

Staff White Paper

Development of an Ecosystem Fishery Management Plan

Prepared by Pacific Council Staff

Background – Purpose of This Document

There is broad interest in the concept of an ecosystem fisheries management plan (E-FMP).¹ Furthermore, National Marine Fisheries Service's (NMFS) stated policy is to incorporate ecosystem considerations into fisheries management, and most councils have either implemented some version of an E-FMP or are in an active planning stage. Thus it is appropriate that at their November 2006 meeting the Pacific Fishery Management Council (Council or Pacific Council) moved to begin development of an E-FMP for waters off the three West Coast states, Washington, Oregon, and California. In part, the Council intends the E-FMP initiative to serve as a long term measure for developing fishing regulations to complete proposed marine protected areas within the Channel Islands National Marine Sanctuary. The new E-FMP is envisioned to be of an "umbrella" type structure, so as to allow the current four Council FMPs to continue while enabling comprehensive and coordinated fishery regulation in all EEZ ecosystems.

In order to stimulate discussion, Council staff has prepared this white paper covering procedural and substantive issues related to the development of an E-FMP. This paper draws on the recommendations in a recent article by John Field and Robert Francis, *Considering ecosystem-based fisheries management in the California Current* (2006) (Agenda Item C.5.a, Attachment 2), which is specific to the institutional environment of the Pacific Council, and more generally, the report of the Ecosystem Principals Advisory Panel (EPAP) (1999). The main points covered in the paper are:

- Development of an E-FMP should be "evolutionary, not revolutionary." This means, rather than implementing a fully fleshed out program all at once, ecosystem-based approaches to fishery management can be phased in over time, based on a strategic planning document. The use of a programmatic environmental impact statement is discussed as the vehicle for developing this strategic vision. The concept of "tiering" is used to subsequently evaluate in detail and implement program elements.
- Plan development under institutional resource constraints is discussed. Seeking assistance from NMFS is identified. Creating a plan development team comprising members of existing FMP management teams, in part as a cost-saving measure, is discussed.
- Staff recommends the development of an umbrella plan that complements, but does not replace, existing FMPs. However, the statutory basis of an umbrella E-FMP needs to be clarified early in the process.

¹ Another commonly used term is fisheries ecosystem plan (FEP). The name ecosystem FMP is chosen to emphasize its relationship to the core mission of the Pacific Fishery Management Council.

- The scope of the E-FMP needs to be determined in terms of policies and principals, geographic coverage, and management unit species.
- Consistent with the evolutionary approach, staff recommends ongoing development of an ecosystem information program. This program would draw on expertise within NMFS, and possibly outside research institutions, to provide on a regular basis an “ecosystem SAFE document.” (SAFE, which stands for stock assessment / fishery evaluation, is a required product for all FMPs implemented under the Magnuson-Stevens Act.) Provision on an ecosystem SAFE could be the first program element to be implemented. An important issue to be considered in concert with development of the ecosystem SAFE is the development of a policy framework covering how such information would be used in Council decision-making.
- This paper concludes with a brief discussion of the types of management measures that might be implemented through an E-FMP, recognizing that its legal status needs to be resolved. Evaluating existing closures in a more integrated, ecosystem-based framework would seem a prerequisite for rationally considering future area-based measures in an ecosystem context. For example, when implementing fishery related closures within this framework the Council could consider State MPA initiatives and areas proposed for closure by National Marine Sanctuaries. The importance of considering the socioeconomic dimensions of ecosystem-based management is also mentioned.

Process Framework

A Strategic Approach

Field and Francis recommend “there should be an emphasis on an evolutionary, rather than revolutionary, move towards an ecosystem approach” (p. 563). They also argue that a programmatic environmental impact statement (PEIS) be the primary vehicle for implementing an E-FMP both because the National Environmental Policy Act (NEPA) offers a limited mandate that “suggests that ecosystem considerations should be evaluated” and it has intrinsic procedural benefits “as a result of legal requirements for analysis, disclosure, and transparency” (p. 555). They allude to the view of many in the Council process that NEPA merely imposes an administrative burden; and the PEIS has been a difficult concept to understand and execute within the fisheries management arena. For this reason careful thought should be given at the outset on how to approach development of a PEIS. First, for the integration of ecosystem-based fishery management to be evolutionary, the PEIS must be truly strategic; and in fact internationally this type of programmatic document is termed a “strategic environmental assessment” (SEA). Furthermore, in Council on Environmental Quality (CEQ) regulations, while there is no specific reference to a PEIS, review of policies, plans, and programs is discussed, and is strongly linked to the concept of “tiering” where “general matters are evaluated in broader environmental impacts statements (such as national program or policy statements) with subsequent narrow statements ... concentrating solely on the issues specific to the statement subsequently prepared” (1508.28). Tiering can be used to move from a broad policy evaluation to an analysis of lesser scope or an analysis of a specific action at an early stage to a subsequent analysis at a latter stage. The regulations also identify the PEIS and tiering as a way to reduce paperwork by “[u]sing program, policy, or plan environmental impact statements and tiering from statements of broad scope to those of narrower scope, to eliminate repetitive discussions of the same issues” (1508.4(i)).

