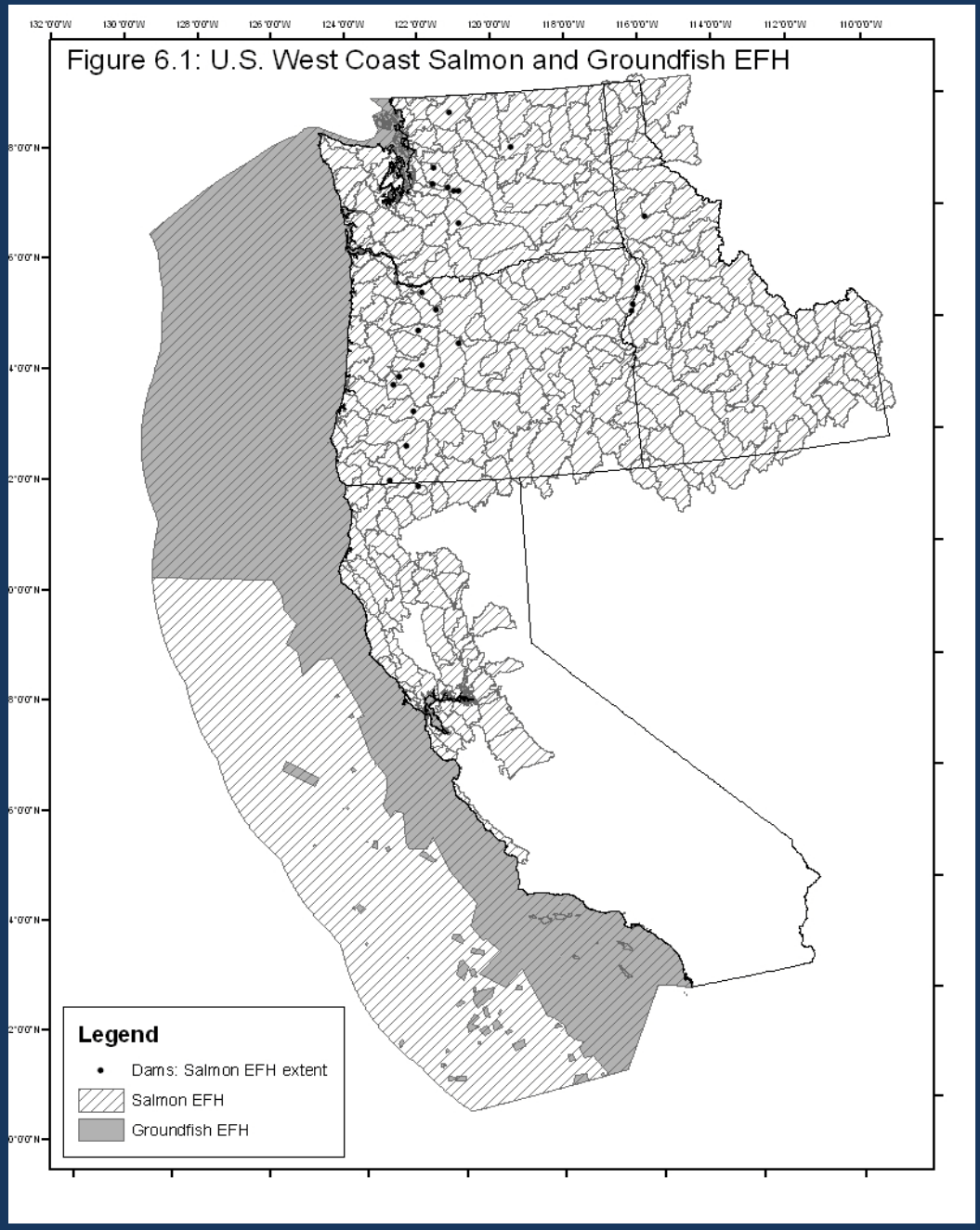


Figure 6.1: U.S. West Coast Salmon and Groundfish EFH
132°0'0"W
130°0'0"W
128°0'0"W
126°0'0"W
124°0'0"W
122°0'0"W
120°0'0"W
118°0'0"W
116°0'0"W
114°0'0"W
112°0'0"W
110°0'0"W
Legend
Dams: Salmon EFH extent
Salmon EFH
Groundfish EFH

H1b, Attachment 1:

+background on PFMC interest in ecosystem-based fishery management (Sxn 2)

+ state of ecosystem science (Sxn 7)

+ practical considerations for alternative EFMP formats (App A)

+ collected goals & objectives of PFMC's 4 FMPs (App B)

Requesting Council Guidance for Future Actions (H.1.b., EPDT Suppl. Report):

-- Desired planning document format
-- Geographic area
-- Species of interest
-- Meshing ecosystem work with EFH processes
-- Bringing science to the Council process

Unless otherwise indicated, all images courtesy of NOAA, except:

PFMC: November 2009 schedule, CPS vessel

FMCs: M. Dorn & S. Ralston SSC workshop photo

Academic Regalia Depot: PhD mannequin

WDFW: M. Culver & halibut

Half Moon Bay Sport Fishing and Tackle: lingcod huggers (R. Ingles & friend)

National Institute of Health: Brain

Doubletree Boise-Riverside: hotel ballroom

CDFG: Kelp & sardines

ECOSYSTEM PLAN DEVELOPMENT TEAM REPORT ON AN ECOSYSTEM FISHERY MANAGEMENT PLAN

At its November 2009 meeting, the Pacific Fishery Management Council (Council) discussed ecosystem-based fishery management planning and assigned following series of tasks to Council staff and to the Council's newly-formed Ecosystem Plan Development Team (EPDT) and Ecosystem Advisory Subpanel (EAS), which are detailed on page 1 of H.1.b., Attachment 1, *Ecosystem Fishery Management Planning for U.S. West Coast Fisheries.* The EPDT met jointly with the EAS in February 2010 and in an individual session in July 2010, primarily to complete a report to respond to the above requests received from the Council (Agenda Item H.1.b, Attachment 1). This report complements that larger initial report and focuses on EPDT recommended alternatives for the council's Ecosystem Fishery Management Plan (EFMP) and suggested next steps in developing an EFMP.

A challenge the EPDT faced in its Council-response report was in drafting a potential purpose and need statement and a potential set of goals and objectives without knowing the full scope of the Council desires for an EFMP or other ecosystem planning document. The report's purpose and need statement (Section 3) and goals and objectives statement (Section 4) are necessarily loosely defined, to be refined as the EPDT receives further Council guidance over time. Section 5 of the report highlights the issues the Council might consider as it addresses the potential regulatory scope of and management unit species within an EFMP. Receiving Council guidance on regulatory scope, management unit species, and the geographic range (Section 6) of the EFMP will be essential to future EPDT work planning. The EPDT notes that the Council's Scientific and Statistical Committee and Habitat Committee both provided comments on these issues at the Council's November 2009 meeting (see November 2009 Briefing Book, Agenda Item D.1.b) and that the EPDT has also received comments from the EAS on these issues. EPDT recommendations to the Council, below, are intended to take into account the guidance already received from these bodies.

One of the more important ideas that kept re-surfacing during EPDT discussions is that moving the Council process toward ecosystem-based fisheries management is not as straightforward as developing another set of FMP documents. Ecosystem-based fisheries management is a philosophy that can and should be woven throughout Council operations. To that end, the EPDT makes several recommendations, below, to begin cross-FMP discussions between and within the Council's many advisory bodies.

Depending on Council direction, the EPDT anticipates working on its next Council assignments over fall and winter 2010, with tentative plans to report back to the Council by its March 2011 meeting, or as soon thereafter as the Council directs.

EPDT Recommendations for Council Action or Direction on EFMP Development

- **Choose a document or ecosystem planning process format (status quo with no planning document, advisory fishery ecosystem plan, umbrella EFMP, regional omnibus, or coastwide omnibus EFMP) and direct the EPDT to outline such an FMP for its next report to the Council.**
- **Adopt the West Coast Exclusive Economic Zone (EEZ) as the EFMP's area of regulatory authority. Note Council's interest in information on: (1) how human activities, including fisheries management, within state marine waters, upland watersheds and high seas waters affect ocean ecosystems, and (2) how natural ecosystem dynamics beyond the EEZ may affect Council-managed species and fisheries.**
- **If the Council recommends proceeding with an EFMP, provide guidance on the types of species the Council may wish to see evaluated for management under an EFMP.**

EPDT Recommendations for Council Action or Direction on Moving Council Process Toward Ecosystem-Based Fisheries Management

- **Direct that each FMP's Management Team and Advisory Subpanel collaborate to respond to Council's November 2009 direction to "review the existing Council FMPs to identify existing approaches and commonalities regarding ecosystem approaches to management." These bodies should also identify where their FMPs or fisheries interact with other fisheries outside of their FMPs.**
- **Direct that Advisory Bodies charged with leading the Council's essential fish habitat (EFH) review processes to ensure that any EFH, habitat areas of particular concern (HAPC,) or EFH closed areas may be compatibly mapped across FMPs. The Council and the public should be able to see maps of all of those areas for all of its FMPs, to better consider cross-FMP EFH issues.**
- **Adopt a schedule of receiving regular Council briefings on various aspects of California Current ecosystem science and policy.**
- **Request that NMFS lead development of a prototype "State of the California Current Ecosystem Report" that would ultimately be scheduled for regular delivery to the Council and the public.**

PFMC
09/08/10

SUMMARY MEETING MINUTES
Ecosystem Advisory Subpanel

Pacific Fishery Management Council
Large Conference Room
7700 NE Ambassador Place, Suite 101
Portland, Oregon 97220
503-820-2280

May 4, 2010

The primary purpose of this Ecosystem Advisory Subpanel (EAS) work session was to review and comment on a draft report to the Pacific Fishery Management Council (Council) on initial stages of developing an Ecosystem Fishery Management Plan (EFMP). The Ecosystem Plan Development Team (EPDT) was tasked by the Council in November 2009 to prepare report on developing an EFMP that includes a draft statement of purpose and need, a draft list of possible initial goals and objectives, and a draft range of options on the geographic range, managed species, and regulatory scope of the EFMP. Members of the EPDT attended to review the report and respond to EAS questions and comments. The final report is scheduled to be presented to the Council at its September 2010 meeting in Boise, Idaho.

