ECOSYSTEM WORKGROUP REPORT ON THE ECOSYSTEM AND CLIMATE INFORMATION INITIATIVE

At its September 2022 meeting, the Pacific Fishery Management Council (Council, PFMC) tasked the Ad Hoc Ecosystem Workgroup (EWG) with getting the Ecosystem and Climate Information Initiative underway by providing the Council with a draft workplan for its March 2023 meeting. This new ecosystem initiative is intended to build on ideas generated under the Climate and Communities Initiative and would:

(i) review the incorporation of ecosystem and climate information into the Council's harvest-setting and fisheries management processes,
(ii) determine the need and appropriate timing for additional fisheries management plan (FMP)-specific ecosystem and climate information, and
(iii) where there is a need for additional ecosystem and climate information, develop clear pathways for it to be used in the setting of scientific uncertainty and harvest policy.[1]

Ecosystem and climate reporting developed out of this initiative would be distinct from and in addition to the annual ecosystem status report (ESR), and would be targeted for use in management under particular FMPs. For this March 2023 meeting, the EWG asks that the Council:

- Review and comment on the near-term ecosystem and climate information reporting ideas in Section 1 of this report, focusing on petrale sole as a demonstration species;
- Provide guidance on developing new species selection criteria for September 2023, discussed in Section 2;
- Review and comment on the proposed schedule for this initiative in Section 3;
- Ask the National Marine Fisheries Service (NMFS) Science Centers to support this initiative with species and ecosystem expertise and the NMFS West Coast Region and the appropriate fisheries management staff from the states and tribes to support this initiative with season management expertise between April and September 2023; and,
- Prioritize time (1-2 hours) in spring/summer 2023 for the Groundfish Management Team (GMT) and Groundfish Advisory Subpanel (GAP) to advise the EWG in the drafting of the petrale sole risk table proposed in Section 2. We would also appreciate Scientific and Statistical Committee (SSC) review time on this project in September 2023.

The EWG would be grateful for advice from Council advisory bodies and the public on:

- Preferred methods or priorities for grouping Council-managed species together when choosing new species groups for future ecosystem and climate information reports; and
- Preferred times in FMP-specific management processes when it would be most useful to receive ecosystem and climate information to support harvest-setting, or pre-season or inseason management processes (see Appendix A).

[1] FEP appendix:
https://www.pcouncil.org/documents/2022/09/fep_initiatives_appendix_post_03_17_final_170509.pdf/

1. Background

Fishery management councils have used a variety of reports and methods to consider ecosystem and climate information in their decision-making processes. Although scientific institutions, such as California Cooperative Oceanic Fisheries Investigations (CalCOFI) have been reporting on ecosystem conditions since the mid-20th century, the North Pacific Fishery Management Council (NPFMC) led the nation in opening its process to receiving regular informational ecosystem reports (NPFMC 1994). In 2012, the Pacific Council received the first ecosystem status report (ESR) from the California Current Integrated Ecosystem Assessment (CCIEA) group (Levin and Schwing 2011, Levin and Wells 2013). Since then, the annual California Current ESR has become increasingly more attuned to the scientific interests and management needs of the Council. In turn, Council and advisory body discussions of the ecosystem and the ESR have become increasingly more sophisticated with the evolving report. Ecosystem Initiative 2, the Coordinated Ecosystem Indicator Review,[2] raised novel questions about interactions between different components of the California Current Ecosystem (Tommasi et al. 2021) and improved the applicability of the ESR's contents to Council decisions.

Under this initiative, the Council plans to bring ecosystem and climate information into FMP-based harvest and season-setting decision processes, which requires understanding both the regular patterns of those decision-making processes and the type, format, and timing of information that could support those processes. There are a variety of decision points in the Council process that could use ecosystem and climate information, some of which can be targeted in the near term, while others will require more long-term effort.

Near Term: Both the NPFMC and the Mid-Atlantic Fishery Management Council (MAFMC) have experimented with risk tables, which provide them with semi-quantitative accounts of uncertainty around stock assessment model inputs and performance, population dynamics, and ecosystem conditions (Dorn and Zador 2020, Gaichas et al. 2018). These risk tables are intended to inform the councils' risk policies, mentioned in the National Standard 1 guidelines at 50 CFR 600.310(f)(ii):

> *Acceptable biological catch (ABC) is a level of a stock or stock complex's annual catch, which is based on an ABC control rule that accounts for the scientific uncertainty in the estimate of the overfishing limit (OFL), any other scientific uncertainty, and the Council's risk policy.*

In the NPFMC, the risk tables are intended to aid the NPFMC's SSC as it takes scientific uncertainty into account when recommending ABC levels (Dorn and Zador 2020). The MAFMC addresses a wide variety of elements in their risk tables, somewhat similar to our ESR, for species, fisheries, and the ecosystem (Gaichas et al. 2018).

