ADAPTIVE MANAGEMENT TOOLS AND CHALLENGES IN WEST COAST FISHERIES

Introduction

The Flexible and Adaptive Management project (Adaptive Management project) is one of three special projects for which the Pacific Fishery Management Council (Council) has received dedicated funding from the National Marine Fisheries Service (NMFS). This project's objective is to identify innovations to Council decision-making processes and operating procedures that will allow the Council to develop, analyze, and adopt management actions and recommendations on timeframes that are more responsive to rapidly changing conditions. These innovations and efficiencies could be focused both on decreasing the length of time required to finalize key Council actions and on increasing the Council's ability to develop management responses tailored to and commensurate with the scope and speed of observed and predicted changes in the marine environment.

This Supplemental Attachment is intended to help support the Council's discussion under this agenda item by describing some existing tools and approaches to increase flexibility and responsiveness in Council processes, including examples of challenges from each of the Council's fishery management plans (FMPs) that adaptive management may help to mitigate or resolve. This is an initial review of both tools and challenges, with the expectation that a more comprehensive exploration could be undertaken as part of the Adaptive Management project once it is fully underway (such an exploration could also include a review of Council Operating Procedures, which this attachment does not discuss). Advisory Bodies may also identify actions, measures, and processes in their respective FMPs that could benefit from more nimble and adaptive management approaches.

General tools for increasing flexibility and adaptative management

A wide variety of tools, measures, and approaches exists within the Federal fisheries management system to increase both flexibility and the capacity to manage fisheries more adaptively. Below are several examples; this list is not intended to be comprehensive but rather an illustration of the types of approaches that the Council could consider applying in new or expanded ways.

- FMP frameworks. NMFS Magnuson-Stevens Act (MSA) Operational Guidelines (NMFS Procedure 01-103-03 and appendices) defines frameworking as "establishing in an FMP/amendment or regulations a mechanism for implementing recurrent, routine, or foreseeable actions in an expedited manner." Frameworks spell out criteria for modifying management measures solely by rulemaking, describe the types of management measures that may be modified, the decision-making process a fishery management council employs to determine the modifications to be made, and the corresponding rulemaking mechanism.
- If/then tools. FMPs may include processes for the annual or periodic consideration of factors that influence stock status and fishery performance. These factors could then be coupled with predetermined, generalized responses (and the thresholds that trigger them) to different scenarios, where analysis and review of those responses are completed in

advance. Such if/then tools would likely benefit from a high degree of collaboration between managers and fishermen. Some examples include:

  - Federal regulations for groundfish fisheries off Alaska developed by the North Pacific Fishery Management Council provide numerous if/then conditions that authorize the NMFS Regional Administrator to take automatic action via Federal Register notice to open and close fisheries, shift in-season allocation, adjust incidental catch, and other measures without prior Council in-season coordination, but with subsequent Federal Register notice via in-season action (see 50 CFR §679.20 and §680.22).
  - Federal regulations for red snapper authorize the NMFS Regional Administrator to set recreational fisheries management measures in federal waters via Federal Register notice and at the request of state fishery managers with delegated management authority for red snapper (see 50 CFR §622.23), or to close Gulf shrimp fisheries via Federal Register notice if a closure is needed to reduce red snapper bycatch.
  - Federal regulations for precious coral taken off American Samoa authorizes the NMFS Regional Administrator to determine whether harvest quota for a coral bed has been reached before the end of the fishing year and to close that coral bed for fishing via Federal Register notice (50 CFR §665.166).