Members in Attendance
Mr. Merrick Burden (Vice-Chair), Washington, Environmental Defense Fund
Ms. Susan Chambers, Oregon, West Coast Seafood Processors Association (Alternate for Mr. Frank Warrens)
Mr. Ben Enticknap, Oregon, Oceana
Ms. Kathy Fosmark, California, F/V Seeadler
Mr. Steven Fukuto, California, United Anglers of Southern California
Mr. Don Maruska, California, C/O Don Maruska and Company, Inc.
Mr. Scott McMullen, Oregon, Oregon Fisherman's Cable Commission
Mr. Dan Waldeck (Chair), Washington, Pacific Whiting Conservation Cooperative

Members Absent
Mr. Geoff Le Bon, Washington
Mr. Frank Warrens, Oregon, President, Frank Warrens Automotive and Marine Services, Inc.

Ecosystem Plan Development Team Members in Attendance
Ms. Yvonne deReynier, National Marine Fisheries Service, Northwest Regional Office
Mr. Corey Niles, Washington Department of Fish and Wildlife
Ms. Cyreis Schmitt, Oregon Department of Fish and Wildlife, (AM only)

Others in Attendance
Mr. Mike Burner, Pacific Fishery Management Council (Council) Staff
Mr. Steve Joner, Makah Tribe
Mr. Steve Nelson, Program Manager, USAID Water and Coasts Team (AM only)

Call to Order and Administrative Matters

Mr. Dan Waldeck, Interim Chair opened the meeting at 8:30 a.m. The agenda was approved with little modification. Ms. deReynier noted that she would prefer that the morning agenda items on the EPDT report be treated more as an informal discussion and exchange of ideas rather than a formal presentation.

Mr. Burner reviewed recent developments in the Council schedule regarding the EFMP process. At its April meeting, the Council responded to an overload of time sensitive, core responsibilities scheduled for their June 2010 agenda by postponing several items for which June consideration was not an obligation. A report on ecosystem-based fishery management (EBFM) was postponed until the September 11-16, 2010 Council meeting in Boise, Idaho.

The group discussed the need for an electronic document library of EBFM publications and literature. Mr. Burner will look into establishing an FTP site and/or Council web page for this purpose. It was noted that some of the documents are proprietary or copyrighted materials that cannot be posted. Never the less, many documents are open source and in the public domain and it would be helpful to organize them in a central location.

Election of Officers

Several EAS members expressed appreciation for the work and organization skills of interim officers Mr. Waldeck and Mr. Burden. Mr. Mc Mullen nominated Mr. Waldeck and Mr. Burden as EAS Chair and Vice-Chair respectively. Mr. Waldeck and Mr. Burden were elected unanimously.

Report of the Ecosystem Plan Development Team (EPDT)

Ms. deReynier presented a flow chart diagram that connected the Council's tasks and assignments with the various sections of the draft EPDT document and noted areas where the EPDT would appreciate EAS comments (see Appendix 1). The EPDT's approach to the document has been to provide the Council with good information in response to specific requests without getting too ahead of existing guidance. The members of the EAS had reviewed the draft document and provided thoughtful comments in advance of the meeting, so, in the interest of time; Ms. deReynier opened the session to questions and comments rather than provide a detailed presentation.

Regulatory Scope

Mr. Enticknap spoke in favor of the range of regulatory scope that and EBFM plan could take; "an [advisory Fishery Ecosystem Plan (FEP)] or EFMP, an umbrella EFMP with selected [management unit and ecosystem consideration] species, a Regional Omnibus EFMP, and a Coastwide Omnibus EFMP." The group discussed existing Council guidance on the topic.

Mr. Burner characterized the Council record as one more focused on desired outcomes than a firm recommendation on the type of plan to develop. The Council has discussed the informational benefits that a non-regulatory framework plan could bring in terms of improved science and better coordination among its four FMPs, but has also expressed an interest in centralizing regulatory actions such as essential fish habitat protection, spatial management, and fishery regulation within National Marine Sanctuaries as items that are common to the existing FMPs that may benefit from being treated in a coordinated EFMP.

It was noted that the Magnuson-Stevens Fishery Conservation and Management Act (MSA) has explicit and detailed provisions for FMPs whereas the legal guidance on implementing EBFM or a FEP is far less defined. The group generally agreed that what is important at this stage is to present the Council with a full range of regulatory options that clearly maps the tradeoffs of developing an advisory or informational FEP versus a full FMP.

Review of Existing FMPs and Fishery Management Tools

Mr. Burden suggested that a first step would be to review the existing FMPs for commonalities and management tools consistent with EBFM. It is important to first determine what existing mechanisms are useful in meeting EBFM objectives before developing a purpose and need statement. Does the Council have everything it needs within existing FMPs? If not, what is lacking and what sort of plan does the Council need to reach its objectives.

Mr. Maruska noted that the November 2009 statement of the Scientific and Statistical Committee supports this concept with the following suggested initial tasks:

- *Catalog aspects of ecosystem management that are already taking place under the current FMPs (e.g., habitat protection and protected species).*
- *Examine what gaps within or between the FMPs need to be filled by ecosystem based management.*
- *Analyze the goals and objective across the current FMPs and see if they can be more consistent.*
- *Analyze why it is important to augment single species management. What are the outcomes ecosystem based management may achieve that are not possible through single species management?*
- *Document the approaches to ecosystem management that have been used in other regions.*

The Council, other Regional Fishery Management Councils, and other nations all have experienced the trials and tribulations of implementing EBFM and there are certainly lessons learned that would benefit this process.

Mr. Maruska suggested that the EAS and the EPDT hold future meetings with other Council Advisory Bodies as well as representatives from other RFMCs to better understand what works and what rationale has been used for the various management approaches chosen.

Mr. Niles (EPDT) noted that he is still grappling with the topic of determining the Council's objectives. He suggested that only when it is clear as to what the Council intends to accomplish can we fully determine the best regulatory vehicle. The MSA is clear on what is required of Council's and their FMPs. The Council is interested in many of these same questions and it seems appropriate to present a suite of possibilities that address a range of objectives and appropriate management responses.

A "case-study" approach was suggested to help provide small-scale answers to get a handle on bigger issues. The California Current Ecosystem (CCE) is huge and perhaps a smaller scope would be a better starting place; a way to demonstrate how EBFM could make a difference. Mr. Enticknap characterized the North Pacific EBFM process as one of narrowed scope where the focus was on one system (Aleutian Islands) as a starting place to see what could be accomplished and learned. The EAS discussed possibly focusing on west coast nearshore management as a

possible subset of the CCE. However, because there is a paucity of focused research there is relatively little data, which could lead to unsatisfactory conclusions unrelated to the pros and cons of EBFM. Mr. Nelson noted that the International Council for the Exploration of the Sea has done work on cod in the North Atlantic as a case study for EBFM.

The group discussed the workload of summarizing the various approaches to EBFM and all agreed that the resulting report to the Council should be focused and not lengthy. Ms. Fosmark noted that California, through its Marine Life Management Act process, as a result of the implementation of the Marine Life Protection Act has developed a "lessons learned" type of document that may be of interest, and Responsive Management provided the Council with a public opinion poll that could provide useful information on public values on such things as protecting natural biodiversity versus food supply, and sustainability versus preservation. The EBFMP should consider these polls. The final report could simply have a short list of the most pertinent findings from a comprehensive review.

Ms. deReynier stated that this effort has been done to some degree and reported in the document and this initial review indicates that it is unlikely that there is an existing EBFM approach that exactly meets what is generally believed to be the Council's interests, but there are pieces of other programs that may be useful.