The foregoing suggests two key points: the PEIS should be a relatively brief strategic document establishing policies and broad program areas and should set the stage for subsequent evolutionary implementation of programs and management measures that are evaluated in tiered documents. A

combination of both tiering rationales described at 1508.28 can be considered: moving from policies and program descriptions to management measures (i.e., requirements described in Federal regulations) and “evolving” from an early, strategic and schematic stage to more detailed implementation stages. In fact, the requirements for fishery management plans contained in the Magnuson-Stevens Act (MSA) would likely impose more barriers to a streamlined strategic document. The question of whether the MSA authorizes E-FMPs therefore becomes a two-edged sword. If an E-FMP does derive authority from the MSA must its contents conform to §303? Many of these requirements seem to have limited relevance and utility for developing an E-FMP.

In streamlining the PEIS it should be recognized that much of the bulk of NEPA documents may be taken up by an exhaustive description of the “affected environment” bearing a tenuous relation to the actual analysis of effects, which is often difficult because of predictive uncertainty. Another way to streamline the PEIS/E-FMP would be to limit description (incorporating by reference from completed NEPA documents). As discussed below, the PEIS should outline a process whereby this information can, if needed, be collated and delivered to the management process. Aside from the problem of bulking up the EIS, this descriptive information can rapidly become dated. Frame working a process highlights periodic update and tailoring information to current management issues.

The following table (from Wiseman 1996) offers an instructive contrast between a project-specific environmental impact assessment and a strategic environmental assessment.

Environmental Impact Assessment	Strategic Environmental Assessment
Is reactive to a development proposal	Is proactive and informs development proposals
Assesses the effect of a proposed development on the environment	Assesses the effect of the environment on development needs and opportunities
Addresses a specific project	Addresses area, regions, or sectors of development
Has a well defined beginning and end	Is a continuing process aimed at providing information at the right time
Assesses direct impacts and benefits	Assesses cumulative impacts and identifies implications and issues for sustainable development
Focused on the mitigation of impacts	Focused on maintaining a chosen level of environmental quality
Narrow perspective and high level of detail	Wide perspective and a low level of detail to provide a vision and overall framework
Focus on project-specific impacts	Creates a framework against which impacts and benefits can be measured

An important consideration is how to structure an impact evaluation. The typical EIS focuses on discrete and if possible measurable impacts to specific environmental components (e.g., projected fishing mortality on a fish stock). The E-FMP, or at least an initial strategic planning document covered by a PEIS, would not propose management measures to be implemented. Environmental effects are likely to be diffuse, cumulative, and long term. By the same token, the evaluation should be broad-scale, not detailed, and relatively brief.

Resources for Plan Development

At the moment the Council has no funding dedicated to E-FMP development and is confronting an array of other pressing issues demanding the time of Council members, committee members, and Council and agency staff. On the other hand, there is a growing body of research and preliminary thinking (as evinced in the Field and Francis paper) given over to ecosystem-based fishery management. In addition to the broad policy commitment by NMFS, there are also institutions, such as the Pacific Fisheries Environmental Laboratory in Pacific Grove, California, that could provide input if the Council were

interested in integrating ecosystem principals into decision making. As outlined above, if a PEIS focuses on policies and program outlines, some of the development costs (e.g., staff or consultant time spent on writing, data collation, modeling, and other forms of detailed quantitative analysis) could be reduced. As Field and Francis put it “While an appropriately funded mandate to develop [E-FMPs] would be desirable from the perspective of truly developing an ecosystem perspective, this would not preclude the development of a road map toward adopting an ecosystem-based approach to management, or otherwise integrating ecosystem considerations into the current management regime to the greatest extent possible” (p. 563).

