



September 6, 2016

Mr. Herb Pollard, Chair  
Pacific Fishery Management Council  
7700 NE Ambassador Place, #101  
Portland, OR 97220

RE: Agenda Item E.1: Fishery Ecosystem Plan Coordinated Ecosystem Indicator Review Initiative

Dear Chair Pollard and Council Members:

Ocean Conservancy, the Pew Charitable Trusts, Wild Oceans, Natural Resources Defense Council, Oceana, and Audubon California are writing in regards to the Pacific Fishery Management Council's (Council) coordinated ecosystem indicator review. Proper identification, development and application of ecosystem indicators are essential to fully realizing the utility of the Council's Fishery Ecosystem Plan (FEP), and the benefits it can bring to our marine ecosystem and coastal communities. We commend the Council for the actions it has taken to implement ecosystem-based approaches to fishery management, and we offer suggestions below for how the Council can continue the transition to ecosystem-based fishery management (EBFM) through its FEP.

The use of ecosystem indicators is a well-recognized approach to bringing ecosystem considerations into the fishery management process.<sup>1</sup> We appreciate the Council's development of its State of the California Current Report as a vehicle for monitoring and reporting on ecosystem indicators to inform its decision making process. However, a number of foundational steps remain before the Council will fully benefit from the efficiencies and stability an EBFM approach provides.

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<sup>1</sup> Livingston, P. A., Aydin, K., Boldt, J., Ianelli, J., and Jurado-Molina, J. 2005. A framework for ecosystem impacts assessment using an indicator approach. e ICES Journal of Marine Science, 62: 592e597

Specifically, we recommend that the Council:

1. **Develop a set of ecosystem-level goals and objectives** to guide the development and use of ecosystem indicators and provide a basis for weighing trade-offs in management decision-making.
2. **Update the California Current Integrated Ecosystem Assessment State of the California Current Annual Report** (Annual Ecosystem Report) with recommendations from stakeholders including Council advisory bodies and the public.
3. Build off of the success of the Annual Ecosystem Report by making the information provided more relevant for managers:
  - a) **develop Fishery Management Plan (FMP)-specific ecosystem reports to tailor information when and where it is needed**, and
  - b) **endorse the focal topics process** as recommended by the Ecosystem Workgroup

### 1. Ecosystem-level Goals and Objectives

Through the current FEP initiative on ecosystem indicators, the Council is exploring how to improve the use of ecosystem indicators in management through advisory body and public consideration and feedback. While ensuring that indicators in the Annual Ecosystem Report are informed and guided by stakeholder knowledge is important (see page 4), there is a critical step missing from the larger process of indicator development and use. To be most beneficial to managers, ecosystem indicators should be tied to Council ecosystem goals and objectives so that they can compare trade-offs and indicate success or failure towards an outcome the Council wishes to achieve. EBFM considers, in contrast to single-species management, a wider range of ecological, economic, and human impacts on societal objectives regarding resource use and protection of the marine ecosystem.<sup>2</sup> If the Council wishes to improve outcomes for all three in a resource-limited management environment, then articulation of goals for all three is necessary. Research and management must be prioritized and tailored based on these aspirations, and managing for the overall net benefit requires a statement of what that net benefit looks like, particularly in terms of a healthy ecosystem that includes people.

The articulation of goals and objectives for ecosystem health is a foundational step in implementing an ecosystem-based approach to fishery management, and is well-established in the scientific and management literature. The 1999 Report to Congress on EBFM by the Ecosystem Principles Advisory Board,<sup>3</sup> mandated by the 1996 Magnuson-Stevens Fishery Conservation and Management Act (MSA) reauthorization, concluded that FEPs should contain “indices of ecosystem health as targets for management,” and that “Inherent in this management strategy would be specific goals for the ecosystem...” Additionally, Integrated Ecosystem Assessment (IEA) processes (which have been largely accepted as the leading

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<sup>2</sup> National Marine Fisheries Service, *Integrated Ecosystem Assessments*. NOAA Technical Memorandum NMFS-NWFSC-92, June 2008.