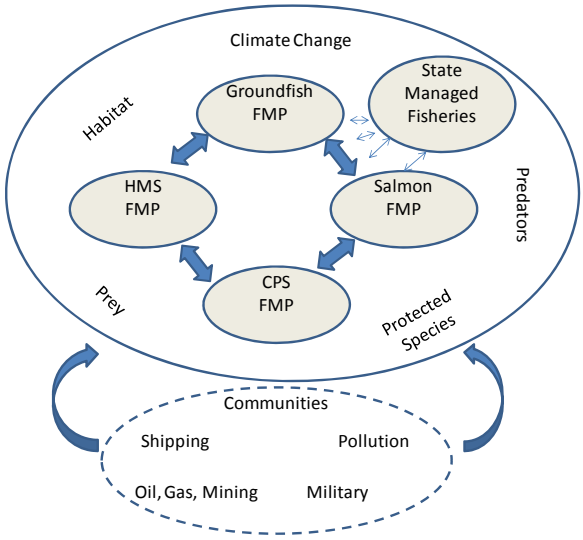
Defining EBFM and Developing a Purpose and Need

Mr. Maruska agreed that choosing a tool before assessing the job makes no sense. To help understand the concept the EAS drew up a chart that expresses a progression from determining just what is EBFM, to what are the shortcomings of existing management, to what can be learned from other processes, to what should be done.

Working table for the purpose of developing an EBFM definition and purpose.			
Topic	**Need**	**What Works**	**What to do**
What is EBFM and its value?	What are the shortcomings of existing mgmt. approaches?	What approaches and tools will effectively access the value?	What decision and approach and implementation?
EBFM is a systems approach that looks at interactions of habitats and species to optimize ecosystem services in ways that encourage sustainability of the broader marine ecosystem and the health and resilience of fisheries, fish stocks, fishing communities. /1	What is EBFM's worth or what is the value of the needs?	What can we learn from other EBFM approaches?	

/1 Biodiversity (species, genetic, age, etc.) and the human component (viable communities, seafood supply, etc.) were discussed as example criteria for assessing ecosystem sustainability.

Mr. Enticknap adapted the following graphic from the NPFMC materials on the Aleutian Islands FEP to help the group visualize what the scope of an EBFM approach might be. The solid oval represents the both the four Council FMPs and State managed fisheries for which direct fishery



authority exists within the Council arena as well as other aspects of fishery management that the Council may want to consider and/or take action to protect (non-target predators, prey, and protected species, habitat, climate change). An EBFM approach would consider the interrelationships of the four FMPs, State managed species, non-target species, and the ecosystems they all rely on. The dashed oval below represents activities or entities that are interrelated to fisheries and fish stocks, but are generally outside the authority of fishery management agencies. The impacts to and from these entities could be considered under EBFM and, although not the direct authority of the Council, Council and/or public input on these matters could be strengthened a broader Council position based on ecosytem considerations within an EFMP.

The group reviewed several aspects of current fishery management that could benefit from the linkages depicted above and envisioned for EBFM:

- The Council has established many area-based conservation zones to avoid bycatch (*i.e.* salmon conservation zones for the Pacific hake fishery). These areas are generally constant over time, but it is likely that these conservation areas would benefit from a more adaptive strategy that adjusts conservation areas according to a contemporary understanding of oceanographic and ecological interactions.
- Under the trawl rationalization program, the timing of the harvest of individual quota shares is envisioned to fall to the discretion of the shareholder with potential improvements to socio-economic factors. However, there may be biological justification for when and where harvest occurs that could be considered under an EFMP.
- Groundfish fishery management increasingly considers impacts to communities when establishing harvest policies, but currently lacks a broad understanding of how communities operate and considerations tend to be segregated by FMPs. An ecosystem approach could provide for a big picture consideration of the cumulative impacts to communities across all Council managed species.
- Predicting effort in open access groundfish and albacore tuna fisheries is often highly dependent upon the availability of other fishing opportunities such as salmon. Issues of effort shift between fisheries managed under separate FMPs could be better understood

from an ecosystem perspective.

- The Council addresses many bycatch issues in fishery management, salmon bycatch in groundfish and coastal pelagic fisheries, halibut bycatch in groundfish fisheries, etc. as well as impacts to non-target protected fish and mammal species across several Council FMPs.

Ms. Schmitt described a diagram she is working on for the EPDT that, to some degree, would blend the tabular and graphic approaches presented above. Her vision is a diagram that depicts the graphical relationships between the various management tools, ecosystem services, and desired ecosystem characteristics and couples them with text description of the issues, concepts, case studies, and tradeoffs. The goal is an easily digested graphical summary of the interrelated concepts the Council will need to balance in its decision making.

Mr. McMullen noted that there is full a range of costs and benefits associated with EBFM, many that still need to be explored. He drew analogies to farming practices and noted that some, but not all, farming practices with ecological benefits increase production. There are potential consequences, intended or otherwise, that should be considered.

The EAS adopted the following working definition of EBFM and recommends it to the PDT for their consideration:

EBFM is a systems approach that looks at interactions of habitats and species to optimize ecosystem services in ways that encourage sustainability of the broader marine ecosystem and the health and resilience of fisheries, fish stocks, fishing communities.

The EAS noted that MSA Section 3 defines the terms “conservation and management” and “optimum yield” to include ecological, ecosystem, and marine environment considerations. The EAS recommended that the implications of these definitions to existing Council authorities should be further explored for their application to EBFM and the development of an FEP or EFMP.

MSA Section 3(5) and Section 3(33):

*(5) The term "**conservation and management**" refers to all of the rules, regulations, conditions, methods, and other measures*

(A) which are required to rebuild, restore, or maintain, and which are useful in rebuilding, restoring, or maintaining, any fishery resource and the marine environment; and

(B) which are designed to assure that—

(i) a supply of food and other products may be taken, and that recreational benefits may be obtained, on a continuing basis;

(ii) irreversible or long-term adverse effects on fishery resources and the marine environment are avoided; and

(iii) there will be a multiplicity of options available with respect to future uses of these resources.

*(33) The term "**optimum**", **with respect to the yield from a fishery**, means the amount of fish which—*

(A) will provide the greatest overall benefit to the Nation, particularly with respect to food production and recreational opportunities, and taking into account the protection of marine ecosystems;

(B) is prescribed as such on the basis of the maximum sustainable yield from the fishery, as reduced by any relevant economic, social, or ecological factor; and

(C) in the case of an overfished fishery, provides for rebuilding to a level consistent with producing the maximum sustainable yield in such fishery.

Additional Ecosystem Advisory Subpanel Comments

Document Flow and Organization

The EAS appreciated the presentation and layout of the current draft and found the relationship between the tasks assigned and the material presented to be well organized. However, the EAS recommended that the document would benefit from some transitional text to help the flow of the document and to clarify the linkages between the document sections. Additionally, the document would benefit from a glossary and consistent use of key terms such as, biodiversity, resilience (of what), and ecosystem health.

Purpose and Need

As discussed earlier in the meeting, the EAS found the purpose and need discussions in the document lacking in terms of a clear description of the management framework desired and what it is really going to do. The document talks about other approaches and outlines some ideas, but is foggy on what the focus of the plan will be. If the first step is to set up an informational FEP, the purpose and need statement should discuss what sort of management is envisioned as the plan evolves and future tiered actions are considered and existing FMPs should always be subject to oversights that lead to improvement.

The EAS gleaned four specific purposes from the draft PDT report. The EAS recommends these four items be considered by the PDT in developing the purpose and need statement, specifically:

The EBFM document provides a vehicle to (1) improve information and improve decision making; (2) identify gaps in information; (3) integrate across species-specific FMPs; and (4) provide a nexus to regional and national ecosystem-related endeavors.

Based on comments submitted by Mr. Maruska, the EAS recommends that the following items also be considered in the purpose and need statement (5) establish a platform or framework that enables management at the appropriate ecosystem scale for a species or complex of species, (6) create incentives for improved stewardship and (7) encourage innovation by offering an alternative pathway for management of a complex of species that might yield a more robust portfolio of fishing opportunities.

Goals and Objectives

The goal statement in the draft is focused on bringing a greater understanding of the CCE to the Council process. Mr. Enticknap felt this is too limited and should not be the goal of the plan. The goal should be broadened to include items such as achieving optimal harvest levels and desired ecosystem services while maintaining a healthy and sustainable ecosystem. The desire for improved information speaks more to tools needed to get to this broader goal.

Ms. deReynier noted that Council and National Marine Fisheries Service authority is limited to fisheries, an authority that alone cannot ensure a healthy ecosystem. Mr. Niles added that the Council does have some authority in the MSA to protect habitat, deep-sea corals, and to close all fishing if there is supporting rationale. Ms. deReynier noted that, however, even in that broader context, the Council has no authority over marine uses such as shipping, drilling, mining, but Council positions and comments on many of these issues could have greater influence with the backing of an ecosystem plan and/or rationale.

