ECOSYSTEM WORKGROUP REPORT ON FISHERY ECOSYSTEM PLAN INITIATIVE 3: CLIMATE & COMMUNITIES

1.0 Introduction

This report discusses next steps in the Climate and Communities Initiative (the "Initiative"). Our intent is to stimulate discussion and recommendations from the Council's advisory bodies and the public on those next steps. The guidance the Council provides at this meeting will help shape the Ecosystem Workgroup's (EWG) and others' efforts between now and the March 2019 meeting.

The EWG is meeting via webinar on August 21 to present this report and information on the potential Fishery Ecosystem Plan (FEP) review (Agenda Item G.2) to interested Council members, advisory body members, and the public. After hearing feedback from that webinar meeting, the EWG may submit a supplemental report on this agenda item at the September Council meeting.

As detailed below, this Initiative's work has provided basic background information on what climate change and ocean acidification might bring to the California Current Ecosystem (CCE). That work has also provided general prescriptions for how we might respond to those changes, such as with regulatory flexibility within or between fisheries to allow fisheries participants to diversify their risks across fishing portfolios. Upcoming work under the Initiative should provide specific recommendations of where the Council could improve its management strategies for addressing near-term climate variability, long-term climate change, and ocean acidification.

Instead of a single large Council action, this Initiative is likely to lead to a suite of smaller actions over varying timeframes. Some actions might alter how the Council conducts its business, or provide planning tools for future Council work in Fishery Management Plans (FMPs) or Council

Operating Procedures, or checkpoints for the Council to more deliberately consider whether its management recommendations provide sufficient resilience for fish stocks and flexibility for fishing communities. In this EWG report, we respond to Council direction from March 2018 and provide guidance on next steps for developing that suite of actions.

2.0 Council Direction from March and Planning for September

At its March 2018 meeting, the Council recommended revising the goal statement for the Initiative as shown here **in bold text**, to highlight the Council's intent that the Initiative lead to fisheries management actions, and not just changes in Council processes:

> *The goal of a cross-FMP Climate and Communities Initiative is to consider, **develop, and implement** strategies for improving the flexibility and responsiveness of our management actions to near-term climate shift and long-term climate change, and strategies for increasing the resiliency of our managed stocks and fisheries to those changes. This approach should better support West Coast fishing communities that depend on marine fishery resources.*

The Council also discussed whether the Initiative should focus on fisheries beyond the FMP species' fisheries. While prioritizing fisheries under Council authority, the Council was interested in looking at whether the effects of climate and oceanographic conditions on state and tribal fisheries would interact with those same effects on Council-managed fisheries. For example, the major invertebrate fisheries, such as for Dungeness crab and pink shrimp, are key pieces of West Coast commercial fishing portfolios for fishermen who also participate in Council-managed fisheries. Therefore, we expect discussions on the Initiative will range into key connections across fisheries without delving into strategies for management action for particular state and tribal fisheries.

Council members were also interested in thinking about and discussing some of the potential effects of climate change and stream warming on interior Chinook salmon stocks that support multiple fisheries. We note that the Northwest and Southwest Fisheries Science Centers included a new discussion in their 2018 Ecosystem Status Report (Harvey et al., eds.) within Appendix F on *Snow-Water Equivalent, Streamflow, and Stream Temperature*. The information in that appendix, and scientific efforts to develop other freshwater habitat indicators should improve the information the Council and the public receive about stream conditions. *Climate Change and Our Natural Resources* (TTWW 2016) provides suites of recommendations for improving the resilience of freshwater and marine stocks and habitats to climate change, such as: restoring native freshwater habitat, improving natural streamflows, managing sediment load in streams, and identifying and (where possible) mitigating for warmer stream temperatures.

Finally, the Council noted at its March meeting that the FMPs include existing measures that build resilience into fish stocks and create flexibility for fisheries. Section 3.5.1.2 of the FEP, which is provided in the appendix to this report, lists the ecosystem-based management measures within each of the FMPs, although that list is only up to date through 2012, and management measures to improve fisheries management adaptability are likely just a subset of the measures discussed in

the FEP. That section of the FEP was developed in close coordination with the FMP-specific management teams; therefore, the EWG suggests that updating a comprehensive list of FMP-specific management measures to support fisheries management under climate variability and change should begin with a consultation between the EWG and each of those management teams.