<sup>3</sup> Ecosystem Principles Advisory Panel, "Ecosystem-Based Fishery Management" 1998.

mechanism for implementing EBM<sup>4</sup>) are proposed as “...a formal synthesis and quantitative analysis of information on relevant natural and socioeconomic factors, in relation to specified ecosystem management objectives. It is an incremental approach, in which integrated scientific understanding feeds into management choices...”<sup>5</sup> Step one of the IEA process is scoping, where the public meets with managers to develop a set of management goals and objectives. Step two is the development of indicators, which are then tied to the goals and objectives identified in step one. To guide the development and use of ecosystem indicators within the IEA process, ecosystem-level goals and objectives are needed.

In fact, the draft EBFM Road Map calls for Councils to use the IEA process to implement EBFM, “This Road Map recognizes the need for a framework to integrate and synthesize a wide range of information....NOAA Fisheries will adopt the IEA approach to execute the Guiding Principles for achieving EBFM...”<sup>6</sup> Moreover, the draft Road Map states under Guiding Principle 1b, “FEPs are policy planning documents that the Councils or NOAA Fisheries may use to describe ecosystem objectives and priorities for fishery science and management...By exploring fishery management options that simultaneously address multiple objectives, they may help Councils, NOAA Fisheries, and other agencies better address the cumulative effects of our actions on the environment.”<sup>7</sup>

Last, in July of 2016, the summary panel report for the Northwest Fishery Science Center Ecosystem Program Review recommended that the center, “Work with the PFMFC, PSP [Puget Sound Partnership], and Regional Planning Bodies to clearly identify objectives for EBM. Then prioritize data collection programs, analysis, modeling assessment and advice based on those objectives.”<sup>8</sup> Although this recommendation speaks to implementing EBM, it clearly highlights the important role that the Council plays in EBFM.

While the Council is arguably ahead of other regional Councils in its development and implementation of an FEP, as indicated by Council action to protect unmanaged forage species, an effort drawn from the FEP appendix, it is lacking this key goals and objectives component. The FEP contains an objectives section;<sup>9</sup> however this section only speaks to FEP process objectives, and does not define Council goals and objectives for the ecosystem. While the

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<sup>4</sup> National Marine Fisheries Service, *Integrated Ecosystem Assessments*. NOAA Technical Memorandum NMFS-NWFSC-92, June 2008.

<sup>5</sup> Levin, P. S., Fogarty, M. J., Murawski, S. A., & Fluharty, D. (2009). Integrated ecosystem assessments: developing the scientific basis for ecosystem-based management of the ocean. *PLoS Biol*, 7(1), e1000014

<sup>6</sup> National Marine Fisheries Service Policy Directive, *Ecosystem-based Fishery Management Road Map*, Public Comment draft (August 17, 2016). Page 8.

<sup>7</sup> *Ibid.* page 11.

<sup>8</sup> National Marine Fisheries Service, Chair’s Executive Summary of Program Review of Ecosystem Science, Northwest Fisheries Science Center. July 12-14, 2016. Available at: [https://www.nwfsc.noaa.gov/news/events/program\\_reviews/2016/documents/Ecosystem%20Panel%20Report%2025%20July%202016%20\(1\)%20\(1\).pdf](https://www.nwfsc.noaa.gov/news/events/program_reviews/2016/documents/Ecosystem%20Panel%20Report%2025%20July%202016%20(1)%20(1).pdf)

<sup>9</sup> Pacific Fishery Management Council, *Pacific Coast Fishery Ecosystem Plan* (Public Review Draft), February 2013. Page 4.

process objectives are excellent, they are functionally different than those required by the IEA process and best practices for implementing EBFM.<sup>10, 11</sup>