Framework for Future Management

The EAS is supportive of an evolutionary process that starts with an overarching or programmatic framework as well as the potential for specific management and regulatory actions that could build or tier off the initial framework. The EAS recommends that the following SSC comments from November 2009 for a plan framework should be considered and incorporated in the next draft of the document:

> *"…it will be important to establish a general framework in which [an EBFM] plan will operate. This framework should allow the Council to monitor ecosystem characteristics, and take actions to protect the California Current ecosystem or particular ecosystem components as necessary to achieve the goals of the plan."*
>
> *"The plan should give the Council the ability to manage ecosystem components that are not specifically treated in the existing FMPs."*

Broad Stakeholder Involvement

In order for the EFMP to be effective and broadly supported, one objective of the plan should be to seek input from multiple stakeholders. The Council process is a good vehicle for public input, but may not routinely involve the full suite of interested stakeholders, particularly those outside the realm of fishery management.

Summary of EAS Recommendations to the EPDT and Council staff

This is a summary of specific EAS recommendations as discussed at this meeting in no priority order. It should be noted that several EAS members provided detailed comments directly to the EAS and the EPDT in advance of the meeting only some of which have been captured in this document.

General recommendations:

- Continue to develop a full range of regulatory options that clearly explains the tradeoffs between the suite of options; from developing an advisory or informational FEP to a full EFMP.
- Review and carefully consider SSC recommendations from November 2009, specifically for reviewing existing FMPs and EBFM approaches around the nation and the world.
- Request that the Council tap the collective expertise of the Management Teams and Advisory Subpanels of the four FMPs to achieve a comprehensive understanding of existing and needed ecosystem-based management tools.
- Continue developing the diagram envisioned by Ms. Schmitt depicting the relationships and tradeoffs inherent in EBFM.
- Seek to maximize stakeholder input during development and implementation of an EBFM plan.
- Council staff should arrange agenda time for review and input from the Council's other Advisory Bodies before or during the September Council meeting.

Recommendations specific to the draft EPDT report:

- Develop transitional text to help document flow and to clarify linkages between document sections.
- Add a glossary to the document so that key terms are well defined and used consistently.

- Consider revising the current goals and objective section to broaden the plan goals to achieve optimal harvest levels and recognize desired ecosystem services while maintaining a healthy and sustainable ecosystem.
- Review the MSA Section 3 definitions of "conservation and management" and "optimum yield" when describing existing Council authorities.
- Consider adding the following items under the purpose and need (a) establish a platform or framework that enables management at the appropriate ecosystem scale for a species or complex of species, (b) create incentives for improved stewardship, and (c) encourage innovation by offering an alternative pathway for management of a complex of species that might yield a more robust portfolio of fishing opportunities.
- Hew closely to the November 2009 SSC recommendations in general and specifically when considering the plan's framework for future management.

Future Work and Meeting Planning

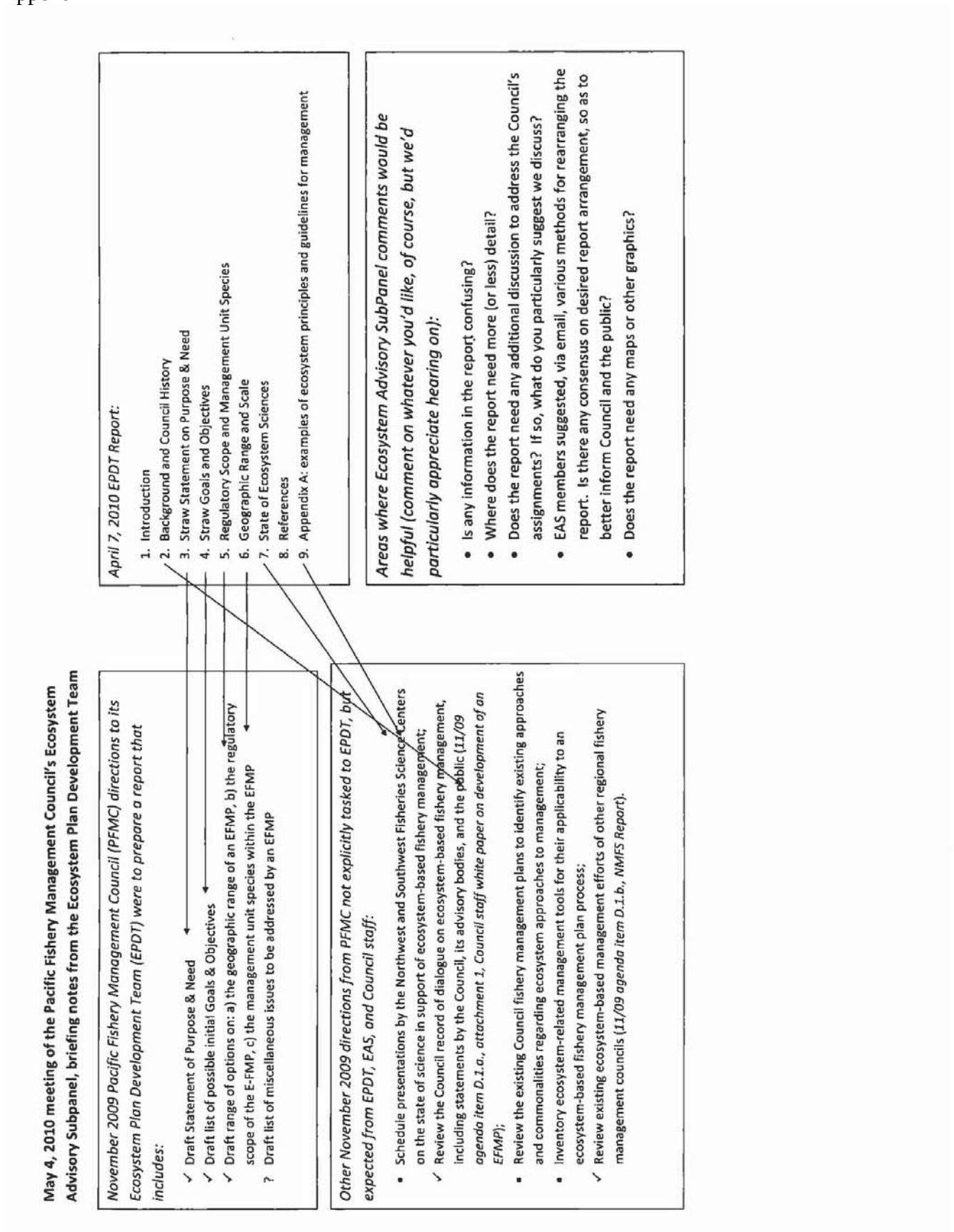
The group tentatively agreed to the following schedule of future events:

1. EAS comments and summary minutes are provided to the EPDT by mid-May.
2. EPDT reviews comments and begins revising the document. Mr. Waldeck and Mr. Burden will work with the EPDT on any needed EAS feedback.
3. EPDT meets in mid to late July to finalize the next draft and distribute to the EAS (and other Council Advisory Bodies?) for review. The EPDT would also draft a statement to the Council that includes recommendations for the next steps in the process.
4. EAS meeting on August 11 in Portland to review the revised draft and develop and EAS report to the Council for its September meeting.
5. The final EAS and EPDT reports are completed in advance of the August 25 deadline for the September Briefing Book.
6. Under this schedule, the full EAS or EPDT would not need to attend the September Council meeting, but the EAS and EPDT Chairs would attend to deliver their respective reports and respond to Council questions.

The EAS is interested in getting input from a wide range of Council Advisory Groups and noted that holding an EAS and/or EPDT meeting at a Council meeting could afford the opportunity to meet jointly with one or more groups. Specifically, the EAS found merit in meeting collaboratively with the Habitat Committee and the SSC. Also, to foster coordination and improve input to the Council the EAS it was suggested that SSCs EFMP Subcommittee meet to review the reports before the September session of the full SSC.

PFMC
05/10/10

Appendix 1


May 4, 2010 meeting of the Pacific Fishery Management Council's Ecosystem Advisory Subpanel, briefing notes from the Ecosystem Plan Development Team
November 2009 Pacific Fishery Management Council (PFMC) directions to its Ecosystem Plan Development Team (EPDT) were to prepare a report that includes:
✓ Draft Statement of Purpose & Need
✓ Draft list of possible initial Goals & Objectives
✓ Draft range of options on: a) the geographic range of an EFMP, b) the regulatory scope of the E-FMP, c) the management unit species within the EFMP
? Draft list of miscellaneous issues to be addressed by an EFMP
Other November 2009 directions from PFMC not explicitly tasked to EPDT, but expected from EPDT, EAS, and Council staff:
▪ Schedule presentations by the Northwest and Southwest Fisheries Science Centers on the state of science in support of ecosystem-based fishery management;
✓ Review the Council record of dialogue on ecosystem-based fishery management, including statements by the Council, its advisory bodies, and the public (11/09 agenda item D.1.a., attachment 1, Council staff white paper on development of an EFMP);
▪ Review the existing Council fishery management plans to identify existing approaches and commonalities regarding ecosystem approaches to management;
▪ Inventory ecosystem-related management tools for their applicability to an ecosystem-based fishery management plan process;
✓ Review existing ecosystem-based management efforts of other regional fishery management councils (11/09 agenda item D.1.b., NMFS Report).
April 7, 2010 EPDT Report:
1. Introduction
2. Background and Council History
3. Straw Statement on Purpose & Need
4. Straw Goals and Objectives
5. Regulatory Scope and Management Unit Species
6. Geographic Range and Scale
7. State of Ecosystem Sciences
8. References
9. Appendix A: examples of ecosystem principles and guidelines for management
Areas where Ecosystem Advisory SubPanel comments would be helpful (comment on whatever you'd like, of course, but we'd particularly appreciate hearing on):
• Is any information in the report confusing?
• Where does the report need more (or less) detail?
• Does the report need any additional discussion to address the Council's assignments? If so, what do you particularly suggest we discuss?
• EAS members suggested, via email, various methods for rearranging the report. Is there any consensus on desired report arrangement, so as to better inform Council and the public?
• Does the report need any maps or other graphics?