For September 2023, the EWG proposes working with CCIEA scientists and stock assessors, in consultation with the GMT, GAP, SSC, and Ecosystem Advisory Subpanel, to develop a draft risk table for an example species, petrale sole, for Council consideration. We would use the Dorn and Zador (2020) general risk table (Table 1, below) and Gulf of Alaska pollock risk table (Table 2,

[2] https://www.pcouncil.org/actions/initiative-2-coordinated-ecosystem-indicator-review/

below) as baselines for drafting example petrale sole tables. We chose petrale sole as a pilot species because it is an information-rich species, with a new benchmark stock assessment being conducted this year and with extensive existing research on environmental drivers of petrale sole recruitment (Haltuch et al. 2020). Starting with one pilot species this year would allow the Council to review the methodology and consider whether to move forward with additional species groups and stocks in future years.

Table 1. NPFMC Risk classification table for assessment, population dynamics, and environmental/ecosystem considerations (Dorn and Zador 2020).

	Assessment-related considerations	Population dynamics considerations	Environmental/ecosystem considerations
Level 1: Normal	Typical to moderately increased uncertainty/minor unresolved issues in assessment.	Stock trends are typical for the stock; recent recruitment is within normal range.	No apparent environmental/ecosystem concerns.
Level 2: Substantially increased concerns	Substantially increased assessment uncertainty/ unresolved issues.	Stock trends are unusual; abundance increasing or decreasing faster than has been seen recently, or recruitment pattern is atypical.	Some indicators showing an adverse signal but the pattern is not consistent across all indicators.
Level 3: Major Concern	Major problems with the stock assessment, very poor fits to data, high level of uncertainty, strong retrospective bias.	Stock trends are highly unusual; very rapid changes in stock abundance, or highly atypical recruitment patterns.	Multiple indicators showing consistent adverse signals a) across the same trophic level, and/or b) up or down trophic levels (i.e., predators and prey of stock).
Level 4: Extreme concern	Severe problems with the stock assessment, severe retrospective bias. Assessment considered unreliable.	Stock trends are unprecedented. More rapid changes in stock abundance than have ever been seen previously, or a very long stretch of poor recruitment compared to previous patterns.	Extreme anomalies in multiple ecosystem indicators that are highly likely to impact the stock. Potential for cascading effects on other ecosystem components.

Table 2. NPFMC Risk table evaluation for Gulf of Alaska pollock in the 2018 stock assessment (Dorn and Zador 2020).

Assessment-related considerations	Population dynamics considerations	Environmental/ecosystem considerations
Contradictory data, very poor model fits to recent survey indices. But model seems robust, no retrospective pattern. **Conclusion: Level 2, substantially increased concerns**	Stock dominated by a single year class. Four years of very weak recruitment. There have been similar patterns in the past, but never this extreme. **Conclusion: Level 2, substantially increased concerns**	Onset of a marine heatwave and projections of a weak El Niño are not conducive for winter survival for age-0 pollock. Zooplankton indicators are mixed. Some suggest prey for adult pollock is abundant, but planktivorous parakeet auklets in the central GOA had poor reproductive success in 2018. **Conclusion: Level 2, substantially increased concerns**

The main focus will be on the risk table approach, but the EWG expects there will be opportunity to discuss other approaches as well. There are additional tools beyond risk tables that could also be used to inform the Council's risk policies for harvest setting. In addition to developing risk tables, the EWG could work with CCIEA scientists, management teams, and advisory bodies to assess where short-term forecasts of ocean conditions or species distributions might support the work of the Council and its cooperating agencies in setting pre-season and inseason management measures. The CCIEA program commonly compiles stoplight type tables that summarize ecosystem indicators related to salmon stock abundance, including information about the stressors that may be affecting different stocks of salmon within small enough geographic areas to help the Council consider the effects of ecosystem and climate on different sections of the coast (e.g., Newport Hydrographic Line stoplight table).[3]