Development of Council ecosystem-level goals and objectives could be completed by drawing largely on existing Council documents that represent Council, and vis a vis stakeholder, policy and intent over time. The four Fishery Management Plans contain common goals and objectives, as collated in Chapter 3 of the FEP.<sup>12</sup> We recommend this as a starting place to clarify cross-FMP goals and objectives and draw potential ecosystem-level goals and objectives from. We have provided in appendix 1 a list of potential ecosystem-level goals and objectives and corresponding proposed indicators. *Please note that this is a straw-man proposal only, intended to stimulate conversation and pose as an example for what could be eventually developed.*

This straw-man proposal pulls directly from existing FMP goals and objectives, and we recommend these as starting points for development of a full list, and eventual development of corresponding indicators. The EWG likewise recommended using the existing goals and objectives as a starting point to develop indicators in their September 2015 report to the Council.<sup>13</sup> Goals and objectives could also be drawn from national-level law and policy, for example the MSA, National Standards, Essential Fish Habitat Final Rule, National Bycatch Strategy, and Marine Mammal Protection Act.

Regarding a potential scoping process; public input is necessary and important to this process, as the results are meant to represent societal aspirations for how public resources are used and conserved.<sup>14, 15</sup> We recommend that the Council consult with the NOAA IEA program on how to best conduct a sufficient scoping process that would develop the Council's ecosystem goals and objectives, and amend Section 2 of the FEP to include the results. A resource-intensive process should not be required given availability of existing documents and IEA program expertise.

## **2. Annual Ecosystem Report**

The current FEP Ecosystem Indicators Initiative seeks input on the content of the Annual Ecosystem Report. Guided by Council-endorsed EWG reports on this initiative,<sup>16</sup> advisory bodies and the public were asked to provide feedback on the indicators presented in the Annual

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<sup>10</sup> Leslie, Heather M., and Karen L. McLeod. "Confronting the challenges of implementing marine ecosystem-based management." *Frontiers in Ecology and the Environment* 5.10 (2007): 540-548.

<sup>11</sup> Levin, Phillip S., et al. "Developing conservation targets in social-ecological systems." *Ecology and Society* 20.4 (2015): 6.

<sup>12</sup> Pacific Fishery Management Council, *Pacific Coast Fishery Ecosystem Plan* (Public Review Draft), February 2013. Page 4.

<sup>13</sup> Pacific Fishery Management Council, *September 2015, EWG Report, Agenda Item D.1.a.*

<sup>14</sup> Yvonne, L., Phillip S. Levin, and Noriko L. Shoji. "Bringing stakeholders, scientists, and managers together through an integrated ecosystem assessment process." *Marine Policy* 34.3 (2010): 534-540.

<sup>15</sup> Levin, Phillip S., et al. "Developing conservation targets in social-ecological systems." *Ecology and Society* 20.4 (2015): 6.

<sup>16</sup> Pacific Fishery Management Council, *March 2016, Ecosystem Workgroup Report, Agenda Item D.2.a.*

Ecosystem Report. We support this process as a step to increase the management-relevancy of the Annual Ecosystem Report by bringing the Council, stakeholders, and the public into the indicator selection and refinement process. We strongly recommend the development of goals and objectives that link with indicators and would like to see a process to complete this initiated, however, including the public in an on-going dialogue on the use and application of existing indicators is appropriate and useful. We hope that the advisory body reports, which are unavailable at the time of writing, will shed new light on existing indicators and possible future indicators, and recommend that the Council update the Annual Ecosystem Report with these suggestions.

We additionally recommend that the Annual Ecosystem Report:

- Specify research priorities for coming years. Including a list will ensure prioritized use of resources by the IEA and Council, and help close the loop between Council recommendations, IEA action, and Council application. This research priorities section could help organize the “focal topics” section recommend by the EWG (see below).
- Use CCIEA conceptual models to help prioritize existing indicators for inclusion in the Annual Ecosystem Report
- Support risk-assessment as a tool to identify key indicators and consequent areas of importance for management action as it relates to stated goals and objectives.