ECOSYSTEM ADVISORY SUBPANEL REPORT ON AN ECOSYSTEM FISHERY MANAGEMENT PLAN

The Ecosystem Advisory Subpanel (EAS) met on May 4, 2010 to review an Ecosystem Plan Development Team (EPDT) draft report that was prepared in response to Pacific Fishery Management Council (Council) requested tasks on the initiation of an Ecosystem Fishery Management Plan (EFMP). This report summarizes the recommendations and comments from our May 4th meeting minutes (Agenda Item H.1.c, Attachment 1). Several members of the EPDT attended our May 4th session and the EAS is generally pleased with the resulting final EPDT report to the Council (Agenda Item H.1.b, Attachment 2).

Regulatory Scope

The EAS believes that what is important at this stage is to present the Council with a full range of regulatory options that clearly maps the tradeoffs of developing an advisory or informational Fishery Ecosystem Plan (FEP) versus a full Fishery Management Plan (FMP).

Review of Existing FMPs and Fishery Management Tools

It is important to first determine what existing mechanisms are useful in meeting ecosystem-based fishery management (EBFM) objectives before developing a purpose and need statement. That is, does the Council have everything it needs within existing FMPs? If not, what is lacking and what sort of plan does the Council need to reach its objectives? In line with these questions, the EAS agrees with the initial tasks recommended by the Scientific and Statistical Committee (SSC) in November 2009:

- Catalog aspects of ecosystem management that are already taking place under the current FMPs (e.g., habitat protection and protected species).
- Examine what gaps within or between the FMPs need to be filled by ecosystem based management.
- Analyze the goals and objective across the current FMPs and see if they can be more consistent.
- Analyze why it is important to augment single species management. What are the outcomes ecosystem based management may achieve that are not possible through single species management?
- Document the approaches to ecosystem management that have been used in other regions.

Defining EBFM and Developing a Purpose and Need

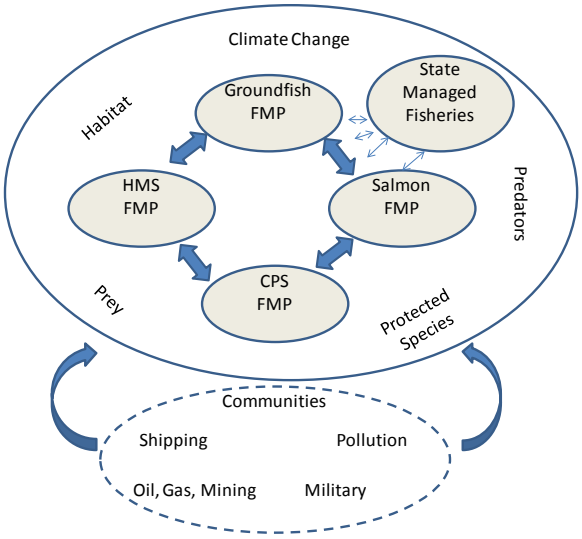
The EAS developed the following working definition of EBFM to facilitate our discussions:

> EBFM is a systems approach that looks at interactions of habitats and species to optimize ecosystem services in ways that encourage sustainability of the broader marine ecosystem and the health and resilience of fisheries, fish stocks, fishing communities.

In this context, biodiversity (species, genetic, age, etc.) and the human component (viable communities, seafood supply, etc.) were discussed as example criteria for assessing ecosystem sustainability.

The EAS notes that Section 3 of the Magnuson Steven Fishery Conservation and Management Act (MSA) defines the terms "conservation and management" and "optimum yield" to include ecological, ecosystem, and marine environment considerations (see Appendix 1). The EAS recommends that the implications of these definitions to existing Council authorities should be further explored for their application to EBFM and the development of an FEP or EFMP.

Specific to development of the Council's Ecosystem Plan, the EBFM approach would (at the highest level) consider the interrelationships of the Council's four FMPs. The EAS illustrates this in the following diagram, which is based on the North Pacific Fishery Management Council's Aleutian Islands FEP:



The solid oval represents the both the four Council FMPs and State managed fisheries for which direct fishery authority exists within the Council arena as well as other aspects of fishery management that the Council may want to consider and/or take action to protect (non-target predators, prey, and protected species, habitat, climate change). As stated, an EBFM approach would consider the interrelationships of the four FMPs, as well as state-managed species, non-target species, and the ecosystems they all rely on. The dashed oval below represents activities or entities that are interrelated to fisheries and fish stocks, but are generally outside the authority of fishery management agencies. The impacts to and from these entities could be considered under EBFM and, although not the direct authority of the Council, Council and/or public input on these matters could be strengthened a broader Council position based on ecosystem considerations within an EFMP.

There are several aspects of current fishery management that could benefit from the linkages depicted above and envisioned for EBFM:

- Area-based conservation zones, at present, are generally constant over time. However, these conservation areas could benefit from a more adaptive strategy that adjusts conservation areas according to prevailing oceanographic and ecological interactions.
- Under the trawl rationalization program, it is believed that the timing of the harvest of individual quota shares will be determined by shareholders based on market considerations. However, there may be biological justification for when and where harvest occurs that could be considered under an EFMP.
- Management decisions increasingly considers impacts to communities when establishing harvest policies, but a broad understanding of how communities operate is lacking and these considerations tend to be segregated by FMPs. An ecosystem approach could provide for a big picture consideration of the cumulative impacts to communities across all Council-managed species.
- Predicting effort in open access groundfish and albacore tuna fisheries is often highly dependent upon the availability of other fishing opportunities such as salmon. Issues of effort shift between fisheries managed under separate FMPs could be better understood from an ecosystem perspective.
- The Council currently addresses many bycatch issues that cross FMPs, e.g., salmon bycatch in groundfish and coastal pelagic fisheries, halibut bycatch in groundfish fisheries, as well as impacts to other protected resources such as sea turtles and marine mammals. An EBFM approach could help to improve how issues that cross FMPs are addressed.

Specific to the purpose of and need for a Council Ecosystem Plan, the EAS identified several specific items to be considered by the PDT in developing the purpose and need statement, specifically:

> The EBFM document provides a vehicle to (1) improve information and improve decision making; (2) identify gaps in information; (3) integrate across species-specific FMPs; and (4) provide a nexus to regional and national ecosystem-related endeavors; (5) establish a platform or framework that enables management at the appropriate ecosystem scale for a species or complex of species, (6) create incentives for improved stewardship and (7) encourage innovation by offering an alternative pathway for management of a complex of species that might yield a more robust portfolio of fishing opportunities.

Specific to goals and objectives, the EAS discussed this issue in regard to whether the PFMC Ecosystem Plan would have a narrow focus (e.g., providing a better understanding of the California Current Ecosystem to the Council process to better inform Council decision making) or a broad focus (e.g., specifying measures to achieve optimal harvest levels and desired ecosystem services while maintaining a healthy and sustainable ecosystem, which could include measures beyond the scope of Council authority.) The EAS discussed the practicability of these two general approaches, but reached no conclusion or recommendation.

Framework for Future Management

The EAS supports an evolutionary process that starts with an overarching or programmatic framework as well as the potential for specific management and regulatory actions that could

build or tier off the initial framework. The EAS supports SSC comments from November 2009 for a plan framework:

> "…it will be important to establish a general framework in which [an EBFM] plan will operate. This framework should allow the Council to monitor ecosystem characteristics, and take actions to protect the California Current ecosystem or particular ecosystem components as necessary to achieve the goals of the plan."
>
> "The plan should give the Council the ability to manage ecosystem components that are not specifically treated in the existing FMPs."

Broad Stakeholder Involvement

In order for the EFMP to be effective and broadly supported, one objective of the plan should be to seek input from multiple stakeholders. The Council process is a good vehicle for public input, but may not routinely involve the full suite of interested stakeholders, particularly those outside the realm of fishery management.

Specific Comments on the Final EPDT Report (Agenda Item H.1.b, Att. 1)

- Broaden the goals and objectives - In order for the EFMP effort to gain traction, it needs to identify ways to achieve "win-win" solutions, i.e. improved ecosystem health and greater fisheries productivity, landings, and vitality of fishing communities. Specifically, the report should incorporate items 6 and 7 from the May 4th EAS meeting (see page 3):
  > (6) Provide a context to create incentives for improved stewardship
  >
  > (7) Encourage innovation by offering an alternative pathway for management of a complex of species that might yield a more robust portfolio of fishing opportunities.
- Add concrete examples of how an EFMP would add value to the Council process – in other words, "How in concrete terms might it be possible for an EFMP to enhance our work?" Appendix A of the EPDT report (Example Practical Considerations for EFMP Alternatives) is a good example of how this type of exercise can inform decision-making.