Beyond the risk table approach, the EWG understands that CCIEA scientists have been working with salmon scientists and managers during the salmon pre-season management period to share stoplight tables and other indicators that might be useful to that process. We would be interested in working with the salmon advisory bodies and CCIEA scientists to better integrate the existing stoplight tables, or some other pre-season indicators reporting tool, into the annual salmon management process. While the ESR includes several indicators that could potentially support pre-season salmon management development, in looking to additional uses, the EWG is also interested in whether ecosystem or climate information could be useful in supporting groundfish catch and bycatch management, the groundfish stock assessment prioritization process,[4] or coastal pelagic species (CPS) season development.

[3] www.integratedecosystemassessment.noaa.gov/sites/default/files/inline-images/2021-Ocean-Indicators-and-Salmon-Forecasting-trend-all-no-numbers-030322.png

[4] www.pcouncil.org/documents/2022/05/f-3-attachment-2-nmfs-assessment-prioritization-workbook-electronic-only.xlsx/

Long Term: The Council's groundfish stock assessment Terms of Reference includes[5] requirements that full (not updated) assessments include:

> *Ecosystem considerations that include relevant information on how environmental drivers, prey, competition, predation, and/or (habitat requirements/preferences may affect stock's status, vital rates (growth, survival, productivity, recruitment), or range and distribution. Ecosystem considerations may also include how these factors, cross-FMP interactions with other fisheries and human social dynamics that may affect the stock (e.g., reliance and dependence by fishing communities, non-target species constraining harvest rates)…*

Bringing ecosystem and climate information into stock assessments requires significant upfront species-specific work to test the utility of that information in those assessments. However, where that work has been conducted (Tolimieri et al. 2018, Haltuch et al. 2020), its importance and utility can extend beyond the assessments for the particular researched species, expanding our broader understanding of the effects of oceanographic and other forces on our managed species. Although the EWG does not see revisions to stock assessments as part of this initiative, we are particularly interested in ongoing and new research on the ability of ecosystem information to inform and predict recruitment and other estimates in stock assessments. The relationship between spawning stock biomass (SSB) and recruitment (R) is often weak (Cury et al. 2014), and environmental information and information on fish early life stages might be helpful for characterizing the abundance of the youngest cohorts in a given stock at the time of that stock's assessment. There is a strong need for ongoing scientific work on bottom-up drivers of species dynamics to better inform the management process. The work done by the Pacific Whiting Treaty's Joint Technical Committee and collaborators is another example of how information on environmental conditions can be used to aid consideration of recruitment as well as management issues like the northward distribution of the stock in a given year.

The EWG is also interested in the use of ecosystem and climate information in the design and implementation of harvest control rules (HCRs), but recognizes that it has so far been challenging. Sardine management illustrates those challenges. Scientific confidence in the links between sardine abundance and sea surface temperature (SST) was fairly strong when that HCR was first implemented in 1999; however, more recent scientific research into the effects of ocean conditions on CPS stock dynamics has decreased our confidence in that particular linkage. Regardless, the management process itself has served as a model for using an environmental indicator in an HCR. Despite the challenges, the EWG expects environmental indicators to have a significant role to play in future HCR development.

2. Selection criteria for providing ecosystem and climate information for particular species or species groups

In addition to identifying methods or mechanisms that would be used to integrate ecosystem and climate information into management processes, this initiative will also need a framework to

[5] www.pcouncil.org/documents/2022/06/terms-of-reference-for-the-groundfish-stock-assessment-review-process-for-2023-2024-june-2022.pdf/

identify and prioritize the Council-managed species groups or species with management processes that should next be supported with ecosystem and climate information.

While using petrale sole as a pilot species offers an information-rich example to launch this initiative, future ecosystem and climate reporting efforts could more efficiently focus on groups of species within FMPs where possible. A framework for Council prioritization of future species or species groups for ecosystem and climate information reporting will need to first scope species groups to determine if the species within those groups are likely to respond in a similar manner to environmental dynamics. For example, within the CPS FMP, sardine and anchovy seem to respond differently to climate forcing (Checkley et al 2017). By contrast, recruitment dynamics of multiple species of rockfishes appear to be synchronous through time, suggesting that the same environmental driver affects the entire complex (Schroeder et al. 2019). The EWG welcomes any suggestions the Council and its advisory bodies may have for grouping Council-managed species as future subjects of ecosystem and climate information reporting.