Beyond the Council's focus on and priority for developing management strategies for its fisheries, this Initiative may have other benefits for coastwide ecosystem-based management. Assessments of current conditions, such as those provided in the annual ecosystem status report, and the outlook for the future of the CCE and its fisheries may be interesting to government agencies, private entities, and members of the public beyond the Council process. The Council could consider shaping the Initiative's analyses and discussions to help people and organizations who fund, create, and influence environmental policy and programs at various levels of government and civil society to help them weigh their options, choices, and investment decisions for their futures. The Initiative may help other natural resource managers considering how to mitigate for and adapt to climate change by documenting and communicating the potential unavoidable costs of climate variability and change to the CCE and its fisheries and fishing communities.

3.0 Initiative Activities to Date

Leading up to the Council's March 2018 discussion of the Initiative, the EWG had coordinated a January-February webinar series featuring scientists from the Northwest and Southwest Fisheries Science Centers discussing recent scientific information on the potential effects of climate variability and change on the CCE and West Coast fisheries. We also anticipate that the climate vulnerability assessments for CCE fish, the results of which were preliminarily presented at the Council's September 2017 meeting, will be helpful to the Council in sorting out which species may be more or less vulnerable to the potential effects of climate variability and change. Also in 2017, EWG members and Council staff attended a workshop on ocean tipping points to train resource managers to understand and apply a suite of scientific tools and methods to support effective management decisions related to ecological regime shifts, fisheries collapse, and other types of dramatic ecological change in the ocean.

For the Council's April 2018 meeting, the EWG provided a supplemental informational report intended to help the Council consider issues and ideas for a May 2018 workshop, sponsored by The Nature Conservancy, on the Initiative. Members of the EWG and the larger Council family attended the workshop. Council staff have posted materials from the May workshop on the Council's website for this initiative. We understand that The Nature Conservancy and The Fisheries Leadership & Sustainability Forum, which facilitated the May workshop, will be reporting on that workshop to the Council at this meeting.

The EWG met via webinar on May 22, 2018, primarily to develop its report to the June 2018 meeting on the Draft Research and Data Needs Document. In that supplemental June EWG report, we not only provided comments on that draft Document, we also discussed the EWG's priorities for ecosystem science in support of the Initiative.

4.0 Initiative Discussion Questions for Council Family

In July 2018, we drafted questions on this Initiative for Council members, advisory body members, and the public. We intended these broad questions to help Council process participants think about concerns they might have for our fisheries under climate change, based on their past and current experiences, and what they might want out of the Initiative looking forward. We are expecting these questions to spur conversations, not to lead to immediate answers for Council action. Advisory bodies could share their initial thoughts about and answers to these questions in their September 2018 reports. Responses to these questions from Council advisory bodies and the public should be useful to Council discussions under this agenda item.

Posted on this initiative's website and distributed to Council advisory bodies via email, we asked:

1. How do you think the Council can best address or minimize risks associated with the effects of increased climate variability on marine species?
2. Addressing increased climate variability requires fisheries management that is flexible and adaptable to minimize impacts on the fisheries and associated communities.
    a. What do you see as the biggest constraints to flexible and adaptable management that the Council/National Marine Fisheries Service (NMFS)/States could or should address?
    b. How far out in time are you thinking when planning and making fishing business, fishery management, or fishery science decisions? A year? 3-5 years? Farther than 10 years?
    c. Do you know whether your state, tribe, agency, or other organization is doing anything already to address concerns about the potential effects of climate variability? Anything you want to bring to the Council's attention?
3. Do you want more flexibility to switch between fisheries? Or, flexibility to change where you fish for the species you target?
4. Did you witness changing ocean, stream, or fishery conditions during our recent, 2014-2016, El Niño and Marine Heat Wave (Warm Blob) period? If you are a fisherman, did you have to react (fish differently?) than during previously large changes in ocean conditions?
5. Are there climate and fishery issues that are important for your state or tribe, but which are not usually discussed in the Council process? (If so, which fisheries and for which state/tribe?) How might they play a role in Council actions in the future?

5.0 Fisheries Management Challenges and Tools to Buffer Against the Effects of Climate Variability and Change

During the Council's March 2018 discussion of the Initiative, the Council asked the EWG to develop some ideas and generate discussion on fisheries management challenges and actions under climate change. The Council recognized that many of our traditional fisheries management tools could be useful to buffer against the potential effects of climate variability and change on fish stocks and fisheries.