### **3. FMP-specific Ecosystem Reports and Focal Topics**

In addition to updating the Annual Ecosystem Report with recommendations from stakeholders including Council advisory bodies and the public, we recommend asking NOAA staff to develop FMP-specific ecosystem reports to tailor information when and where it is needed to improve use of ecosystem indicators in management, and adopting the focal topics process as recommended by the EWG:

#### *3a. FMP-specific Ecosystem Reports*

The Council has expressed a desire to better utilize the ecosystem information provided in the annual report.<sup>17</sup> A mechanism to help do this is the development of FMP-specific ecosystem reports; similar to the Annual Ecosystem Report, each report would cover indicators and ecosystem trends but would directly relate to each FMP, and would be delivered to each advisory body, management team, and the Council at the appropriate time in each FMPs management cycle. For example, a groundfish ecosystem report would be developed by the California Current Integrated Ecosystem Assessment (CCIEA) program and reflect indicators and trends that most impact and are impacted by groundfish stocks and the fishery in the previous two years. The CCIEA program would then deliver and present the contents of the report to the

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<sup>17</sup> Pacific Fishery Management Council, *Council Meeting Record. September 11-16, 2015.* Agenda Item D.1.c, mp3: 9-11-15pm1: 0:39:32.

Groundfish Advisory Panel, Groundfish Management Team, and Council at the meeting when it would be most relevant in the groundfish management cycle.

Reports such as this would supplement the existing Annual Ecosystem Report by further tailoring content and providing it at a time in the management cycle when it is most useful. It would additionally stimulate dialogue between the CCIEA program and stakeholders, helping the CCIEA program better understand management needs, and help the Council and stakeholders better understand and utilize ecosystem information and IEA program products. Emerging issues could be more quickly identified by both parties, and areas of future focus more easily recognized. Such reports would not be intended as replacements for the Annual Ecosystem Report, which is expected to provide a broad cross-FMP and cross sector overview, but will pull mainly from the same indicator database and would allow for a tailored and direct information flow.

It is our understanding that based on existing data and analysis such reports could be developed for the groundfish, salmon, and Coastal Pelagic Species FMPs, but that Highly Migratory Species (HMS) would need further development. Ideally, such reports could serve as a platform to identify these data and indicator gaps in the HMS report, and stimulate indicator development. Groundfish, salmon, and CPS ecosystem reports would require limited additional resources as they would entail the use of mostly existing information and analysis, and require only minimal additional staff time.

### *3b. Focal Topics*

The EWG recommended in their March 2016 Supplemental Report to the Council a potential “focal topics” process as a vehicle to improve or supplement specific sections of the Annual Ecosystem Report, in particular to ensure that the 20 pages allotted for the annual report are most efficiently and effectively tailored to the Council’s current priorities. An annual process such as this, coupled with SSC review as recommended by the EWG, would provide a platform for continued improvement of ecosystem indicators and facilitate direct application of indicators to management. Although limited in its ability to bring ecosystem information into the management process based on its annual timing, it is a step in the right direction and helps implement EBFM. We recommend that the Council endorse this process, and select a focal topic for the following year in March 2017.

### **Conclusion**

In closing, we greatly appreciate all of the work that the Council has done to implement EBFM, which will help ensure management that supports a resilient ecosystem inclusive of people. However, foundational change that facilitates both the inclusion of ecosystem information in management decisions as well as recognizes the impacts fisheries management decisions have on the ecosystem are still necessary to prepare our fisheries for a changing climate. We urge the Council to continue its work moving towards EBFM by beginning development of ecosystem-level goals and objectives, improving the Annual Ecosystem Report via stakeholder

input, developing FMP-specific ecosystem reports, and endorsing the proposed focal topics process.