As with petrale sole, there will be some Council-managed species that have already been the subjects of research into connections between stock dynamics and distribution and the environment, and many other species with less rigorous available information. Similarly, different Council-managed species will have different roles within the ecosystem, and different levels of importance to fishing communities. For September 2023, the EWG plans to draft a planning matrix for Council review that would help the Council prioritize the species that should next be subject to ecosystem and climate information reporting.

Example criteria that could help the Council prioritize species groups and species include:

- Ecological
    - Ecosystem role - the extent to which a species or species group is trophically connected to multiple predators as prey, important prey for a predatory species of concern, or an important predator foraging on multiple important prey species.
    - Climate vulnerability - the expected exposure, sensitivity, and adaptive capacity of a species/species group to climate change within the California Current ecosystem, i.e., climate vulnerability ranking as identified through the CCE Climate Vulnerability Assessment (McClure et al. *in press as of briefing book deadline*).
    - Stock distribution - the breadth of a species' or species group's distribution along the coast, or the diversity of the distributions of species subject to ecosystem and climate information reporting (e.g., ensure that we are addressing species with more northerly or southerly distributions, or more onshore and offshore distributions), or the variability of a species' or species group's distribution under different climate conditions.
- Economic
    - Spatial allocation concerns - the extent to which harvest-setting processes are spatially explicit.
    - Impacts from other ocean uses (e.g., offshore wind energy facility development - the degree of overlap between the fishery footprint and (potential) ocean use areas).

    - Fisher/fishing community dependence - the proportion of commercial revenue, recreational trips taken, or known subsistence or ceremonial importance derived by a vessel/community from a species or species group.
- Management-related
    - Data richness/science readiness - the availability of data and information with broad spatial and temporal coverage.
    - Advisory Body/Management Team interest - the degree of interest expressed by ABs/MTs for additional ecosystem and climate information to inform harvest-setting processes.
    - Cross-FMP interactions via bycatch/predation/other - the perceived, empirically-estimated, or model-derived level of interaction between the species or species group and other FMPs.
    - Council authority - the extent to which the Council has authority over management of the species or species group via directed harvest and/or bycatch limits.

3. Council decision-making calendar and future initiative schedule

As part of the workplan for this initiative, the Council asked the EWG to develop clear pathways for incorporating ecosystem and climate information into harvest-setting processes. In Appendix A, we provide detailed descriptions of the Council's harvest-setting processes and schedules for each of the four FMPs. Those schedules can be summarized in a biennial calendar of Council decision-making:

Year	Council meeting	FMP			
		Groundfish	Salmon	CPS	HMS
Odd Year	March		■		■
	April		■	*	
	June			†	
	September	■			
	November	■			
Even Year	March	■	■		
	April	■	■	*	
	June	■		†	
	September				■
	November				■

Figure 1. Summary of Council meetings when harvest specifications and management measures are determined under FMPs (shaded cells). *Sardine specifications are set annually; †mackerel specifications are set biennially in odd-numbered years and central population of northern anchovy specifications considered biennially in even-numbered years.

The Council's third ecosystem initiative, the Climate and Communities Initiative, featured an intense scenario planning process to elicit plans for managing fish stocks and fisheries under climate change. That initiative was strongly supported by the CCIEA program's work on the ESR

and associated research, and by the Council's prior work in its second initiative, the Coordinated Ecosystem Indicator Review. This fourth ecosystem initiative should aim for clear end products and processes that implement ideas from the Council's prior strategic planning efforts. To that end, this initiative would be complete once the Council has:

- adopted and implemented an ongoing process for choosing new species to be subject to ecosystem and climate information products, and
- ensured that advisory bodies have future opportunities and processes for conferring with ecosystem scientists on the potential contents of those reports.