Council actions already involve considerable uncertainty, including scientific uncertainty as to the current and future status and size of fish populations and management uncertainty about the effects of its regulations. The Initiative's webinar series held in early 2018 touched on what science and modelling tell us about how climate change and ocean acidification may add to the mix of uncertainty. As we have seen in recent years, variability is expected to increase overall. This variability may be difficult to differentiate from current levels over the short and medium timeframes. Over the long term, however, we may be headed for a "no-analog" future, where current conditions provide no guidance on what conditions we may expect in the future.

The ability to adjust harvest policies and management measures based on feedback will continue to be the linchpin of fisheries management under climate change. Traditional policies like rebuilding overfished stocks and maintaining healthy stocks make those stocks less vulnerable to the negative effects of climate change than they might have been in past decades. The Council already adjusts harvest policies and levels based on new information about fish stocks, or makes inseason shifts in response to conditions in the fishery. Feedback from monitoring and modelling, as well as from fishery participants and the public, is key to detecting changes in social, economic, and ecological conditions and guiding the Council on options for responding. The major prescription for managing under such uncertainty, and one that the Council has long followed, is to build a system that can be managed adaptively.

The EWG expects that some of the potential effects of climate change, such as changes to a stock's productivity or stock structure, would normally be identified and discussed through the Council's existing fisheries management processes to plan for, review, and adopt stock assessments, and to develop harvest management measures. As NMFS implements its new Stock Assessment Improvement Plan and provides final climate vulnerability assessments for West Coast fish stocks, the Council could prioritize more frequent assessment of those stocks most vulnerable to climate change. The Council could also schedule itself to periodically consider whether harvest policy reviews are needed for any of its FMP species or species groups.

In *A Review of Potential Approaches for Managing Marine Fisheries in a Changing Climate*, Morrison and Termini (2016) provide a literature review and discussion of potential reactive and proactive fisheries management programs and measures that may help address some of the potential effects of climate change. Most of the fisheries management suggestions in Morrison and Termini (2016) call for either:

- monitoring stocks and the system to be more aware of climate variability and its effects,
- improving the status and structure of managed stocks so that those stocks are more resilient to change, including tailoring harvest control rules more closely to the environmental regime for species where linkages have been identified, or
- increasing flexibility and adaptability in fisheries management programs so that the fishing industry can be more flexible and adaptable to change.

Similarly, *Readying California Fisheries for Climate Change* (Chavez et al. 2017) also recommends managing fisheries to build ecological and social resilience, to increase adaptability and support transitions in fisheries management, strengthen forecasting, and expand cross-boundary coordination on fisheries management.

Climate Change and Our Natural Resources (TTWW 2016) focuses on the concerns of treaty fishing tribes, which are strongly place-based, and offer ideas and lessons that may be useful for tribal and non-tribal fishing communities that are geographically constrained in either their safe access to fishing grounds, or road access to fish markets, or both. That report also provides a whole-system look at the interacting effects of terrestrial, freshwater, and marine habitats on fisheries productivity under climate change. As the Council reviews its essential fish habitat (EFH) policies going forward, it might consider: protections for fish nursery grounds; whether existing closed-area boundaries still apply to the species, stocks, and habitats they were intended to protect; and whether there may be West Coast marine habitat features that are particularly vulnerable to climate change.

To support the resilience of coastal communities to climate change, the Council could review its fisheries management programs for whether those programs allow Council decision-making to adapt to changing information, and for whether those programs should be modified for fisheries participants to have more flexibility in how and where they fish. As the Council noted at its March 2018 meeting, the FMPs include existing measures that could build resilience into fish stocks and create flexibility for fisheries.

6.0 Scenario Planning as a Possible Next Step

Morrison and Termini (2016) suggest that fisheries managers and stakeholders use scenario planning processes to explore their options for managing in the face of climate variability and change. Scenario planning is more fully described in a National Park Service publication, *Using Scenarios to Explore Climate Change: A Handbook for Practitioners* (2013).