- Pre-season planning/collaboration. Pre-season meetings can be a means to assess the most up-to-date environmental, social, and economic factors and make decisions about how best to manage within those current conditions. Some West Coast examples include the North of Falcon process for setting salmon harvest guidelines and regulations, where pre-season meetings among state, Federal, and Tribal fishery managers help to ensure those regulations are responsive to the latest data and on-the-water conditions; and the Risk Assessment and Mitigation Program (RAMP) for evaluating and reducing the likelihood of whale entanglements in California's Dungeness crab fishery.
- Ecosystem status reports, such as the California Current Integrated Ecosystem Assessment annual report presented to the Council each March, summarize the status and trends of ecosystem indicators and provide context for making management decisions that are more responsive to recent and projected environment conditions. As such, these reports can help to inform Council actions for the upcoming year by communicating the most up-to-date information about fishery, species, and human/community responses to ecosystem changes and drivers.
- Permitting, quota regulations, and transfers can contribute to flexibility and adaptive management by allowing managers and fishermen to better respond to shifts in species distribution, abundance, and range, as well as near-term changes such as sudden extreme weather events. These tools can also be used to help diversify fishing portfolios, where more diverse portfolios are often associated with greater resilience at both the vessel and community level. Some examples include:
  - Allocation transitions
  - Total reallocations
  - Changes in threshold levels
  - Dynamic permitting methods such as those in use in Alaska; for example, community quota and license programs allow eligible communities to form

Community Quota Entities which may in turn request no-cost community permits or purchase commercial quota share.
    - Onramps and offramps (for inclusion and removal of species from FMPs) for species that move in/out of an area as range shifts and distribution change over time.
- Exempted Fishing Permits (EFPs) allow for exemptions from existing regulations that can foster fishery innovation to address current or future challenges and potentially improve efficiency. Under 50 CFR §600.745, the nationwide regulations on EFP development, EFP applications are submitted to and considered by the NMFS Regional Administrator. The Council has also established Council Operating Procedures (COP) 19, 20 23, and 24 to guide its participation in the EFP development process.
- Risk policies. Including a greater range of factors – in addition to the quantity and quality of data – when calculating a management entity's risk tolerance (as part of a risk policy) may improve managers' ability to consider the impacts of species and fishing interactions, as well as climate and other environmental impacts, when determining the risk of overfishing. These additional factors could be informed by climate vulnerability assessments and other climate or ecosystem information.
- Dynamic spatial management/dynamic ocean management can help management entities respond to changing conditions at a range of spatial and temporal scales.
    - Habitat suitability indices can feed into dynamic ocean management tools and can also be incorporated into descriptions of Essential Fish Habitat. This may in turn improve understanding of and information about species abundance and distribution and spatial management.
- Finer-scale spatial and temporal data/monitoring may help to inform more tailored in-season actions as warranted or needed.
- Automatic actions may be initiated in-season by NMFS without prior public notice in situations such as a fishery closure necessitated by a fishery reaching an allocation or a release of surplus incidental catch allowance.
- In-season management measure actions can be taken either to support a decision made via a frameworked process, such as the in-season salmon management process, or via one Council meeting and one Federal Register notice, as with the groundfish in-season management process.
- Analytical efficiencies. In addition to the tools described above, there are also potential ideas to explore with regard to the National Environmental Policy Act (NEPA) and other analytical requirements. Currently, for NEPA analyses, the Council utilizes a "tiering" process, incorporation by reference, and integrated alternatives, particularly in the Groundfish FMP. Council staff and advisory bodies also use frontloading of analysis to expedite NEPA analyses or other analytical requirements. However, there may be ways to gain greater efficiencies in these processes. As an example, moving to a programmatic Environmental Impact Statement and doing Supplemental Informational Reports to update any impacts, as done in the North Pacific Fishery Management Council, may help to expedite Council actions and associated rulemakings by NMFS.

Existing Council FMP flexibility and adaptive management tools

Before considering the challenges that are emergent or ongoing in the Council's FMPs, it may be helpful to review what tools are already "in the toolbox" so that efforts can be made to build in

additional flexibility to each FMP to meet present (and future) challenges. The following examples are adapted in part from Bell et al.[1] and are not meant to comprise an exhaustive list.

Coastal Pelagic Species (CPS)

- The CPS FMP includes both a Point of Concern framework (where the Council may determine that management action is needed to address a conservation or ecological issue) and a Socioeconomic framework (where the Council may determine that management action is needed to address a social or economic issue). Measures developed within either framework can be acted upon in one or two Council meetings, with NMFS approval. The Council may use these frameworks to initiate an in-season action and/or other actions to address issues on a longer timescale (if the issue in question is considered larger than a single in-season issue).
- The inclusion of an environmental parameter in the Pacific sardine harvest control rule allows for the consideration of recent ocean temperatures in setting harvest levels. While this temperature component doesn't necessarily increase management flexibility, it does build ecosystem factors directly into the management process, which may allow for more or better responsiveness to environmental variability. However, as noted in the next section, the Council could consider further increasing the responsiveness of this parameter to current environmental conditions.
- The FMP's process for setting incidental catch of CPS species caught in other fisheries allows for the reallocation of this catch toward the end of the season if total incidental catch estimates have not been reached.