For April 2023 and beyond, work on this initiative could proceed as follows:

- April - September 2023:
    - EWG works with Science Centers' staff to draft petrale sole ecosystem and climate information report, in consultation with the GAP and GMT, to be shared with the Council under the September 2023 initiative update agenda item.
    - EWG revises and updates future species selection criteria based on guidance from March 2023, presents revised draft under the September 2023 initiative update.
    - EWG drafts schedule for follow-on initiatives to support fishing community resilience (Initiative 2.6 in FEP appendix) and management flexibility (Initiative 2.8 in FEP appendix) based on the FEP and on Council recommendations from the Climate and Communities Initiative.
- November 2023: Following September 2023 Council review of the draft petrale sole report in September, determine whether final petrale sole report can be delivered in support of groundfish agenda items in November 2023. The EWG is seeking SSC input on review timing, noting that it could involve one or both of the Ecosystem and Groundfish subcommittees and be conducted for Council consideration in September or November.
- March 2024: Council and advisory bodies test future species selection criteria process and make recommendations for species or species groups to be added to those receiving ecosystem and climate information reports, taking into account the FMP schedules appropriate to the selected species.
- April 2024 - September 2024:
    - EWG revises and updates future species selection criteria process, finalizing for Council review and adoption in September 2024.
    - EWG works with Centers' staff to draft additional ecosystem and climate information reports for species or species groups recommended by the Council in March 2024.
- September 2024: Council adopts final process for selecting future species or species groups to be subject to ecosystem and climate information reports. Council finalizes initiative and makes any needed near-term adjustments to its advisory body schedules for considering ecosystem and climate information.

4. Workshop Recommendations for The Nature Conservancy

At the EWG meeting on November 21, 2022, Ms. Gway Rogers-Kirchner of The Nature Conservancy and of the Ecosystem Advisory Subpanel, alerted the EWG and the public that they may have funding available for workshops in support of the Council's ecosystem initiative work. The EWG believes that large, multi-party and cross-issue workshops of the type featured in the Climate and Communities Initiative would not be beneficial to this current initiative. The Ecosystem and Climate Information Initiative will best be supported by brief and focused time with particular advisory bodies and scientists to address individual species or FMPs. In fitting with the schedule proposed above, if workshops need to occur before a certain time in order to use the funding provided, the EWG recommends that The Nature Conservancy and the Council consider workshops like those that informed The Nature Conservancy's work on flexibility and nimbleness in fisheries management (Bell et al. 2021) that would aid development of the intended follow-on initiatives discussed in September 2022 and detailed in the FEP appendix:

- ***2.6*** *Supporting Fishery and Fishing Community Resilience*: This initiative would combine elements of the former potential initiatives 2.6 (Human Recruitment to the Fisheries Initiative) and 2.7 (Cross-FMP Socio-Economic Effects of Fisheries Management Initiative) from the 2017 FEP appendix with goals from the Climate and Communities Initiative to "develop strategies for increasing the resiliency of our managed stocks and fisheries." It would build on the Climate and Communities Initiative by using the results of workshop discussions to better understand West Coast fishing communities' vulnerability to and potential resilience from the effects of climate change.
- ***2.8*** *Assess Flexibility in Fisheries Management Process*: This initiative would identify ways in which Council decision-making and NMFS review and regulatory processes can be made more dynamic to respond to rapidly changing environmental conditions. This initiative is intended to respond to the Climate and Communities Initiative goal to develop and implement strategies for improving the flexibility and responsiveness of our management actions to near-term climate shift and long-term climate change.

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Appendix A: PFMC harvest-setting processes and schedules

The Council may address a wide range of management issues across its FMPs but fixed periodic processes, where the provision of ecosystem and climate information would be most easily accommodated, focus on adjusting harvest specifications and related management measures.

Groundfish Biennial Process

NMFS implements regulations for harvest specifications (OFLs, ABCs, annual catch limits (ACLs), and annual catch targets, sigma and P* values used to determine ABC values), allocations, and related management measures on January 1 in odd years covering a two-year period with harvest specifications set for each year in the management period. Council development of biennial specifications and management measures begins at the June meeting in the preceding odd year when a detailed schedule for the Council process is adopted (for example, the schedule for development of 2023-2024 specifications adopted in June 2021).

In summary, the schedule is as follows:

- September, Year 1 (odd year), Council adopts
    - Stock assessments for use in management, as endorsed by the SSC
    - OFLs recommended by the SSC
    - Alternatives when departure from default harvest control rules will be considered for a stock
    - Preliminary range of new management measures
- November Year 1 (odd year), Council adopts
    - Rebuilding analyses for overfished species
    - Any outstanding stock assessments not adopted for management in September (because of the need for further revision/peer review post September)
    - Remaining harvest specifications for stocks where the default HCR is used
    - Models or model revisions to project fishery-specific yield (to gauge ACL attainment)
    - Initial two-year allocation alternatives
    - Final range of management measures for detailed analysis
    - Preliminary selection of exempted fishing permits to be issued for the next biennium
- March Year 2 (even year)
    - Council and advisory bodies briefed on initial analyses of harvest specifications and management measures (including alternatives where relevant)
- April Year 2 (even year), Council adopts
    - Final preferred ACLs (including stocks where the default HCR is changed)
    - Preliminary preferred management measures
    - Preliminary preferred two-year allocations
- June Year 2 (even year), Council adopts
    - Corrections to final preferred harvest specifications if needed
    - Final preferred two-year allocations
    - Final preferred management measures
    - Final recommendations on issuance of EFPs for the next biennium

Once the Council has completed its action on all the elements of the management program at the June meeting, Council and NMFS staffs complete mandated analyses (National Environmental Policy Act (NEPA), Regulatory Impact Review, Regulatory Flexibility Analysis, etc.) and initiate rulemaking so that regulations may be effective on or about January 1 of the next biennium.

The process for conducting and peer reviewing stock assessments used in management precedes the above schedule. A list of stocks proposed for assessment is presented to the Council for review and approval at the June meeting preceding the decision making cycle (e.g., for the 2023-2024 management period, in June 2020). Stock assessments are then conducted and peer-reviewed with final review and recommendations on their use in management made by the SSC as indicated in the above schedule. In some cases, finalization of a stock assessment may overlap further with the management cycle if peer review demands revision of the assessment with final review and adoption occurring prior to and during the November Council meeting of the management cycle.

The Groundfish Endangered Species Workgroup process could be a model for integrating information on ecosystem and climate change drivers for groundfish fisheries. The Workgroup was established as a standing committee of the Council pursuant to the Endangered Species Act (ESA) Section 7 consultation on the groundfish fishery. Workgroup membership includes experts on the listed species subject to consultation and other Council stakeholders (e.g., stage agency representatives). Subject matter experts prepare reports summarizing status and take of listed species in groundfish fisheries with respect to levels of incidental take in authorized fisheries. If incidental take levels are likely exceeded, the Workgroup develops recommendations for the Council on management measures that need to be implemented for the next biennial management period. The Workgroup typically meets in March preceding the June kickoff meeting for the Council decision making cycle. Their report is then submitted for consideration by the Council at the June kickoff meeting (e.g., Agenda Item G.4.a, GESW Report 1, June 2021).

Annual Salmon Harvest Specifications Process

The Council manages commercial and recreational fisheries for salmon in the West Coast Exclusive Economic Zone. Many salmon stocks are listed under the ESA and management revolves around minimizing fishing mortality on these stocks in preference for healthy and/or hatchery produced stocks. The Salmon FMP identifies numerous stocks and stock complexes for Chinook, coho, and pink salmon subject to management.

Because fishing occurs in state and inland waters in addition to the PFMC management area, the management process features intense coordination with a variety of management entities including states and tribes so that FMP conservation objectives may be met for each annual fishing season.

The management decision making process is compressed to accommodate the biology of salmon species. The regulatory start of the annual salmon season begins on May 16, but information necessary to determine stock status and necessary management in the coming season only becomes available late in the preceding calendar year. The Council's Salmon Technical Team (STT) compiles this information in the Annual Review of Ocean Salmon Fisheries (which is the Magnuson-Stevens Act (MSA) mandated stock assessment and fishery evaluation report under the

Salmon FMP) in January of each year. The Annual Review is published preceding the March Council meeting; Council decision making occurs at its March and April meetings to implement management regulations at the start of the next fishing season.

Council decision making revolves around the drafting of three additional pre-season reports used to refine the management measures that will be implemented with baseline information feeding into the process through the Annual Report. (Together, these documents also satisfy the statutory analytical requirements of NEPA.)

Pre-Season Report I is prepared by the STT and made available to the Council in advance of its March meeting. This report contains salmon stock abundance forecasts, and an analysis of the impact of the previous year's management measures or regulatory procedures on the projected abundance in the upcoming management period (the No Action alternative). At its March meeting, the Council adopts a range of action alternatives that are described and evaluated by the STT and reported in Pre-Season Report II. Development of the alternatives is an iterative process between the Council and the STT as management measures are proposed and evaluated against FMP conservation objectives.