Scenario planning can take many forms. One option might be for Council members, or an ad hoc group combining Council members, Council advisors, scientists, and stakeholders, to convene via workshops to discuss how the Council might react to a scientifically-based-but-imagined future scenario for one or more Council-managed fisheries. For example, such a group could consider how fisheries management might change under a scenario where, by 2030, yelloweye rockfish were to fully recover, and Chinook salmon returns to the Columbia River basin were to further decline. Alternately, the scenario planning might instead focus on ports or regional perspectives that include state, tribal, and Federal fisheries together.

Scenario planning would allow discussion of specific possible futures, rather than raising just the vague potential for warmer and more acidic rivers and oceans. While scenarios would involve considerable uncertainty, providing a set of plausible visions for future fisheries management challenges in the CCE would allow managers and stakeholders to better evaluate specific potential changes to fisheries management processes. The EWG provided discussion questions to Council members, Council advisory bodies, and the public during summer 2018 in part to begin soliciting ideas for future scenarios that could be explored in a scenario planning process.

While scenario planning could be done in a variety of ways, all would likely need a sizeable time commitment and effort to design and organize. Scientific expertise would be required to aid the design of the scenarios. If the Council is interested in pursuing the scenario planning concept, the EWG and others could collaborate to provide a more detailed draft process for the Council's review in March 2019.

7.0 EWG Recommendations

As discussed in the Introduction to this report, the EWG anticipates that this Initiative will result in a suite of actions over varying timeframes, rather than a single large effort or document. Ideally, these actions could be phased in as they become ready for Council consideration. To develop those actions, the EWG recommends further and more specific discussions of how the Council might respond to potential changes in the CCE. To that end, the EWG recommends that the Council:

- Consider whether they have received adequate comments and suggestions from the discussion questions for this initiative. If not, send out these, or recommend other, framing questions for a longer and more deliberate public review process in preparation for further discussion at the March 2019 meeting.
- Consider whether the Council process is interested in or ready for climate change scenario planning and, if so, direct the EWG to scope the task and recommend categories of potential workshop participants and specific scenarios. The EWG could report back in March 2019 with a more detailed description of the activities that would occur under a scenario planning exercise and at least a rough schedule.
- Consider whether the Council needs briefings on the potential effects of climate variability and change on either interior salmonid stocks that contribute to Council-managed fisheries, or on non-federal ocean species and fisheries, or both. Or, consider whether the Council would like a briefing on climate impacts on fishing communities and their relevance to Council management, or actions being undertaken to mitigate those impacts. Make recommendations on the appropriate agencies or other entities to develop those briefings.
- If the Council is ready for more specific background information and action recommendations, provide some framing discussion for the EWG and other advisory bodies on the general topics or management areas that the Council would like to see addressed. For example, climate change planning measures could be built into EFH review and management processes, or into stock assessment development and review processes, or into fisheries licensing or license program review processes.
- Direct its management teams to work with the EWG to review and update an inventory of existing FMP measures that could be used to build resilience into fish stocks and create flexibility for fisheries.
- Consider supplementing EWG membership with scientific expertise to aid with the next steps in the Initiative.

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8.0 References

Chavez, F. P., Costello, C., Aseltine-Neilson, D., Doremus, H., Field, J. C., Gaines, S. D., Hall-Arber, M., Mantua, N. J., McCovey, B., Pomeroy, C., Sievanen, L., Sydeman, W., and Wheeler, S. A. (California Ocean Protection Council Science Advisory Team Working Group). 2017. Readying California Fisheries for Climate Change. California Ocean Science Trust, Oakland, California, USA. Available: http://www.oceansciencetrust.org/wp-content/uploads/2016/06/Climate-and-Fisheries_GuidanceDoc.pdf (August 2018).

Harvey, C., T. Garfield, G. Williams, N. Tolimieri, and E. Hazen. 2018. California Current Integrated Ecosystem Assessment, California Current Ecosystem Status Report. Appendix F available: https://www.pcouncil.org/wp-content/uploads/2018/02/F1a_NMFS_Rpt2_2018_IEA_SoCC_FINAL_appendices_Mar2018BB.pdf (August 2018).

Morrison, W.E., and V. Termini. 2016. A Review of Potential Approaches for Managing Marine Fisheries in a Changing Climate. U.S. Dept. of Commer., NOAA. NOAA Technical Memorandum NMFS-OSF-6, 35 p.
Available: https://repository.library.noaa.gov/view/noaa/12973 (August 2018).