Sincerely,



Corey Ridings  
Ocean Conservancy



Steve Marx  
The Pew Charitable Trusts



Ben Enticknap  
Oceana



Theresa Labriola  
Wild Oceans



Anna Weinstein  
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Seth Atkinson  
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## Appendix 1 – Example Ecosystem-level Goals and Objectives

<sup>1</sup> Indicates a goal or objective found in the groundfish fishery management plan or highly similar

<sup>2</sup> Indicates a goal or objective found in the Coastal Pelagic Species fishery management plan or highly similar

<sup>3</sup> Indicates a goal or objective found in the salmon fishery management plan or highly similar

<sup>4</sup> Indicates a goal or objective found in the Highly Migratory Species fishery management plan or highly similar

Example Ecosystem Goal	Example Ecosystem Objective	Example Indicator or Reference Point
1) Overfishing <sup>1,2,3,4</sup> and ecosystem overfishing are prevented	a. Provide adequate buffers between OFL-ABC-ACL/ACT to account for scientific and management uncertainty	B/Btarget, B/Bmsy, B/Bo, P* at, above, or below threshold
	b. Continue to incorporate ecosystem considerations into stock assessments and control rules	# of assessments/control rules with ecosystem considerations
	c. Maintain guild biomass above target level(s)	Mean trophic level of catch, Bguild/Btarget
	d. Maintain total removals below ecosystem level optimum yield cap	Total Removals < OY cap
2) Promote sustained participation of fishing communities <sup>1,3,4</sup>	a. Promote conservation while providing for optimum yield in terms of the greatest overall benefit to the nation with particular reference to food production, and sustainable opportunities for recreational, subsistence, and commercial fishing participants and fishing communities <sup>1,2,3,4</sup>	Tax revenue derived from fishing related activities, total ex-vessel revenue, economic contribution with multipliers, CCEIEA Personal Use Index
	b. Promote efficiency and profitability in the fishery, including stability of catch. <sup>1,2,3,4</sup>	Total removals, removals per FMP, Optimum Economic Yield/Total Removals, ex-vessel revenue, net revenue
	c. Promote management measures that, while meeting conservation objectives, are also designed to avoid significant disruption of existing social and economic structures	CCEIEA Coastal Community Vulnerability Index, # of latent permits, # of permits not renewed
	d. Promote fair and equitable allocation of resources in a manner such that no particular sector, group or entity acquires an excessive share of the privileges <sup>4</sup>	CCEIEA Fleet Diversity Index, Processor and/or co-op share of market, market power index
	e. Avoid consolidation of fishing and processing capacity	Processor and/or co-op share of market, market power index
	f. Promote increased safety at sea <sup>1,3</sup>	% of management measures provided to USCG for

		review in early stages of scoping process
3) Negative impacts of climate change on fishery resources are assessed and mitigated	a. Evaluate risk to managed species and other ecosystem components	# of species with risk above threshold
	b. Evaluate fishery vulnerability to climate change and other pressures	# of fisheries (or sectors) with vulnerability above threshold, CCIEA Coastal Community Vulnerability Index
	c. Develop management measures to addresses risk and vulnerability associated with climate change	# of climate related management actions
	d. Continue to support and engage NOAA Fisheries' Integrated Ecosystem Assessment program	
	e. Identify ecosystem-level tipping points at which management programs and/or measures should change to support the long-term stability of the fisheries and fishing communities.	Y/N: tipping points identified, Y/N: tipping points integrated into decision control rules
	f. Develop abundance estimates for non-target species to inform catch limits and other conservation measures	# of non-target species with abundance estimates
4) Preserve the marine food web	a. Provide adequate forage for dependent species <sup>2</sup>	$F \leq .5(F_{msy}), B \geq .75(B_0)$
	b. Identify key predator-prey relationships through development and refinement of ecosystem models	% of ecosystem modeled using food web or end-to-end models , # of peer-reviewed ecosystem and/or food web models
	c. Account for predator-prey relationship in stock assessments and control rules	$F \leq .5(F_{msy}), B \geq .75(B_0)$
	d. Maintain forage assemblage/guild biomass above target level	$B_{guild}/B_{target}, B_{guild}/B_{threshold}$ , mean trophic level of catch
	e. Avoid localized depletion of important forage species	Spatial concentration of fishing removals, regional catch limits/thresholds
5) Impacts to seabirds, marine mammals, and protected species are minimized and/or avoided	a. Cooperate with other federal agencies to protect ESA-listed species	Y/N: Formal and Informal cooperation protocols established.
	b. Enact conservation/management measures as appropriate to avoid jeopardy of extinction for ESA-listed species	# of conservation/management measures enacted to protect ESA-listed species