Recommendations for Future Work

- Continue to develop a full range of regulatory options that clearly explains the tradeoffs between the suite of options; from developing an advisory or informational FEP to a full EFMP.
- Review and carefully consider SSC recommendations from November 2009, specifically for reviewing existing FMPs and EBFM approaches around the nation and the world.
- Request that the Council tap the collective expertise of the Management Teams and Advisory Subpanels of the four FMPs to achieve a comprehensive understanding of existing and needed ecosystem-based management tools.
- Seek to maximize stakeholder input during development and implementation of an EBFM plan.

Appendix 1

MSA Section 3(5) and Section 3(33):

(5) The term "conservation and management" refers to all of the rules, regulations, conditions, methods, and other measures

(A) which are required to rebuild, restore, or maintain, and which are useful in rebuilding, restoring, or maintaining, any fishery resource and the marine environment; and

(B) which are designed to assure that—

(i) a supply of food and other products may be taken, and that recreational benefits may be obtained, on a continuing basis;

(ii) irreversible or long-term adverse effects on fishery resources and the marine environment are avoided; and

(iii) there will be a multiplicity of options available with respect to future uses of these resources.

(33) The term "optimum", with respect to the yield from a fishery, means the amount of fish which—

(A) will provide the greatest overall benefit to the Nation, particularly with respect to food production and recreational opportunities, and taking into account the protection of marine ecosystems;

(B) is prescribed as such on the basis of the maximum sustainable yield from the fishery, as reduced by any relevant economic, social, or ecological factor; and

(C) in the case of an overfished fishery, provides for rebuilding to a level consistent with producing the maximum sustainable yield in such fishery.

PFMC
09/08/10

GROUNDFISH ADVISORY SUBPANEL REPORT ON AN ECOSYSTEM FISHERY MANAGEMENT PLAN (FMP)

The Groundfish Advisory Subpanel (GAP) received a presentation from Ms. Yvonne de Reynier about the Ecosystem Plan Development Team (EPDT) report, their progress to date, and future considerations. The GAP also discussed the Ecosystem Advisory Subpanel (EAS) report and recommendations.

In general, the GAP supports the recommendations of the EAS, specifically the recommendation to continue to develop a range of alternative ecosystem plans. Ecosystem-based fishery management is complex. It is because of this complexity that the GAP recommends the Council not limit its flexibility by embarking on, at this point, an approach potentially saddled with proscriptive measures to address issues about which we do not have solid data.

It is easy to suggest we protect the food web. It is much harder to monitor and understand the complexities of that food web and harder yet to manage it. The GAP believes that the Council should have the ability to consider ecosystem components not specifically managed in current FMPs, but the Council should have the flexibility to use what is known and available to manage the fisheries without having to come up with a new ecosystem-based management regime. Therefore, it is important to continue to explore a range of ecosystem approaches. Specifically, the GAP supports the EAS recommendation for an evolutionary process that starts with an overarching or programmatic framework, and the potential for future specific management and regulatory actions that could build or tier off the initial framework.

PFMC
09/13/10

HABITAT COMMITTEE REPORT ON ECOSYSTEM FISHERY MANAGEMENT PLAN (FMP)

The Habitat Committee (HC) heard a report on the Ecosystem Fishery Management Plan process, and discussed how to participate effectively in the process.

The HC urges the Council to continue moving forward with ecosystem management. The HC believes the Council will benefit from taking a broad, integrative approach to dealing with ecosystem issues, in addition to focusing on our individual fishery management plans (FMPs). An integrative approach will contribute to a better understanding of complex, overarching issues such as predator/prey interactions, climate change, common threats, food web interactions, and protected species interactions. For example, an ecosystem approach could have been used by the Council to address protection of the water column around the Channel Islands.

An ecosystem fishery management plan (EFMP) could affect and inform many aspects of Council management, and should therefore be thoroughly and deliberately considered. The HC urges the Council to allow the development of an EFMP to unfold in an evolutionary manner, thoroughly considering the big picture issues first and allowing the development of an effective framework.

At its meeting, the HC considered how best to be productive in the EFMP process, with respect to our focus on habitat and essential fish habitat (EFH). Given our involvement in EFH for every FMP, the HC has a unique perspective among advisory bodies in terms of identifying linkages and commonalities among the FMPs. The HC will consider our involvement further at our November meeting.

In addition, the HC agrees with the EPDT's recommendation that the Council receive regular briefings on various aspects of California Current ecosystem science and policy, such as the quarterly reports from PaCOOS (Pacific Coast Ocean Observing System) on climatic and ecological conditions in the California Current. If these briefings were provided early in the Council meeting week, they could help inform subsequent Council discussions.

PFMC
09/12/10

SCIENTIFIC AND STATISTICAL COMMITTEE REPORT ON ECOSYSTEM FISHERY MANAGEMENT PLAN

Ms. Yvonne de Reynier presented an overview of the Ecosystem Plan Development Team's (EPDT) draft planning document (Plan), emphasizing that it is primarily policy-oriented at this stage. While the current draft contains little science for the SSC to comment on, the Scientific and Statistical Committee's (SSC) questions and recommendations for ecosystem-based fishery management (EBFM) planning have been considered by the EPDT. The draft document provides a good review of literature on ecosystem management objectives, and examples of the application of ecosystem based management by other Councils. Several alternatives for the scope and regulatory authority of the Plan are laid out. The draft does not include a detailed analysis of the specific impacts of these alternatives on existing Council operations.

The current lack of consensus on the purpose and application of the Plan to fishery management inhibits scientific evaluation of its benefits. The EPDT needs Council guidance on the preferred Plan type and scope to develop a complete Plan. As suggested in the report, the Plan could be focused on needs that are not well represented by existing fishery management plans, to help the Council address management issues that are not directly related to assessing fish stocks and regulating fisheries. The Purpose and Needs Statement should complement the goals and objectives of the Plan.

As the primary reviewers of the science used by the Council for management, the SSC should review and evaluate the data, methods, results and recommendations generated by ecosystem-based models applied to management questions. This review already includes evaluation of environmental data used in stock assessments, and should also include ecosystem modeling efforts.

The SSC supports a recommendation by the EPDT to provide the Council and advisory bodies with regular updates of ecosystem conditions in the California Current. The reports should include potential or known impacts to fisheries under Council jurisdiction, and should be reviewed by the SSC.

The SSC identified the following next steps:

- The SSC's Ecosystem-Based Management subcommittee should meet with the EPDT once the general format and specific goals and objectives of the Plan have been determined. The purpose of the meeting would be to work with the Team on scientific objectives and review of available tools for EBFM.
- The Council should request NMFS to initiate development of an annual report on conditions in the California Current ecosystem. The SSC can provide guidance on the content, review and dissemination of this report.

- As a step towards integrating ecosystem factors in stock assessments, the SSC recommends that a subset of stock assessments be expanded to include ecosystem considerations. This would likely require the addition of an ecologist or ecosystem scientist to the Stock Assessment Teams (STATs) developing those assessments. The SSC's Ecosystem-Based Management subcommittee should develop guidelines for how ecosystem considerations can be included in stock assessments.
- The SSC should meet with ecosystem modelers to review ecosystem models that could be used for management purposes in the future, and to develop a plan for scientific review of those models.

PFMC
09/13/10

Agenda Item H.1.c
Supplemental Tribal Comments
September 2010

COASTAL TRIBES' COMMENTS ON ECOSYSTEM PLAN DEVELOPMENT

The Coastal Treaty Tribes support the Council's ongoing effort to incorporate broader knowledge of ecosystem processes into fisheries management. Something similar to an advisory Fisheries Ecosystem Plan (FEP) as described in the Ecosystem Plan Development Team's report (Agenda Item H.1.b, Attachment 1) is preferable to an Ecosystem FMP because of the flexibility that it would provide (i.e. an FEP would not be required to designate Fishery Management Units under the Magnuson Act). We would like to see the Plan contain some regulatory authority for refined spatial management – the Coastal Treaty Tribes have long stressed the need for management to reflect regional and local differences in biological community structure, species availability, productivity patterns, etc. This type of spatial management authority should also help align the FEP with national, regional, and local Marine Spatial Planning efforts. We stress, though, that spatial management regulations should not be enacted without sufficient scientific information and justification to support them. Additionally, the Coastal Treaty Tribes would support any recommendations for regular Council briefings or updates of potential indicators of ecosystem status. The Council lacks such updates currently and we believe they would be a good beginning towards viewing our fisheries management from an ecosystem perspective.