A second cost relates to meetings of any committees involved in plan development. For FMPs the practice has been to constitute a plan development team, which takes the lead on identifying principal elements of the plan (although much of the research, writing, and analysis also may be done by Council/agency staff and/or consultants). An advisory subpanel also may be convened to solicit input and review. These committees transition into the management team and advisory subpanel for the FMP once it is implemented. Field and Francis recommend formation of an ecosystems considerations technical team, which would advise the Council on the state of the environment and provide ecosystem guidance on management decisions (p. 563). If the E-FMP is to be an umbrella plan (discussed below), an alternative approach would be to constitute a plan development team by selecting one or more members from each of the existing management teams and the Habitat Committee. An advisory subpanel could be similarly constituted. This approach has the advantage of highlighting the relationship between the E-FMP and existing FMPs and may offer the possibility of some modest cost savings. Such savings could come about if these committees met during Council meetings on a day immediately following any concurrent management team meetings. (Potentially, some travel and meeting room cost savings could be realized.) A potential problem is if there are not enough members of current management teams with the expertise, interest, and commitment to developing an E-FMP. An alternative is to constitute a blended management team, composed of representatives from current management teams and the HC, and experts currently not in the process. Field and Francis’s ecosystem considerations team plays an advisory rather than development role. It may be that such a team would serve the two functions concurrently, and this would support a phased, evolutionary process. Such a concurrent role would be well-served by a team with membership from current FMP teams, since these people are already versed in ongoing management issues before the Council.

Plan Development Issues

E-FMP Structure

Based on current examples there are two ways to consider the relationship between an E-FMP and existing FMPs. As Field and Francis advocate, one approach is to develop an umbrella plan that integrates ecosystem considerations across existing FMPs without supplanting them. This is the approach that has been taken in the North Pacific and makes the most sense on the West Coast. A second approach, exemplified by the Western Pacific, is to replace current FMPs with geographically-based E-FMPs. This makes sense for an insular area with multiple, widely-dispersed and discrete EEZs around islands or island groups and allows treatment of all ecosystems, habitats, and fisheries in a given area in one plan. Given the greater diversity and management complexity of Pacific Council FMPs, replacing them with a set of geographically-based FMPs would be a monumental task requiring the creation of what would be in any given context arbitrary boundaries between management areas (e.g., current management zones or measures that may cut across the most sensible delineation of ecosystem boundaries).

As alluded to above, an important consideration is whether the E-FMP would have sufficient legal basis for implementing pursuant regulations; alternatively, management measures would continue to be

implemented through current FMPs using the E-FMP as the rationale. The E-FMP would establish processes to (1) inform management decisions made within FMP frameworks and (2) in some cases allow consideration and implementation of multiple-objective measures. This suggests two general elements of the E-FMP; a third element would be to describe the scope of the E-FMP, including its relationship to current FMPs. Under this approach, in the short term at least, no regulations would be expected to result from the E-FMP; in the long term multiple-objective measures (such as a marine protected area addressing management objectives across more than one FMP) might be implemented either directly through the E-FMP or through authority of one or more FMPs based on the rationale provided in the E-FMP.

E-FMP Scope

Establishing the scope of the plan involves identifying goals and related policies, determining geographic scope, and enumerating management unit species or species complexes.

Establishing a set of goals is a common and generally useful planning exercise describing desired end states that policies and programs are intended to maintain or achieve. As its name implies, the Ecosystem Principal Advisory Panel identified general principals, goals, and policies that can serve as a starting point for such an exercise. Any principals, goals, and policies enshrined in a Pacific Council E-FMP would indicate the overall scope of the plan in terms of procedures, activities, and instruments (management measures, regulations), which may be organized into programs.

Assuming an umbrella plan, the geographic scope of the E-FMP would be pre-determined as the West Coast EEZ, which is the management area for current FMPs. (The Highly Migratory Species FMP covers vessels fishing outside the EEZ but landing fish on the West Coast and so could broaden the geographic scope of the E-FMP.) Despite this constraint it may be worthwhile as part of planning to consider how the geographic scope can be best matched with ecosystem boundaries. If no regulatory authority is implied by the E-FMP, then the geographic scope could be potentially widened; for example, delineation of the northern California Current system includes waters off Vancouver Island, Canada, while the California Current System also influences waters off of Baja California, Mexico. It also may be useful to subdivide the EEZ by internal biogeographic boundaries such as Cape Blanco, Cape Mendocino, and Point Conception. Considerations of geographic scope should be made in the context of expected policies and programs. For example, differences in the ecosystem north and south of Cape Mendocino are implicit in groundfish FMP management measures such as cumulative trip limits.