National Park Service, 2013. Using Scenarios to Explore Climate Change: A Handbook for Practitioners. National Park Service Climate Change Response Program. Fort Collins, Colorado.
Available: https://www.nps.gov/subjects/climatechange/upload/CCScenariosHandbookJuly2013.pdf (August 2018).

Treaty Tribes of Western Washington. 2016. Climate Change and Our Natural Resources: A Report from the Treaty Tribes in Western Washington. Northwest Indian Fisheries Commission, Olympia, WA. Available: http://nwifc.org/w/wp-content/uploads/downloads/2017/01/CC_and_Our_NR_Report_2016-1.pdf (August 2018).

Appendix

AUGUST 2018 NOTE: THIS APPENDIX EXCERPTS SECTION 3.5.1.2 OF THE FEP, WHICH IS CURRENT AS OF 2012 AND LISTS MANAGEMENT MEASURES IN EACH OF THE FMPS THAT SUPPORT ECOSYSTEM-BASED MANAGEMENT. WE PROVIDE THIS LIST IN THIS 2018 EWG REPORT AS AN EXAMPLE. THIS IS NOT A CURRENT LIST OF MANAGEMENT MEASURES THAT MAY HELP THE COUNCIL BUILD ADAPTABILITY TO CLIMATE CHANGE INTO WEST COAST FISH STOCKS AND FISHERIES.

3.5.1.2 Ecosystem-Based Management Measures within FMPs

This section [of the FEP] identifies existing ecosystem-based principles and management measures within current FMPs, particularly management measures that were either taken to mitigate the impact of fishing on the environment or ecosystem, or measures that take into account the effects of the biophysical environment on managed species. Additional protective management measures have also been promulgated under the ESA and Marine Mammal Protection Act (MMPA). The fisheries are managed to include these protection measures. For each measure listed under the species group FMPs, we indicate in brackets the FMP species groups or protected species that may benefit from the measure listed. The following lists, separated by FMP, are current through February 2013.

Coastal Pelagic Species FMP

1. Krill harvest prohibition: The CPS FMP prohibits harvest of all species of euphausiids (krill) that occur within the U.S. West Coast EEZ to help maintain important predator-prey relationships and the long-term health and productivity of the West Coast ecosystem. These ecosystem conservation principle enhance fishery management by protecting, to the extent practicable, krill resources, which are an integral part of the ecosystem [HMS, groundfish, salmon, CPS, marine mammals, birds]
2. Conservative Management Strategy: The Council has demonstrated a consistently conservative approach to CPS harvest management in response to their ecological role as forage and importance to West Coast fisheries. The Council frequently reviews new science in support of stock assessments and management strategies and conducts annual stock assessments for the actively managed species because of the annual variability that can occur in the biomass of CPS. In the late-1990's, the Council chose the most conservative harvest control rule for Pacific sardine when presented a wide range of FMP harvest policies. The rationale for this harvest policy, like the other harvest controls rules in the FMP, is oriented toward maximizing biomass versus maximizing catch. Because of this, the annual harvest levels that result from the rule never exceed 12 percent of the estimated biomass for that year. [HMS, groundfish, salmon, CPS, marine mammals, birds]
3. Environmental Indicators: The intent of the existing environmental parameter in the Pacific sardine harvest control rule is to explicitly adapt harvest levels in response to environmental variability. The existing environmental parameter is one of the Council's priority research needs and new science suggests a need to explore a broader range of ecological indicators of Pacific sardine productivity. Additionally the annual Stock Assessment and Fishery Evaluation (SAFE) document for CPS includes an 'Ecosystem Considerations' chapter that provides a summary of oceanographic trends and ecological indicators being tracked by NMFS in the CCE and potentially having an effect on CPS stocks. [CPS]
4. Cutoff Parameters: CPS harvest control rules have long utilized "Cutoff" parameters to protect a core spawning population and prevent stocks from becoming overfished. The Cutoff is a biomass

level below which directed harvest is not allowed. Cutoff values are set at or above the overfished threshold and have the effect of automatically reducing harvest rates as biomass levels decline. This mechanism serves to preserve a spawning stock size. For Pacific sardine, the Cutoff value is 150,000 mt or three times the overfished threshold and is part of the Council's conservative management approach. [HMS, groundfish, salmon, CPS, marine mammals, birds]

