

Agenda Item E.2.a and E.2.b
Supplemental EWG PowerPoint
(Electronic Only)
March 2015

Fishery Ecosystem Plan Appendix & Ecosystem Initiatives

Ecosystem Workgroup
Presentation for E.2.a. and E.2.b.

March 8, 2015

A satellite image of Earth showing a large, swirling white cloud mass over the North Pole, likely representing a polar vortex or a major weather system. The surrounding landmasses and oceans are visible in shades of green, brown, and blue.

**April
2013**

The purpose of the FEP is to enhance the Council's species-specific management programs with more ecosystem science, broader ecosystem considerations and management policies that coordinate Council management across its FMPs and the California Current Ecosystem (CCE). An FEP should provide a framework for considering policy choices and trade-offs as they affect FMP species and the broader CCE.

CALIFORNIA CURRENT INTEGRATED ECOSYSTEM ASSESSMENT (CCIEA) STATE OF THE CALIFORNIA CURRENT REPORT, 2015

A report of the CCIEA Team (NOAA Northwest, Southwest and Alaska Fisheries Science Centers) to the Pacific Fishery Management Council, March 8, 2015

1 INTRODUCTION

Section 1.4 of the 2013 Fishery Ecosystem Plan (FEP) outlines a reporting process wherein NOAA provides the Council with a yearly update on the state of the California Current Ecosystem (CCE), as derived from environmental, biological and socio-economic indicators. NOAA's California Current Integrated Ecosystem Assessment (CCIEA) team is responsible for this report. This marks our 3rd such report, with prior reports in 2012 and 2014.

The highlights of this report are summarized in Box 1.1. Sections below provide greater detail. In addition, a list of supplemental materials is provided at the end of this document, in response to previous requests from Council members or the Scientific and Statistical Committee (SSC) to provide additional information, or to clarify details within this short report.

Box 1.1: Highlights of this report

- The Northeast Pacific was dominated by the “warm blob”: record high sea surface temperatures that developed in the Gulf of Alaska and spread to the coast and southward.
- Basin-wide indices trended from ENSO-neutral toward mild El Niño in the MEI, and the PDO and NPGO both shifted from conditions promoting high primary productivity to less productive conditions.
- After a record strong year of coastal upwelling, conditions in 2014 returned to average or slightly below average upwelling. Coupled with the basin scale indices, this would suggest lower primary productivity.
- After several relatively productive years, biomass of energy-rich northern copepod species declined sharply in the fall of 2014.
- Several components of the forage base showed stable or high abundance in spring surveys in 2013 and 2014; it is unknown if the forage base has responded to the oceanographic changes outlined above.
- Central Valley and Lower Columbia Chinook salmon have negative 10-year escapement trends, while trends elsewhere are stable or positive.
- There are presently only 3 assessed groundfish that are in an “overfished” status (canary rockfish, yelloweye rockfish, Pacific ocean perch), and no recent indication of overfishing on groundfish.
- Following an unusual mortality event (UME) of California sea lion pups in 2013, survival improved in 2014; however, pup weights are once again below average and another UME may be under way in 2015.
- Although biomass trends of seabirds in the southern CCE have been stable or increasing, a large-scale mass mortality of Cassin’s auklets has been occurring since late 2014.
- Commercial fishery landings increased from 2009-2013, driven largely by Pacific hake and coastal pelagic species; crab and shrimp landings also increased.
- Diversification of fishing vessels continued its long-term decline throughout much of the fleet, which may indicate greater risk of highly variable annual revenue.
- There is some evidence that catch shares have increased vessel safety in the fixed gear sablefish fleet.

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1.3

Schedule and Process for Developing and Amending the FEP and the Ecosystem Initiatives

Each year at the Council's March meeting, the Council and its advisory bodies will:

- If initiatives are chosen for Council efforts, request background materials from the appropriate entities

E.2.



MR. STEVENS

MR. MAGNUSON

A.2.1

A.2 Potential Future FEP Initiatives for Council Consideration

During its development process for the FEP, the Council and its advisory bodies discussed how a cross-FMP or ecosystem approach to management might assist the Council's long-term planning on a broad range of issues. The following potential future FEP initiatives for consideration by the Council and the public are based on the FEP's Purpose and Need Statement, the FEP's Objectives, and the MSA's national standards and other requirements, including environmental impact analysis under the National Environmental Policy Act (NEPA). Potential initiatives are based in the major themes of the MSA and consider cross-FMP issues, including: harvest level policies and overfished/overfishing, bycatch, EFH, and community effects of fisheries management.