As noted, the Council process also serves as a coordination mechanism for management in state and internal waters since fishing mortality in those areas must be accounted for against the FMP conservation objectives. For example, the North of Cape Falcon process involves discussions between various stakeholders for fisheries in that area including the Columbia River and Puget Sound. (Cape Falcon is on the Oregon coast about 30 miles south of the mouth of the Columbia River. It is a major biogeographic boundary for salmon stocks' ocean distributions.) Those discussions occur in concert with the Council's work at its two spring meetings and figure into the evaluation of management measures for ocean fisheries.

With Pre-Season Report II finalized coming out of the March Council meeting, a series of public hearings are held prior to the April Council meeting to solicit stakeholder input on the alternatives. The Council then selects its preferred alternative at its April meeting, which is described in Pre-Season Report III. Substantial additional work usually occurs at the meeting so that the projected impacts of the preferred alternative fall within the limits set by FMP conservation objectives (including standards dictated by the ESA for listed stocks). The detailed description of management measures is then translated into regulations for the upcoming fishing season. The management process also includes a robust and flexible mechanism for adjusting measures during the fishing season based on the receipt of new information.

Coastal Pelagic Species FMP Management

The CPS FMP includes five stocks (Pacific sardine, Pacific mackerel, Jack mackerel, Northern anchovy (central and northern subpopulations), and market squid. Although market squid is included in the CPS FMP, management of the fishery occurs at the state level (principally by the state of California). The Council routinely assesses and sets harvest specifications for Pacific sardine annually and for Pacific mackerel biennially. The Council also recently adopted a framework on how to review and revise harvest specifications for the central subpopulation of Northern anchovy. This review occurs in even-numbered years and any potential revisions would

be discussed at the applicable June meeting. For Pacific sardine, the Council receives an updated stock assessment at its April meeting and sets harvest specifications for the next fishing season, July 1-June 30. However, Pacific sardine was declared overfished and the fishery closed in 2015. Thus, Pacific sardine management measures focus on setting incidental catch limits for non-target fisheries, consistent with the rebuilding plan. The harvest specifications process for Pacific mackerel is similar; however, Pacific mackerel is managed on a biennial cycle with the Council taking action in odd-numbered years at their June meeting for a two-year period starting July 1 of that year (e.g., July 2023 - June 2025).

Highly Migratory Species (HMS) FMP Management

When adopted, the HMS FMP described a biennial management cycle very similar to that in the Groundfish FMP. However, the substance of this biennial process has been substantially revised in light of the fact that much of HMS management occurs at the international level, principally for the West Coast through the Inter-American Tropical Tuna Commission. Furthermore, the 2007 MSA reauthorization, subsequent to the 2004 implementation of the HMS FMP, established the statutory basis for the so-called "international exception" to harvest specifications. As described in HMS FMP Chapter 4 and National Standard 1 Guidelines at 600.301(h)(1)(ii), ACLs need not be set for stocks or stock complexes subject to management under an international agreement to which the U.S. is a party. Status determination criteria (SDC), maximum sustainable yield, and optimum yield must still be specified. For this reason, the biennial process has evolved to focus on SDC proposed by NMFS. At its September and November meetings in even numbered years, the Council reviews and makes recommendations on any updated SDC proposed by NMFS. The HMS FMP also established a schedule for the delivery of a draft and final stock assessment and fishery evaluation document at these meetings.

The process may extend to the March meeting in the following year if there is a need for the Council to respond to an overfishing/overfished determination[6] or if any management measures are considered as part of the process. The Council has infrequently used the biennial process to develop management measures given that catch control measures are generally not warranted. The last time the biennial process resulted in a regulatory proposal was in 2014. This action modified daily bag limits for the recreational Pacific bluefin tuna fishery (80 FR 44887).

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[6] Here too, there is an exception to the requirement to establish a rebuilding plan described at MSA §304(e); instead §304(i) applies wherein the Council makes recommendations for action at the international level to end overfishing and rebuild the stock and may propose "domestic regulations to address the relative impact of fishing vessels of the United States on the stock." To date, because for most HMS stocks, U.S. vessels managed under the HMS FMP account for a very small fraction of total catch, the Council has not proposed such regulations. Pacific bluefin tuna offers an example of a stock for which a rebuilding plan has been developed at the international level with country-specific catch limits; however, domestic management measures have been implemented through the Tuna Conventions Act rather than the MSA. NMFS has invited the Council to provide input on the development of such measures but not in its statutorily mandated role under the MSA.