Groundfish

- Three framework provisions provide a foundation for management flexibility: Point of Concern, Socioeconomic, and Habitat. Measures developed within the first two frameworks may be applied, adjusted, and removed at any time of the year for any resource conservation, social, or economic reason consistent with the FMP and generally take at least two Council meetings. Actions pursued within the Habitat Framework may still require a full amendment process to implement.
    - The Point of Concern framework allows the Council to develop management measures in response to conservation or ecological issues.
    - The Socioeconomic framework allows the Council to respond to social and/or economic issues that may arise within the fishery.
        - But even with these two frameworks, the Groundfish FMP is generally not designed to include highly responsive, in-season actions at a fine spatial and temporal resolution.
    - The Habitat Conservation framework allows for the consideration of recommendations to open or close areas or change gear requirements to reduce impacts on Groundfish habitats and/or to restore important areas.
- The FMP's risk tolerance policies may provide a pathway for including ecosystem or climate considerations and information in the decision-making process. Tools like climate vulnerability analyses could be integrated into risk tolerance to develop the buffer between

[1] Bell, R., Strawn, A., and Kirchner, G. *Flexibility in the Pacific Fishery Management Council's Fishery Management Plans: What is Flexible Fisheries Management?* The Nature Conservancy. 2021.

the OFL and the ABC. The Council is already working on a formal way to include climate and ecosystem information through the risk tables being developed as part of Fishery Ecosystem Plan Initiative 4 (currently scheduled for an update and discussion of next steps at the Council's June 2025 meeting).

- The Council can recommend in-season adjustments to management in select instances (trip limits, bag limits, area closures, etc.) as outlined in Section 6.2.1 of the FMP, depending on the status of the fishery, to promote attainment or limit exceedance of any quotas. However, such changes can only be made for select management measures where the impacts have been previously analyzed.

Highly Migratory Species (HMS)

- International agreements are vital to the management of wide-ranging HMS species. While the Council can work with NMFS to influence agreements and how they are implemented, the Council's authority is more limited for implementing international agreements versus MSA actions. The international management process facilitates useful communication and collaboration among nations, regions, and stakeholders.
- Like the CPS and Groundfish FMPs, the HMS FMP includes a Point of Concern framework as an additional tool the Council can use to exercise resource stewardship; it is intended to support the Council in determining when a focused review of a particular species is warranted and if management measures are required.
- Some predefined scenarios and actions in the FMP can allow for greater responsiveness to changes in oceanographic conditions. For example, the Pacific Loggerhead Conservation Area (PLCA) closes to drift gillnet fishing during certain months when an El Nino event is predicted or in progress. While not directly connected to increased flexibility, the PLCA can enable a timelier response by the fishery to address a change in conditions and can lead to the avoidance of an unwanted outcome (i.e., bycatch of a protected species). More generally, the concept of area management that varies with oceanographic conditions could improve management flexibility in some fisheries.
- Framework adjustments allow for in-season actions when conditions warrant such changes. These actions can be implemented quickly and without amending the FMP.

Salmon

- Collaborative pre-season planning gives managers and stakeholders a process within which they can identify opportunities for flexibility.
- Catch monitoring provides daily information for tracking catch against the quota; as this information is processed, the FMP allows for regulations to be modified as needed through regular and frequent consultation with fishery advisors. Season length, location fished, and gear type can all be modified in-season based on current information and daily and/or weekly projections.
- A quota exchange allows the transfer of unused quota from one fishery sector or area to another. In-season transfers allow for trades of Chinook and coho species between the recreational and commercial fishery and between recreational subareas North of Cape Falcon (FMP section 5.3.1.2) and transfer of unused recreational allocation from the recreational to the commercial fishery South of Cape Falcon (FMP Section 5.3.2).