A.2.1 Initiative on the Potential Long-Term Effects of Council Harvest Policies on Age- and Size- Distribution in Managed Stocks

This cross-FMP initiative, relevant for groundfish, highly migratory species (HMS), and coastal pelagic species (CPS), has several goals that could help the Council better address the larger-scale harvest issue of maintaining broad age- and size-distributions in managed fish stocks:

- Conduct a comprehensive literature review of the documented and potential consequences of shifting or truncating age or size structure on population reproductive potential, population stability and variability, and interactions between these dynamics and climate variability
- Conduct a review and analysis of long-term effects on the truncation of age- and size-distribution



plemented harvest control rules; economic effects of harvest strategies that focus on different age classes, such as preventing those species from being harvested; and the trade-offs between biological considerations and economic factors. This initiative would also consider the effects of adult life stage CCE species to fish markets worldwide; the effects of truncation that considers the performance of current harvest control rules that incorporate age- and length-structure in harvest control rules.

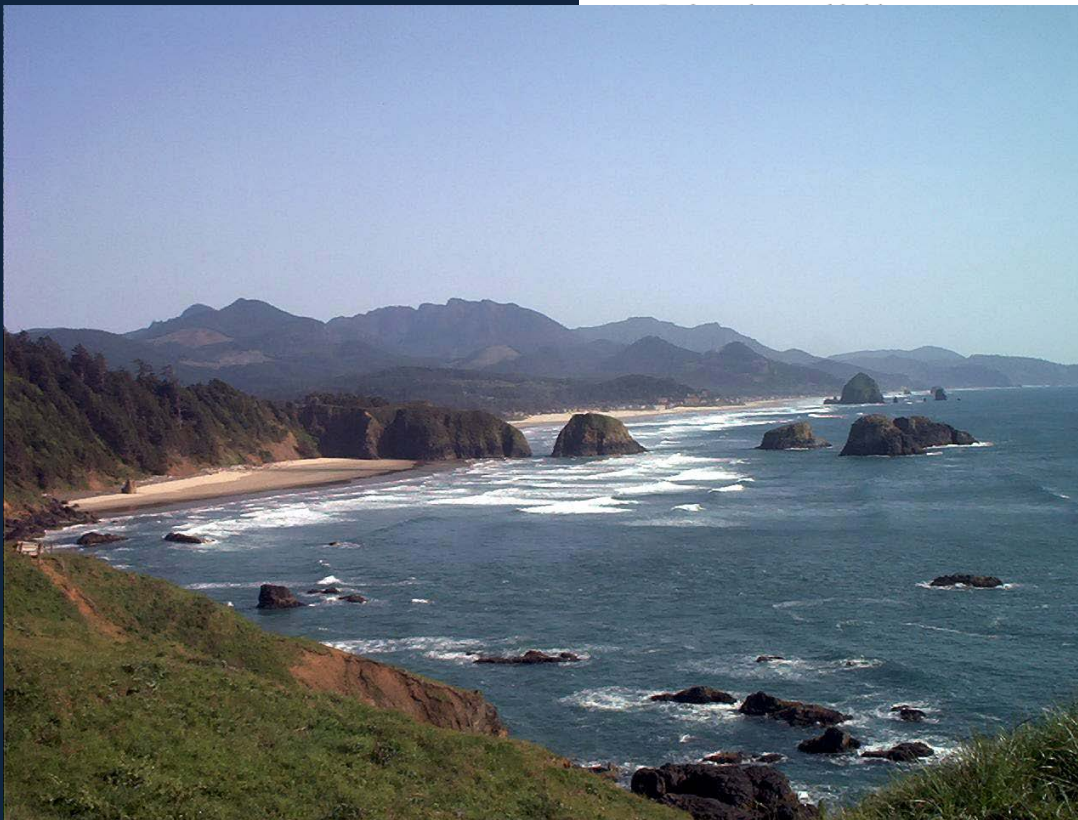
How current harvest control rules behave with respect to managed stocks, and possible alternative harvest control rules, should be evaluated into Council management reference points. Background information on the established, perceived, and potential effects of age- and size structure to effective egg or larval production, and the effects of truncation, should also seek to quantitatively (where possible) evaluate the effects of truncation on the proportion of older and/or larger fish in a population. Harvest control rules should not explicitly consider age composition. As discussed in the literature, truncation in age and size structure can result in and/or more variable egg or larval productivity, real productivity, and increased variability in catches. These effects can be exacerbated by changing environmental conditions or changes in the environment. The effects of truncation on population dynamics, including how life histories and changes in population dynamics, should be considered. The sensitivity to environmental variability should be considered in the context of challenges stemming from scientific uncertainty in population-associated stock size estimates.