The specification of management unit species (MUS) in an FMP establishes a legal nexus to determine regulatory scope. This was evidenced by the recent effort to include krill as a special category MUS in the Coastal Pelagic Species FMP so that a harvest prohibition could be established. If the E-FMP will meet the requirements of the MSA (in order to establish regulatory authority directly from it) it must enumerate MUS. How broad to cast the net, so to speak, would be part of plan development. Including more species in the MUS would broaden the scope, as indicated by the following examples:

- Include only the MUS in current FMPs
- Include the above plus species managed by the three West Coast states
- Include the above plus forage species not already included in an FMP (e.g., other forage fish, euphausiids, copepods)
- Include the above plus biogenic habitat (e.g., corals, sponges)

As the scope is broadened the connection to any regulatory purpose under the MSA becomes more tenuous. For example, it seems unlikely that any activity that could be regulated under the MSA would

directly affect copepods. “Bycatch” of corals, on the other hand, can be regulated because they are part of essential fish habitat even if they are not an MUS under any FMP. To some degree the identification of MUS in the E-FMP may be more of symbolic value by recognizing the scope of ecosystem components that will be considered in management decision making. In keeping with the ecosystem approach, it would make sense to organize the enumeration of MUS by habitat or ecosystem. Alternatively, instead of enumerating MUS, some broader grouping of species would suffice.

Ecosystem Information Program

Field and Francis pose the question, “If fishery management councils were to embrace an ecosystem-based approach in principle, but were limited in the rate at which such an approach could be prescribed as policy, where might they start?” In response they recommend that fishery managers be provided with information about how information on how ecosystem dynamics affect and are affected by fisheries. This would provide additional context when making conventional management decisions, such as setting harvest limits. They describe two categories of information: (1) short- and long-term climate/ ocean conditions and trends, and (2) trophic interactions among fished and unfished species. (This second topic aligns with the EPAP recommendation that an E-FMP include a conceptual model of the food web.) This implies the development of a program or process to bring this information into the management arena and a related set of policies that would provide some guidance on how the information should be used. Currently the Council is strongly wedded to setting harvest limits based on single-species stock assessments. Although stock assessment scientists are increasingly integrating climate forcing into their models, it unlikely that models producing estimates of yield that are used to set harvest limits will, in the foreseeable future, include a detailed specification of both climate forcing and food web dynamics. On the other hand, there are potentially useful non-quantitative predictive outputs that could be used to expand the time horizon of management decision making. One such example is the “red light / green light” index for salmon returns based on Northern California Current ocean and ecosystem conditions as reported by Peterson, et al. (2006). Current stock assessment techniques would be used to derive an initial yield estimate and ecosystem policies would guide decision makers on how that yield estimate may be adjusted in light of non-quantitative predictions about trends and future states (either for the management period in question, or a future time that could be cumulatively affected by harvests during the management period).

The E-FMP (or strategic PEIS) would describe a program for the regular delivery of such information to the management process. A familiar model for such a process is the FMP SAFE (stock assessment / fishery evaluation) document. And in fact the North Pacific Council includes an ecosystem considerations chapter in the SAFE for their groundfish FMP (see <http://www.afsc.noaa.gov/refm/docs/2006/EcoChpt.pdf>). It includes both a discussion and evaluation of ecosystem model developments and reporting of a variety of trends/indices for both climate/ocean conditions and biota. The E-FMP management team would manage development of the document,² although as with other SAFE documents, models and data may be developed and compiled by agency staff at Science Centers or state agencies. Given current interest in ecosystem-based management, it would also be worth exploring relationships with organizations in the wider scientific community, such as PISCO (Partnership for

² Field and Francis advance the idea of a “regional fisheries oceanographer, whose primary responsibility would be to synthesize climate information into usable an understandable formats, orchestrate the development of a climate and ecosystem status and trends document, and act as a conduit between the climate research and the fisheries management communities” (p. 558). Given the list of duties, this sounds like a full time position, either as NMFS or Council staff. The relationship between this position and the management team (or Field’s and Francis’s ecosystem considerations technical team) would have to be worked out. For example, would the person in the position also function in the same relationship as Council staff currently does with respect to FMP management teams?