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99 Pacific Street, Suite 155C
Monterey, CA 93940

831.643.9266
www.oceana.org

September 2, 2010

Mr. Mark Cedergreen, Chair
Pacific Fishery Management Council
7700 NE Ambassador Place, Suite 101
Portland, Oregon 97220-1384

RE: **Agenda Item H.1 Ecosystem Fishery Management Plan**

Dear Mr. Cedergreen and Council members:

Oceana strongly supports the continued development of an Ecosystem Fishery Management Plan (EFMP) by the Pacific Fishery Management Council. It has become broadly recognized that fisheries management must expand its focus from single species to ecosystem-based approaches (NRC 2006, POC 2003, USCOP 2004). From a scientific perspective, we know enough to improve dramatically the conservation and management of marine systems by doing so (McLeod et al. 2005). Yet even with broad scientific consensus and the progress to date by the Council, there remain both challenges and many different strategies for how to implement ecosystem-based fisheries management. We believe that the Council, at this meeting, is uniquely positioned to frame the successful development of an EFMP that will guide long-term sustainable fisheries and a healthy ocean ecosystem that serve as a model for the nation.

At a minimum, the EFMP should:

- Define an ecologically sustainable yield framework that explicitly accounts for all relevant ecological factors for all Council managed species, in which all existing FMPs are consistent;
- Include the regulatory authority to manage ecosystem component species not specifically managed in the existing FMPs;
- Include management authority to establish time and area-based regulations for the purpose of ecosystem protection;
- Conduct a thorough analysis of alternative harvest and management strategies on the functioning and resilience of the California Current marine food web;
- Include a programmatic review of the cumulative ecological impacts of current fisheries.

The process leading to the adoption of an EFMP will help the Council and the public assess broad policy choices and a management framework that can guide future ecosystem-based fisheries management for all of the Council's Fishery Management Plans. As such, the Council is right to develop an Ecosystem Fishery Management Plan—rather than an advisory document—that will assist the Council and NMFS in developing management measures and promulgating regulations directly from the EFMP (e.g., for ecosystem component species or habitats not currently managed in one of the existing FMPs). At this meeting, the Council can set the course for a successful EFMP by adopting the overarching goal statement, objectives, and a purpose and need statement that will further guide development of the plan.

1. Overarching Goal

We urge the Council to adopt an overarching long-term goal for the EFMP that is visionary, allows for the development of innovative implementation approaches, and does not limit this effort to information sharing only. Oceana recommends the following Overarching Goal Statement:

> **The overarching goal of this Ecosystem Fishery Management Plan is to manage for long-term ecologically sustainable fisheries and vibrant coastal communities in a manner that protects, restores and maintains the health, resilience, and biodiversity of the California Current Ecosystem.**

This goal will not limit the Council as it develops ecosystem-based approaches and is consistent with NOAA's long-term goals for a healthy ocean, including sustaining marine fisheries, habitats, and biodiversity within healthy and productive ecosystems (NOAA 2010).

2. Objectives

We largely agree with the objectives recommended by the Ecosystem Plan Development Team (Agenda Item H.1.b, Attachment 1, at 5). These objectives are designed to improve and integrate scientific information into the Council process and include important information such as trends in climate change and the cumulative effects of fishing on the marine ecosystem. Importantly, the objectives include providing for the administrative structure for conservation measures that address relationships across FMPs and for ecosystem components not included in the FMPs. Additional objectives that we believe are necessary include:

- Providing information on ecological factors and species interactions for use in setting catch limits that explicitly account for ecological considerations as required in the MSA;

- Defining an "ecologically sustainable yield" (maximum sustainable yield as reduced by ecological factors) framework for all Council managed species, including Status Determination Criteria for groups of species (e.g., aggregate forage base), and for consistency across existing FMPs;

- Identifying and providing a management policy for key forage species within the California Current marine ecosystem;

- Protecting the food web, including healthy populations of forage species for higher trophic level marine species and commercially and recreationally important fishes;

- Identifying and protecting intact and productive marine habitats necessary for long-term sustainable fisheries and a healthy and productive ecosystem;

- Identifying ecological indicators to be used in monitoring and evaluating whether EFMP objectives are being met (e.g., key top predator populations, food web indicators);

- Assessing the role of oceanographic and environmental conditions on the productivity of Council-managed species.

3. Purpose and Need

A strong purpose and need statement will set the stage for the development of the evaluation of alternatives and subsequent environmental analysis necessary for developing a new management plan. In November 2009, the Council requested a purpose and need statement from its committees. The committees have not provided this statement, and the EPDT stated instead that the Council is not yet at a National Environmental Policy Act analysis stage in its process of considering EFMP development. We believe that the Council's request for a purpose and need statement was more than relevant and look forward to the Council adopting one at this meeting so that the public can continue to be engaged in the development of the EFMP in a manner consistent with the Council and NMFS' NEPA obligations.

We also strongly agree with the November 2009 SSC statement that:

> The plan should give the Council the ability to manage ecosystem components that are not specifically treated in the existing FMPs. This will help in developing regulations for species like krill that form the base of food webs that are important to a wide variety of managed species. This type of framework could likely be developed through a programmatic Environmental Impacts Statement. (D.1.b Supplemental SSC Report, November 2009).

As recommended by the SSC, the development of the EFMP should take place through a Programmatic Environmental Impact Statement (PEIS), a NEPA requirement that applies to Council managed fisheries independent of the development of the EFMP. The development of the EFMP through a PEIS will assist the Council in both developing a strong EFMP and meeting the long overdue evaluation of cumulative impacts and alternative harvest strategies and management regimes.

Further, while we commend the Council for the June 2010 decision to include ecological factors into Amendment 23 to the Groundfish FMP and Amendment 13 to the CPS FMP, the next step is determining how these factors could be incorporated into the setting of catch levels. In our view, this step is a central purpose and need of the EFMP, and we urge the Council to make this explicit.

We have attached a Purpose and Need Statement for your consideration.

4. Geographic Scope

We support identifying a broad geographic scope of the California Current Large Marine Ecosystem for this plan development. The EFMP should recognize the broad physical and biological factors of the large marine ecosystem, including connections to waters off Canada and Mexico, and the river systems connecting land and sea. For management purposes, however, we recommend a geographic scope of the U.S. West Coast Exclusive Economic Zone.

Conclusion

Over the past five years, the Council has taken important steps to implement ecosystem-based approaches. This includes protections for krill, Essential Fish Habitat conservation areas, and recent decisions to consider ecological factors when setting catch limits. The development of an umbrella EFMP, however, can assist in implementing a coordinated ecosystem-based approach and provide a framework in which all existing FMPs are consistent. At the same time, it would provide the Council

with additional management authority (e.g., for Ecosystem Component Species) and would articulate overall management goals and objectives for long-term sustainable fisheries, communities and a healthy ocean ecosystem. The plan will help incorporate vital ecosystem information to advance our understanding of fisheries in the context of a dynamic marine ecosystem and provide a framework for improved decision making and conservation.

We hope you will consider adopting the recommended goals, objectives and purpose and need statement at this meeting. These actions will help move the development of the EFMP forward.

We look forward to continuing to work with you on this important issue.

Sincerely,

Geoffrey G. Shester, Ph.D.
California Program Director

McLeod, K.L., J. Lubchenco, S.R. Palumbi, and A.A. Rosenburg. 2005. Scientific Consensus Statement on Marine Ecosystem-Based Management. Signed by 217 academic scientists and policy experts with relevant expertise. Communication Partnership for Science and the Sea (COMPASS).

National Research Council (NRC). 2006. Dynamic Changes in Marine Ecosystems; Fishing, Food Webs, and Future Options. The National Academies Press. Washington D.C.

Pew Oceans Commission (POC). 2003. America's living oceans: charting a course for sea change. A report to the nation. Pew Oceans Commission, Arlington, Virginia.

U.S. Commission on Ocean Policy (USCOP). 2004. An ocean blueprint for the 21st century. U.S. Commission on Ocean Policy, Washington, D.C.

Attachment.

Draft Purpose and Need Statement

Within the California Current Large Marine Ecosystem, the Pacific Fishery Management Council (Council) and National Marine Fisheries Service (NMFS), in coordination with tribal co-managers and the four states, manage approximately 112 species and 18[1] recreational and commercial fisheries combined in four Fishery Management Plans (FMPs); Coastal Pelagic Species, Highly Migratory Species, Groundfish, and Salmon, plus Pacific halibut. These fisheries all take place within a complex and dynamic large marine ecosystem, including species that interact with each other in the marine food web, changing oceanographic conditions, protected species, and a variety of non-fishing human uses and activities outside of the Council's management responsibility and authority (e.g. shipping, hydrokinetic energy development, pollution discharge).

In order to advance the conservation and management of long-term sustainable fisheries that provide the greatest overall benefit to the Nation, including the protection afforded to the marine ecosystem, the Council and NMFS are proposing to develop an Ecosystem Fishery Management Plan (EFMP) for the California Current Ecosystem (CCE). The EFMP will provide analytical tools and structure necessary for accounting for ecosystem needs when setting Optimum Yield catch levels and managing fisheries. The EFMP will help ensure that management of any one of the Council's fishery groups (Coastal Pelagic Species, Groundfish, Highly Migratory Species, and Salmon) does not negatively affect the management potential of the other species groups, non managed species, or their habitats. The EFMP will help keep the Council updated on current and potential effects on the CCE from human and natural causes (e.g. creation of dredge pile islands, industrial contamination, climate change, etc.). The EFMP will allow the Council and NMFS to improve decision making and advance precautionary, coordinated, and innovative approaches to ecosystem-based fisheries management.