A.2.2

A.2.2 Bio-Geographic Region Identification and Assessment Initiative

Section 3.1.2 of the FEP identified three large-scale bio-geographic regions of the CCE that could be further subdivided into finer-scale nested sub-regions to provide the Council with a framework for undertaking finer-scale fisheries management actions to implement ecosystem-based management and to facilitate linkages with other government policies and processes. One possibility for defining such spatial divisions could be based upon the functional distributions of species, for example:

- Estuarine habitats
- Nearshore habitats



The Council may wish to undertake assessments of fishery removals, bycatch, and other impacts. Evidence for past or present localized depletion of species, depletion, and the impact of freshwater inputs to the CCE as well as coastal ocean (for example the alteration of fresh water flow and salinity) at a finer spatial scale sub-regions is particularly important for nearshore habitat management. The regions identified in the FEP at Section 3.1.2 are likely to be important for implementation of localized ecosystem-based management. Further assessments could improve management outcomes and allow for stronger regulatory processes.

The initiative could include identifying finer-scale sub-regions to facilitate ecosystem-based management. Serial depletion of species can be identified within each fine-scale sub-region and by examining changes in species composition and with depth. Central to the examination of fishery data is the integration of recreational fishing data, particularly in the estuarine and nearshore fisheries management at a finer spatial scale. Scientific work could also provide a framework for investigating: 1) how fishing patterns, particularly spatial and temporal fishing patterns and ecosystem (cumulative impacts of all FMP fisheries), 2) the effects on FMP species and fisheries, 3) changes in species composition and fishing activity location patterns versus biomass distribution.

The Council could assemble an ad hoc advisory committee to assess: data availability and quality for identifying finer-scale sub-regions nested within the large bio-geographic regions of the CCE, and whether any of those finer-scale sub-regions are appropriate for smaller-scale

A.2.3

A.2.3 Cross-FMP Bycatch and Catch Monitoring Policy Initiative

The MSA's National Standard 9 states: *Conservation and management measures shall, to the extent practicable, (A) minimize bycatch and (B) to the extent bycatch cannot be avoided, minimize the mortality of such bycatch.* FMPs are also required to *establish a standardized reporting methodology to assess the amount and type of bycatch occurring in the fishery, and include conservation and management measures that, to the extent practicable and in the following priority – (A) minimize bycatch; and (B) minimize the mortality of bycatch which cannot be avoided* [§303(a)(11)].



Bycatch monitoring programs vary between Council fisheries, as does the quantity and quality of information provided by these programs. The Council has historically had greater concern with bycatch in groundfish and HMS fisheries than in the salmon and CPS fisheries, although salmon fishery management at itself is largely a complex effort to conduct fisheries that minimize the bycatch of threatened and endangered runs of salmon. Under this initiative, the Council would take a cross-FMP look at its bycatch minimization and monitoring policies, to share information and methodologies across FMPs, and to coordinate cross-FMP bycatch minimization goals. A notable challenge with this initiative is that the gear, fishing methods and locations, and target species of the different FMPs are so distinct from each other that there is a reasonable possibility that bycatch minimization methods that are effective in one fishery are not be effective in other fisheries.

Bycatch minimization policies necessarily focus on the bycatch within particular fisheries. Moving from fishery-specific to the MSA by reducing the volume and rate of bycatch in individual Council-managed fisheries is most likely resulted in an overall reduction in the total volume of incidentally-caught and discarded marine life. However, moving beyond the fishery-by-fishery approach could allow the Council to better assess issues like: the cumulative effects of the bycatch of non-Council species taken in Council-managed fisheries; whether gear innovation programs or products in one fishery could benefit other fisheries; and whether the timing and interactions of multiple Council-managed fisheries increase or decrease the likelihood of bycatch in these fisheries. The Council could also use a cross-FMP look at its bycatch to help it prioritize its bycatch monitoring and minimization of workload, perhaps prioritizing its most vulnerable fisheries with greater amounts of bycatch, or greater numbers of incidentally-caught species.