5. Monitored stock harvest strategy: The ABC control rule for monitored stocks consists of a 75% reduction from the species overfishing level. This precautionary approach is in response to greater scientific uncertainty about stock status or management. [HMS, groundfish, salmon, CPS, marine mammals, birds]
6. EFH: EFH for CPS finfish species is temperature-based. The east-west geographic boundary of EFH for CPS is defined to be all marine and estuarine waters from the shoreline along the coasts of California, Oregon, and Washington offshore to the limits of the EEZ and above the thermocline where sea surface temperatures range between 10°C to 26°C. The southern boundary is the U.S.-Mexico maritime boundary. The northern boundary is more dynamic, and is defined as the position of the 10°C isotherm, which varies seasonally and annually. [CPS]
7. Ecosystem Component (EC) Species: The CPS FMP contains two EC species, jacksmelt and Pacific herring. In recognition of their role as forage, bycatch and incidental catch of these species is specifically monitored, along with all other bycatch/incidental catch, annually in the CPS Stock Assessment and Fishery Evaluation document.
8. Bycatch provisions: Incidental catch provisions are often included in annual management recommendations for CPS. These provisions are included to allow for small allowances of incidental catch of a specific CPS species, for which the directed fishery may be closed, in other CPS fisheries to prevent and reduce discard. [CPS]
9. ESA incidental take protections: CPS fishing boat operators and crew are prohibited from deploying their nets if a southern sea otter is observed within the area that would be encircled by the purse seine. [otters]

Groundfish FMP

1. EFH Conservation Areas: extensive, coastwide, long-term closed areas to protect groundfish EFH from bottom contact gear, particularly in rocky reef areas; extensive, coastwide, long-term closed area to freeze the footprint of West Coast trawl gear use to inshore of 700 fm depth contour. [Groundfish, salmon (particularly Chinook), marine mammals, seabirds]
2. Rockfish Conservation Areas: coastwide, seasonally-variable closed areas to minimize bycatch in all groundfish fisheries of rebuilding groundfish species. For cowcod and yelloweye rockfish, species-specific closed areas off the southern (cowcod) and northern (yelloweye) U.S. West Coast. [Groundfish, salmon (particularly Chinook), marine mammals, seabirds]
3. Salmon Conservation Zones: mid-coast, estuary-plume-focused closed areas to minimize bycatch in whiting fisheries of endangered and threatened salmon stocks. [Salmon, CPS, green sturgeon, marine mammals, seabirds]
4. Commercial fishery vessel monitoring system (VMS) requirements to better enforce closed areas and other regulations. [Groundfish, salmon, marine mammals, seabirds]
5. Coastwide, mandatory observer program to gather total catch data from commercial fisheries. [All FMP species, all protected species taken as bycatch]
6. Weak stock management to curtail allowable harvest of more abundant species in order to reduce opportunities for incidental catch of less abundant, co-occurring species. Harvest levels for species managed via an overfished species rebuilding plan are usually set at a fraction of FMSY harvest rate. [Groundfish, salmon]
7. For less abundant stocks and stocks with little scientific information, harvest policies become increasingly precautionary. [Groundfish]

8. Allowable harvest of shortbelly rockfish, an abundant species with high prey value to the CCE, is set extremely low to accommodate incidental catch while discouraging any fishery development, to ensure that it retains its role as prey for other (non-human) predator species. [Groundfish, HMS, salmon, marine mammals, seabirds]
9. Stock assessments include literature review and discussion of relevant ecological biological, social and economic factors and the interactions between them, to allow SSC and Council to weigh impacts of those factors under different potential harvest scenarios. [Groundfish]
10. Trawl gear regulations to constrain habitat damage through a small footrope requirement shoreward of the RCAs, and minimize catch of juveniles through a minimum mesh size requirement. Fixed gear regulations to prevent lost gear from ghost fishing through a gear attendance requirement and, for pots, a biodegradable escape panel requirement. [Groundfish, salmon (particularly Chinook), marine mammals, seabirds]
11. Regulations requiring fishery participants to sort their catch by species, ensuring better long-term data on the hugely varied groundfish species catch and landings. [Groundfish]
12. For whiting, participation in a U.S.-Canada bilateral treaty organization to jointly manage and conserve Pacific whiting to ensure that harvest of the cross-boundary resource remains within sustainable parameters. [Groundfish, marine mammals, seabirds]
13. Implementation of the Individual Fishing Quota trawl rationalization program, which has demonstrated reduced bycatch of non-target species such as halibut and overfished species of concern since its inception in January 2011. [Groundfish, Halibut]