Interdisciplinary Study of Coastal Oceans), COMPASS (Communication Partnership for Science and the Sea) and MBARI (Monterey Bay Aquarium Research Institute), that are involved in ecosystem-related research. It might be possible to contract with these organizations for the provision of SAFE elements (although such a contract would likely be non-monetary). To the degree that this process includes a model development and evaluation component, the Council's current stock assessment review (STAR) process can serve as an example. This would have particular benefit for models or indices that provide outputs external to single species stock assessments, when such outputs are expected to inform decision making. A peer review process would give decision makers greater confidence in using such information and could also provide guidance on the best way to use it. A less crucial consideration is timing of delivery of the SAFE, given that management cycles vary under the different Pacific Council FMPs. A notional January 1 delivery date may make the most sense for use of the information through the calendar year.

Potentially the most difficult aspect of establishing such an ecosystem information program would be the development of policies related to how the information would be used. Some constituents would advocate policies that require specific actions (such as downward adjustment of harvest limits based on negative index/trend information). On the other hand, a set of policies that provide no concrete guidance on how ecosystem effects should be considered would diminish the benefit of such information. Field and Francis note that "quantitative modeling of trophic interactions has the potential to lead to changes in harvest or management strategies in the near term, and at a minimum represents a valuable contribution to a more holistic understanding of ecological connections and interactions" (p. 560). The challenge is to translate this sentiment (by extension including climate considerations) into a set of practical policies.

Multi-objective Management Measures

As discussed above, the implementation of management measures may be a later component in the "evolutionary" implementation of the E-FMP. One question is what types of management measures would actually require an E-FMP to implement; related to this is the question of the legal status of the E-FMP and whether its contents would support the promulgation of regulations. In considering ecosystem-related management measures, very broadly fishing has two effects: fishing mortality and habitat degradation due to gear contact (and the two may be interrelated for biogenic habitat). Many management measures that mitigate these two effects can be implemented through FMPs, by means of harvest management strategies and gear restrictions for example. Groundfish FMP Amendment 19, addressing essential fish habitat (EFH), offers a good example of how a range of ecosystem-related management measures (including closed areas and gear restrictions) can be implemented within the FMP framework. Thus, as already discussed, for many measures the E-FMP may only provide a strategic framework while their actual implementation would occur through existing FMPs. This approach has the added advantage that the E-FMP would not need to go through the content and procedural requirements (Secretarial Review) of the MSA. Therefore, this could be the preferred strategy in the early stages of E-FMP evolution. Later on the E-FMP could achieve the legal status necessary for promulgation of regulations. But at the outset it would be helpful to address these types of legal questions and construct a road map for how management measures meeting multiple objectives (ecosystem considerations across several FMPs) would be implemented. This would be a very appropriate subject for the PEIS.

When the Council initially called for E-FMP development one specific purpose they hoped it would achieve is establishing marine reserves within National Marine Sanctuaries under MSA authority. Although such actions may require an E-FMP to provide the legal basis for promulgation, there are other non-regulatory tasks that could be facilitated by an E-FMP. In a broader context, the EPAP recommends that an E-FMP should be the framework for developing zone-based management where "areas within an ecosystem would be reserved for prescribed uses." An initial task would be to evaluate existing area-based management measures and place them in a more holistic, ecosystem-based framework. Groundfish

EFH closed areas and Groundfish Closed Areas (GCAs) are examples of two types of closed areas implemented with different objectives but having the same practical effect. EFH closures may have some bycatch mitigation effect while GCAs protect habitat, at least in the core, permanently closed areas. Broadening this consideration to the full range of closures and management zones and developing such a framework would seem a prerequisite for rationally considering future area-based measures in an ecosystem context. For example, when implementing fishery related closures within this framework the Council could consider, State MPA initiatives and areas proposed for closure by National Marine Sanctuaries.

Management measures can also intentionally or unintentionally affect the socioeconomic characteristics of a fishery. Field and Francis also discuss the “socio-ecological perspective” that recognizes “the potential consequences to the ecosystem that may result from the activities undertaken by fisherman and sanctioned by management bodies” (p. 553-554). Field, et al. (2006) in a paper discussing an ecosystem model for the Northern California Current, mention the value of resilience, which suggests that rather than trying to manage for equilibrium, the fisheries system should be structured “to facilitate existing processes and variability, rather than attempt[ing] to control them” (p. 265). They cite a study by Hanna (1992) of Northern California Current fisheries demonstrating that diversification of fishing strategies promoted resilience. The implication is that less capital intensive (because they are less invested in one strategy) and more flexible fishing enterprises respond better to ecosystem dynamics. While not advocating a specific policy, it seems clear that another component of an E-FMP would be policies and related management measures that address such socioeconomic issues.

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