Examples of current challenges from Council FMPs that may benefit from additional flexibility and/or new adaptive management approaches

In considering what FMP or actions could be the initial focus of this project and benefit from additional flexibility or adaptive management approaches, Council staff have put together a brief list of current challenges facing each of the FMPs and some potential solutions that could be considered as a part of this project. Advisory Bodies may bring forward other recommendations or ideas under this agenda item.

CPS
CPS stocks are characterized by boom-and-bust cycles of abundance, even in the absence of fishing, with climate and other environmental fluctuations being a significant driver. These variations can occur on an intra- or inter-annual basis or on decadal scales and can result in distributional shifts. Currently, some aspects of management of CPS are fairly static which is counter to the dynamic nature of CPS stocks. Overly prescriptive assessment schedules for Pacific mackerel, an underutilized stock, may benefit from a more framework-style management approach (similar to the central subpopulation of northern anchovy) thereby freeing up resources for other work. Additionally, more dynamic harvest control rules, rather than static formulas as currently prescribed in the FMP, may be able to more accurately reflect current conditions through factors such as DISTRIBUTION or E_{msy}.

We note that under Agenda Item G.5 at this meeting, the Council will be selecting priority CPS science and management topics for development. Within the list of topics identified (Agenda Item G.5, Attachment 1), the above examples and other topics may be areas where focus from this project may be appropriate.

Groundfish
As highlighted in March 2025 under Agenda Item H.8 (Groundfish Workload and New Management Measures Priorities), participants in the groundfish fishery are struggling with the ability to react in a timely manner to current conditions. In response, the Council recommended four items (per the Groundfish Advisory Subpanel's March 2025 Supplemental Report 1 for Agenda Item H.8.a., items D1-D4 at Table D) as priorities that would focus on creating additional opportunity for the fishery:

- Allow change to harvest specifications during the biennium, including through a "green light" mechanism; allow phase-in of control rules;
- Change P* maximum to 0.4999 and examine time-varying sigma;
- Adjust harvest specifications through carrying over unharvested fish from prior year;
- Develop multi-year average catch policy for setting harvest specifications.

More broadly, there is a need to look at reframing how groundfish are managed and develop increased flexibility to adjust to both environmental and socioeconomic conditions occurring in the fishery.

HMS
As the HMS fishery is undergoing significant changes with the phase-out of the drift gillnet fishery and rebuilding of Pacific bluefin tuna, adaptive opportunities are needed for fishery participants. The HMS FMP is a primary focus of another special project for which the Council has received

dedicated funding, where that funding is supporting the further development of the Council's HMS Roadmap and associated efforts to accelerate the testing of economically viable EFPs while avoiding and mitigating bycatch. This funding will also help the Council consider the expanded application of Dynamic Ocean Management (DOM) tools, which may be used to increase responsiveness to changing conditions within HMS and other Council-managed fisheries. The Council's newly formed Ad Hoc HMS Fishery Innovation Workgroup (FIW) is currently exploring pathways to develop new and/or innovative HMS fishing gears and methods via the EFP process (among other objectives). This effort may include making modifications to COP 20, as well as considering ways to test DOM via EFPs – both of which would also align closely with this Adaptive Management project.

Salmon
The Salmon FMP and its implementing regulations are generally considered the most flexible combination of the Council's FMPs and NMFS's regulations. Salmon season structures are set through a time-intensive and iterative process during the March and April Council meetings; the salmon preseason schedule enables the STT to prepare reports once all relevant data has been gathered, ensuring that annual regulations are based on the most up-to-date information available. Furthermore, Salmon FMP provides for flexible management practices to ensure the achievement of management objectives. The FMP allows for both fixed and flexible in-season actions to ensure management measures are consistent with escapement goals, conservation of the salmon resource, any federally recognized Tribal fishing rights, and the ocean allocation scheme. Nevertheless, there is always room for improvement, and if methods to adjust run size forecasts during the season were implemented, management could become more responsive to prevailing conditions.

Timing and workload implications

Depending on the Council's selection of priority actions for the Adaptive Management project, impacts on other Council priorities would need to be considered. After the Council identifies the scope of actions under consideration, and the FMP(s) associated with those actions, Council staff will return with a proposed work plan for further discussion.

PFMC
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