Work for developing this initiative would require an assessment of the available bycatch data and management information for Council-managed fisheries. Much of this information is available in Council Stock Assessment and Fishery Evaluation documents and in NMFS reports, including the National Bycatch Report (NMFS 2011). If agency staff were to review available data to provide a cross-comparison of bycatch management programs within Council-managed fisheries, including an evaluation of where fisheries management and regulations for different fisheries might be expected to affect bycatch rates, that review could provide the Council with an initial assessment of the greatest challenges might lie in reducing cumulative bycatch in Council-managed fisheries. The list of bycatch monitoring and management issues should, at a minimum, address:

A.2.4

A.2.4 Cross-FMP EFH Initiative

The MSA defines EFH as “those waters and substrate necessary for growth to maturity” [§3(10)]. All four of the Council’s FMPs with the groundfish FMP having the most detail, including HAPC designations and closed areas to protect EFH. Geographic areas of EFH are designated in the Groundfish FMP, CPS, and Salmon FMPs, except CPS. The CPS and Salmon FMPs have designated areas of EFH (50 CFR 600.815(A)(10),) and the Groundfish FMP would develop a plan to integrate its work between the other FMPs.

The Council has been engaged in 5-year EFH review cycles. A new round of EFH review would start in 2014-2015. An integrated EFH review would provide a better understanding of complex overarching habitat quality, protected species interactions, or ocean conditions that would both provide required updates for FMPs, and identify areas that are considered highly productive or biodiverse under multiple FMPs. Species from multiple FMPs could serve as focal points for assessing fishing and non-fishing effects on EFH, and for research on interactions between FMP species and their shared habitat. One possible result of an integrated EFH review would be cross-FMP HAPC designations for areas that are important to species from multiple FMPs.

The Council could also expand or alter this initiative to consider spatial management policies more generally. Historically, the Council has implemented spatial management measures under its different FMPs without undertaking a cross-FMP assessment of how those measures may affect fish and fisheries managed under other FMPs. If area closures in various Council-managed fisheries could be better-synched between FMPs, the Council could reduce regulatory confusion across fisheries, and better tailor closed areas for benefits under multiple FMPs.

Background work for developing this initiative would require an assessment of the commonalities and differences between how FMPs approach the 5-year EFH review requirements. If agency staff were to



A.2.5

A.2.5 Cross-FMP Safety Initiative

The MSA's National Standard 10 states: *Conserve, where practicable, promote the safety of human life at sea.* Federal National Standard 10 guidelines at 50 CFR information and technology (77 FR 22342, April 2012, Item J.1.c, Attachment 1) included United States Code for vessels participating in fisheries targeting species updated, including parenthetical comments from US



Table A.3: West Coast recorded vessel incidents, by FMP

	CPS	Groundfish		
Recorded safety issues, vessel incidents, and mortalities for fisheries under each FMP	USCG District 11 2006-2011 data: 11 squid fishery vessel incidents, from which one life was lost and 8 vessels were lost.	USCG District 11 2006-2011 data: 11 groundfish fishery vessel incidents, from which 2 lives were lost and 9 vessels were lost.	incident, no lives nor vessels lost.	incidents (3 of which were combination crab/salmon trips,) from which 3 lives were lost and 6 vessels were lost.
	USCG District 13 2000-June 2012 data: 4 sardine fishery vessel incidents, from which 2 lives were lost and 4 vessels were lost.	USCG District 13 2000-June 2012 data: 12 groundfish fishery vessel incidents, from which 11 lives were lost and 6 vessels were lost. (The F/V Lady Cecilia sinking in March 2012 caused the loss of 4 lives and one vessel.)	USCG District 13 2000-2008 data: 11 tuna fishery vessel incidents, from which 2 lives were lost and 10 vessels were lost. (Fatigue continues to be a contributing factor to tuna vessel casualties.)	USCG District 13 2000-June 2012 data: 24 salmon fishery vessel incidents, from which 11 lives were lost and 23 vessels were lost.

A.2.6

A.2.6 Human Recruitment to the Fisheries Initiative

The MSA's National Standard 8 states: *Conservation and management measures shall, consistent with the conservation requirements of this Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities by utilizing economic and social data that meets the requirements of paragraph (2) [National Standard 2 requiring the use of best available science], in order to (A) provide for the sustained participation of such communities, and (B) to the extent practicable, minimize adverse economic impacts on such communities.*



A.2.7

A.2.7 Cross-FMP Socio-Economic Effects of Fisheries Management Initiative

Like A.2.6, this initiative is also intended to support the MSA's National Standard 8, particularly where the standard refers to taking into account the importance of fishery resources to fishing communities by using economic and social data that meets National Standard 2. National Standard 2 states that: *Conservation and management measures shall be based upon the best scientific information available.* Analyses conducted in support of Council actions regularly include socio-economic analyses of the anticipated effects of those particular actions. This initiative, however, would look at the information the Council needs to better understand how communities may be affected by management actions across the



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economic challenges faced by fishing communities can help the Council to understand the cross-FMP effects their actions have on those communities.