	c. Enact conservation/management measure to avoid impacts to critical habitat for ESA-listed species	Extent of spatial overlap of fishing effort and removals with critical habitat
	d. Avoid localized depletion of forage species important to seabirds and marine mammals	Extent to which spatial distribution of fishing effort and removals overlap with known foraging areas
	e. Establish limits on the catch and mortality of seabirds and marine mammals	# of seabird and marine mammal interactions
6) Minimize and/or avoid bycatch <sup>1, 2, 3, 4</sup>	a. Account for bycatch mortality in catch accounting and improve accuracy of mortality assessments for protected and non-target species	Discard mortality rate (DMR)/Target DMR
	b. Promote and support monitoring programs to improve estimates of total fishing-related mortality and bycatch	Cumulative observer or electronic monitoring coverage % across FMPs
	c. Establish limits on the catch and mortality of non-target species	Bycatch rates from observer program, not-target species mortality / directed catch
	d. Develop incentives for bycatch reduction/avoidance and maximized retention	Y/N: Incentives implemented?
	e. Encourage development of practicable gear intended to reduce regulatory and/or economic discards	# of exempted fishing permits testing bycatch reduction methods and gear
	f. Develop abundance estimates for non-target species to inform catch limits and other conservation measures	# of non-target species with abundance estimates
7) Species diversity, richness and age structure are restored and protected	a. Evaluate age structure of managed species in stock assessments and promote management measures to avoid age and size truncation	# of stocks with known age truncation
	b. Evaluate changes in density over known species range	Change in species distribution from survey data and fishing effort
	c. Promote spatial/temporal management measures to help ensure adequate species distribution across known range	Change in species distribution from survey data and fishing effort
	d. Consider measures to reduce fishing pressure at northern and southern extent of species range where appropriate	Latitudinal distribution of effort

8) Habitat diversity and integrity is restored and protected	a. Review and evaluate efficacy of existing habitat protection measures for managed species	% of fishery and ecosystem habitats assessed for influence on fishery and ecosystem health, % of habitats for which quantified minimum area that needs to be protected to ensure ecosystem and fishery health has been calculated
	b. Describe, identify, and designate essential fish habitat (EFH) and habitat areas of particular concern <sup>1,4</sup>	% of benthic habitat in EEZ mapped, categorized, and/or designated, level of uncertainty associated with habitat predictability models.
	c. Identify adverse impacts on EFH, and adopt management measures to minimize adverse impacts to EFH <sup>1,4</sup>	% of coral habitat protected, % of benthic EFH protected, % of each representative habitat category protected
	d. Minimize impacts to ecologically important habitat	Amount of coral habitat exposed to demersal fishing gear, coral bycatch data
	e. Develop a marine protected area policy in coordination with national and state policies	Y/N: Marine protected area policy established, Area of marine habitat set aside from resource extraction: Area of marine habitat recommended by scientific committees to be set aside from resource extraction
	f. Encourage development of a research program to identify regional baseline habitat information and mapping	
9) Fishery resources are used equitably	a. Provide economic and community stability to harvesting and processing sectors through fair allocation of fishery resources	CCEIA Fleet Diversity Index, Spatial distribution of landings and processing, # of open access vessels, # of permits, # of tribal fishing vessels
	b. Recognize the multispecies nature of some fisheries and establish a concept of managing by species and gear or by groups of interrelated species <sup>1</sup>	# of fishery management complexes established that consider species and gear or groups of interrelated species
	c. Provide for adaptive management by periodically evaluating the effectiveness of limited access and rationalization programs	CCEIA Fleet Diversity index, CCEIA Costal Community Vulnerability Index
	d. Develop management measures that consider the equitable use of fishery resources taking into account the interest of harvesters, processors, and communities	CCEIA Fleet Diversity index, Spatial distribution of landings and processing, # of processors, total ex-vessel revenue, community vulnerability index