Highly Migratory Species (HMS) FMP

1. FMP designates EFH for each species within the FMP, with sub-designations for the different life stages of those species. EFH designations for some HMS' life stages are temperature-based, recognizing those species' habits of associating with certain temperature ranges, regardless of where those temperatures may occur in any given season or year.
2. Sea turtle and marine mammal bycatch minimization and mitigation measures: NMFS-trained observers on vessels. Sea turtle protections: swordfish longline fishery prohibited west of 150° W. long.; prohibition on light stick possession for longline vessels operating west of 150° W. long.; shallow set longline fishing prohibited east of 150° W. long; seasonal area closures for drift gillnet in times and areas where there have been prior fishery interactions with leatherback sea turtles (the Pacific Leatherback Conservation Area), regulations for drift gillnet closures during El Niño events; equipment and handling requirements for bringing incidentally caught turtles onboard, and resuscitating and releasing when possible; mandatory sea turtle amd marine mammal training for skipper and crew participating in the drift gillnet fishery. Marine mammal protections: Pacific Cetacean Take Reduction Plan requires gear modifications on drift gillnet gear (pinger and gear depth requirements). State regulations to reduce marine mammal bycatch using time/area closures. [Sea turtles, marine mammals]
3. Seabird bycatch minimization and mitigation measures: gear configuration and setting requirements, offal discharge requirements, equipment and handling requirements for bringing incidentally caught short-tailed albatross onboard, and resuscitating and releasing when possible. [Seabirds]
4. Bycatch limitations for HMS taken with non-HMS gear. [HMS]
5. HMS permitting and record-keeping requirements for U.S. vessels operating in the EEZ and on the high seas and landing HMS in U.S. ports. [HMS]
6. Selected commercial fishery vessel monitoring system (VMS) requirements to better enforce closed areas and other regulations. [HMS]

7. Mandatory observer program to gather total catch data from commercial fisheries. [HMS, salmon, CPS, groundfish]
8. Nation-wide shark-finning prohibition. [Sharks]
9. Nation-wide dolphin-safe tuna import requirements. [Marine mammals]
10. Participation in international regional fishery management organizations to develop and implement multinational conservation measures, such as restricting fishing around fish aggregating devices (FADs) for tropical tunas, and area closures to minimize bycatch of mammals and turtles. [HMS, marine mammals, sea turtles]

Salmon FMP

1. FMP designates EFH from the ocean extent of the EEZ to the shore, and inland up to all freshwater bodies occupied or historically accessible to salmon in Washington, Oregon, Idaho, and California, with exceptions for dammed streams, recognizing the long-term potential for managed stocks to recover in historically-used areas. [Salmon, and in marine waters, groundfish and CPS where EFH for those species intersects with salmon EFH]
2. Yelloweye Rockfish Conservation Area off Washington state to minimize bycatch of an overfished rockfish species in the salmon troll fisheries. Regulations restricting groundfish and halibut retention, coupled with inseason management to adjust those as needed. [Groundfish, halibut]
3. Geographic control zones that may be opened or closed to fishing on an annual basis, depending on a particular year's management objectives and run forecasts, used to constrain the catch of salmon from less abundant runs caught in common with salmon from more abundant runs. [Salmon]
4. Adaptive management process that allows swift inseason regulations changes to respond as catch information becomes available. That same process also includes an annual retrospective analysis of the effectiveness of modeling and management, ensuring an ongoing refinement of predictive and monitoring methodologies. [Salmon]
5. Oregon coastal natural (OCN) and Columbia River coho harvest matrices that use juvenile salmon ocean survival as a predictor of ocean conditions, ultimately providing allowable total fishery impacts rates based on the return of jacks (sub-adults) to spawning streams. Also for OCN coho, the Council's SSC has recommended a new predictor methodology that blends multiple parameters, including sea surface temperature and copepod assemblage abundance. [Salmon]
6. Participation in international regional fishery management organizations to ensure cooperation on both North American and high-seas multinational conservation measures to prevent overharvest. [Salmon]
7. Prohibition on the use of nets to fish for salmon within the EEZ to allow for live release of undersized salmon and to prevent bycatch of non-target species. [Salmon, HMS, groundfish]