This federal action would establish an EFMP to compliment the ongoing conservation and management of federally managed fisheries in the U.S. Exclusive Economic Zone off Washington, Oregon and California, as authorized by the Magnuson-Stevens Fishery Conservation and Management Act (MSA) and pursuant to NEPA and other applicable statutes and executive orders.

[1] Groundfish FMP – 89 species, 3 primary fisheries (groundfish trawl, non-trawl and recreational). Salmon FMP – three species, 5 fisheries (commercial and recreational ocean chinook and coho, pink salmon). HMS FMP – 13 species, 5 fisheries (commercial albacore, coastal purse seine, harpoon swordfish, drift gillnet, West Coast recreational). CPS – 6 species, 4 fisheries (commercial sardine, jack mackerel, Pacific mackerel, anchovy). Pacific halibut – managed by the International Pacific Halibut Commission, along with NMFS, and catch sharing by the PFMC (tribal, non-tribal, commercial and recreational).

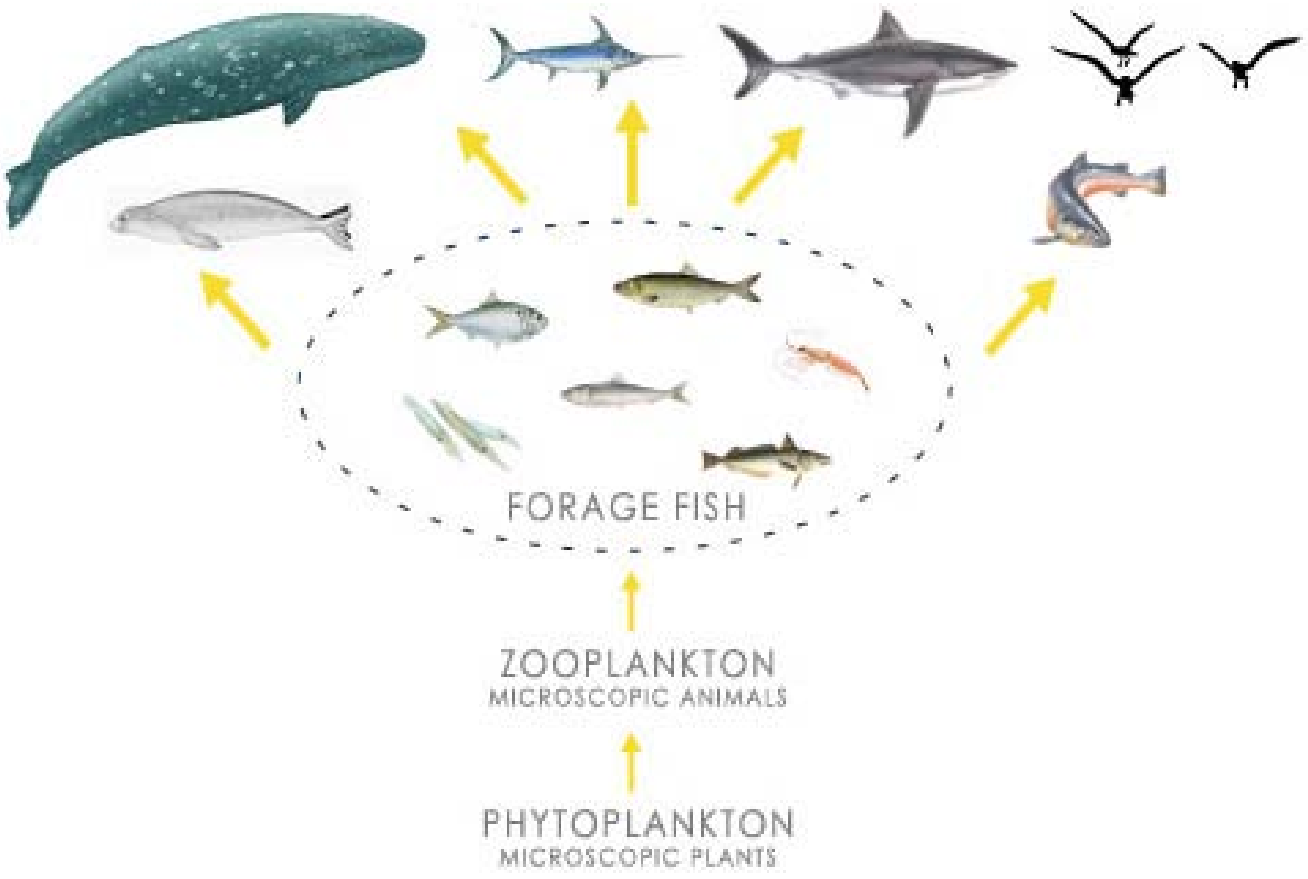
Agenda Item H.1.d
Supplemental Public Comment 2 (PowerPoint)
September 2010

The Pacific EFMP:
A Leadership Opportunity for Ecosystem-Based Management

Geoff Shester, Ph.D.
California Program Director

OCEANA

FORAGE FISH: THE VITAL LINK OF THE FOOD WEB



“Freeze the Menu”

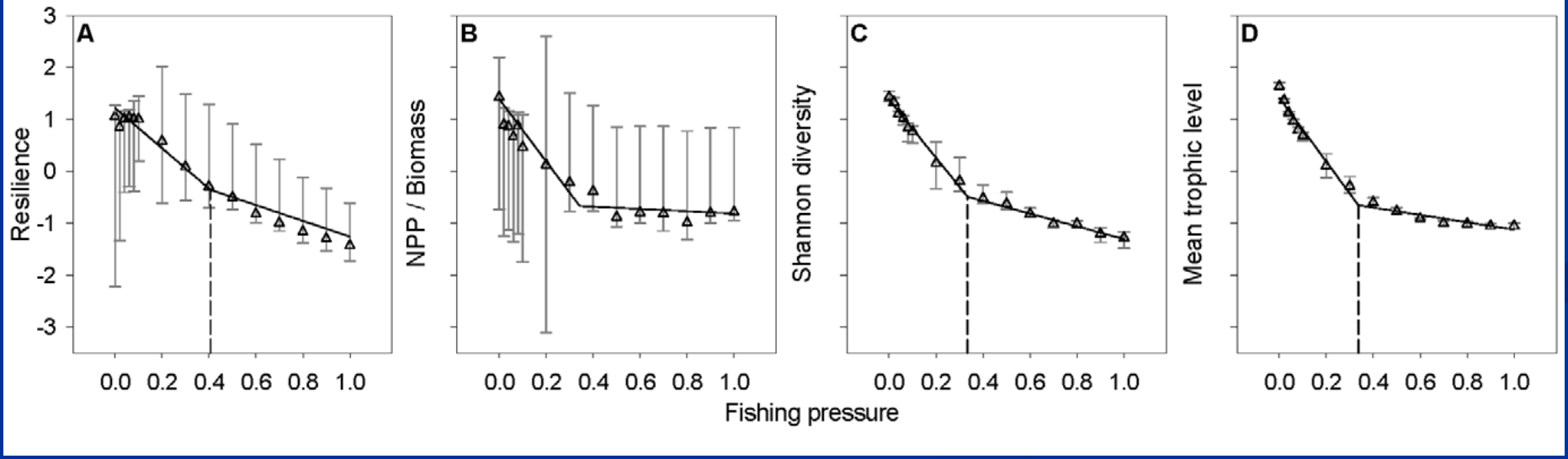
Prevent new fisheries from developing on key forage species

Precautionary Actions by Pacific Fishery Management Council:

- Prohibited Krill Fishing off entire US West Coast
- Prevented expansion of harvest on Shortbelly Rockfish
  - Key forage for Chinook salmon, seabirds, mammals, etc.

Ecosystem Effects of Fishing

- Effects on predators (fish, seabirds, mammals)
- Food web indicators (e.g., Atlantis, Ecopath w/ Ecosim)



From Samhouri et al. 2010, NWFSC

Optimum Yield = Ecologically Sustainable Yield

- How do we maintain the resilience of the food web?
- How much do predators need?
- Role of fishing vs. environmental effects
- Maintain total overall forage base/guilds
- Protect key habitats (spawning grounds)
- Separating fishing effects from environmental effects

EFMP: Purpose and Need

- Tools for ecological factors into OY (ACLs)
- Establish new management authority to meet Ecosystem objectives (Needs to be true FMP)
- Establish PFMC as a leader in Ecosystem-based Management
- Programmatic review of Council management

EFMP should include:

- Framework for ecologically sustainable yield (OY)
- Identify key forage species in California Current
- Analyze alternative harvest strategies on ecosystem
- Programmatic review of cumulative fishing impacts
- Establish regulatory authority
  - Manage new ecosystem component species
  - Time/area closures for ecosystem protection
- Periodic reports on "State of California Current LME"


Thank you
OCEANA