A.2.8

A.2.8 Cross-FMP Effects of Climate Shift Initiative

As discussed in Section 3.1.1 and Chapter 4 of the FEP, the CCE is subject to both interannual and interdecadal climate variability that can have significant effects on seasonal and long-term productivity. Over the longer term, three prominent properties of the environment are predicted to undergo significant



(such as alkalinity), and deep-water oxygen. Other factors (including changes in upwelling intensification (interannual variable, primary and secondary productivity), El Niño/Southern Oscillation and the Pacific Decadal Transition, and changes in the frequency and intensity of El Niño/Southern Oscillation and the Pacific Decadal Transition) are known to have developed life-history strategies that include large-scale shifts in the abundance of CPS, shifts in the abundance of most coastal pelagics, Pacific hake, and rates of most groundfish, and diversified

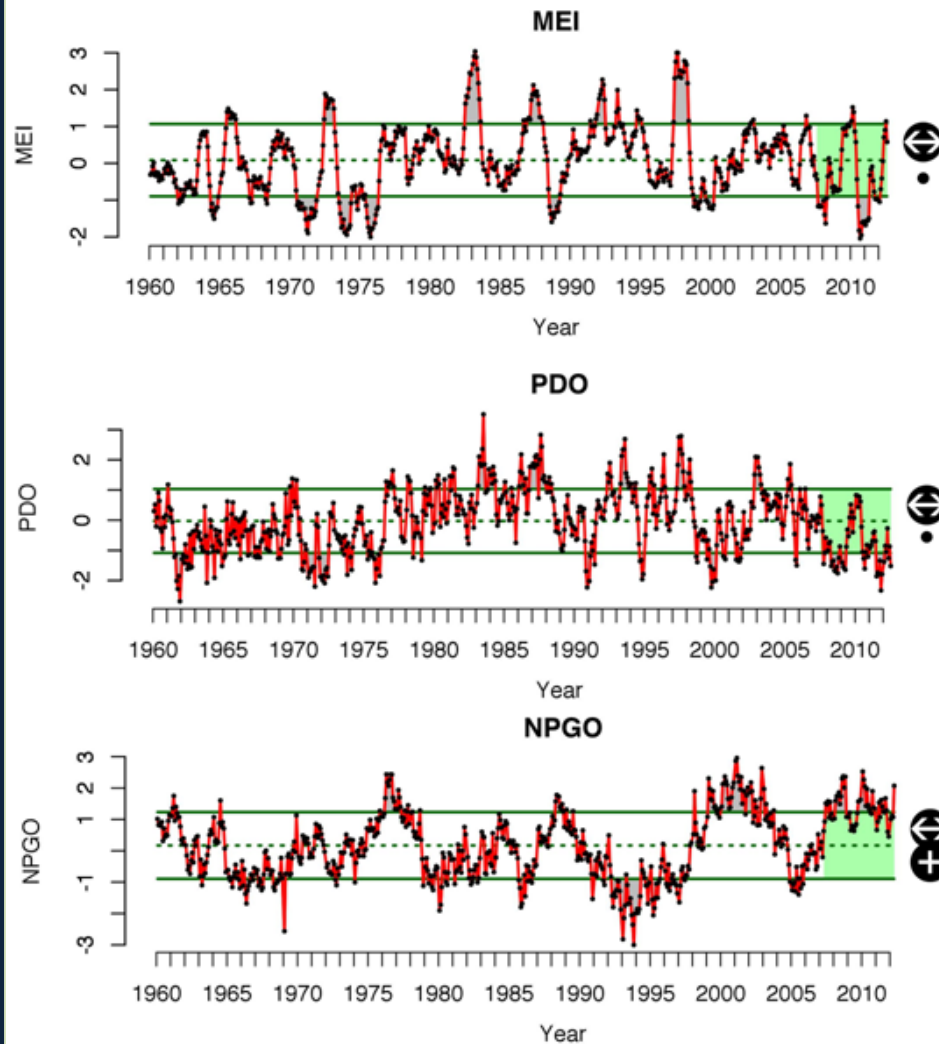
Addressing its questions about the longer-term effects of climate change, the direct public and private efforts to provide for the CCE management plans will likely examine the effects of climate change. The focus of this initiative would be on the effects of climate change on the species across all management plans. CCE management plans would be a social fabric of at least 125 communities in the CCE and the ecosystems that sustain them are altered. The consequences for the fisheries and the

Key elements: 1) exposure to the physical effects of climate change on the productivity of fisheries or dependence of the regional economy on the extent to which adaptive capacity enables the CCE to respond. For developing this initiative would initially require a literature review on the current state of knowledge about the anticipated effects of climate

A.2.9

A.2.9 Indicators for Analyses of Council Actions Initiative

Under NEPA, actions that may have an effect on the environment, such as Federal fishery management actions, are required to be analyzed for the significance of the potential direct, indirect, and cumulative impact on the environment. The purpose of this requirement is to inform decision-makers and the public about the greater potential environmental consequences expected from a proposed action or series of actions, and to ensure that the entities proposing the action evaluate options for mitigating potential environmental impacts.



At §1508.7, cumulative impact is defined as *the impact on the environment incremental impact of the action when added to other past, present, and future actions regardless of what agency (Federal or non-Federal) or persons.* Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. In Chapter 4, the FEP discusses broad categories of cumulative impacts from human actions or environmental shifts, of changes within the marine environment and the Council's interest or responsibility: fish abundance within the CCE, the abundance of species within the CCE, changes in biophysical habitat within the CCE, changes in fishing effort, changes in fisheries and dependence upon fishery resources, and aspects of climate change and its effects on marine resource populations within the CCE.

Agencies, staff, and advisory bodies all participate to some degree in the analysis and implementation of Council actions. One major challenge in analyzing the potential impacts of actions is to understand the cumulative effects of human activities on the environment and tracking the potential effects of fishery management actions on the environment within the CCE. Under this initiative, the Council and its advisory bodies would look for ways to assess the direct, indirect, and cumulative impacts of actions taken on the environment. Ultimately, this initiative could help the Council to determine what management measures are needed to help buffer against uncertainties resulting from the cumulative effects of human activities on the environment, and to support greater long-term sustainability for its fishing communities.

In the development of the FEP, the Council has also been considering the form and content of the annual CCE report. The intent of such a report would not be to discuss all known environmental impacts on the CCE; rather, it would be to report on specific indicators of the environmental impacts that affect or are affected by fisheries. As the Council and its advisory bodies consider the indicators to be included in the Council's annual state of the CCE report, it may wish to consider indicators useful to the Council's decision-making processes. For example, the Council may want to consider indicators that track major management goals, like tracking stock status against the objective of maintaining stocks at or above levels and thresholds for identifying when a stock should be considered overfished. Indicators do more than simply illustrating the current and past states of the environment; they also indicate the points at which management programs should change?

Implementing this initiative could include a cross-FMP assessment of commonalities in environmental indicators conducted under each of the FMPs. In particular, background information is needed for the FMPs to assess the effects of fishing activities on the CCE as a whole, both on the current state of the CCE, and on the anticipated state of the CCE over time. The Council's ongoing refinements to the annual state of the CCE report should be made available to NEPA analyses on the effects of the fisheries on the status of the CCE. The Council's ongoing refinements to the annual state of the CCE report should be made available to NEPA analyses on the effects of the fisheries on the status of the CCE. The Council would likely need to ensure the availability of scientific information on potential indicators of CCE status, and to ensure that this information is made available to the Council's decision-making process.

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For those images where sources are not shown directly on image, all are courtesy of the U.S. National Oceanic and Atmospheric Administration, except:

Slides 2: Northeast Pacific Ocean; NASA/Goddard Space Flight Center; FEP cover image, Blue Marble: Next Generation, Reto Stöckli, NASA Earth Observatory

Slide 7: Senators Theodore Stevens (AK) and Warren Magnuson (WA), with permission from Anchorage Daily News (Anchorage Dispatch News).

Slide 10: Chad Leiferman, Bob Hannah, and Jeff Boardman with experimental bycatch reduction device aboard F/V Miss Yvonne, ODFW.

Slide 12: Survival suit training, U.S. Coast Guard.

Slide 14: Westport, WA commercial crab fleet, Washington Department of Fish and Wildlife.

Slide 15: Anglers and Humboldt squid catch, HuliCat Sportfishing, John Field, NOAA.

Slide 18: Debate of congressional pugilists, 1798, Library of Congress.