

Center for Independent Experts Independent Peer Review of the Alaska Fisheries
Science Center Ecosystem Status Reports for the Eastern Bering Sea, Aleutian
Islands, and Gulf of Alaska

Matthew D. Cieri

April 2023

Executive Summary

A review of the Alaska Fisheries Science Center Ecosystem Status Reports (ESR) for the Eastern Bering Sea, Aleutian Islands, and Gulf of Alaska was held at the Alaska Fishery Science Center (AFSC) in Seattle, WA February 28th, 2023, to March 2, 2023. The objective of the Review was to examine the ESR process and determine if the project should remain focused on only providing ABC advice, or if it should move more in the direction it has naturally been moving; providing outreach as well as contextual information to the Council, SSC, and stakeholders through both “In Brief” reports and Council presentations. After examining the objectives and reviewing the Terms of Reference, 13 different recommendations were made to help improve the ESR process and to address specific questions posed to the Review Panel via the Terms of Reference.

Overall it is suggested that the ESR teams should still focus much of their efforts on supporting the ABC determination process, but that it also expands its activities, as resources permit, to supporting the Council/SSC in the allocation of the OY among the groundfish stocks, serve as a repository for presentations to the Council and of collaborative research, increase its online presence, and support assessment teams at the data/early assessment phase. These new tasks are unlikely given current resources, however. It is hoped that the AFSC would re-examine the structure of the REEMP so that better communication and more resource sharing occur to aid in these tasks.

Background

Introduction

From February 28th, 2023, to March 2, 2023, a review of the Alaska Fisheries Science Center Ecosystem Status Reports (ESR) for the Eastern Bering Sea, Aleutian Islands, and Gulf of Alaska was held at the Alaska Fishery Science Center (AFSC) in Seattle, WA. This report represents the deliverables for this author and includes an overview of the activities, findings, conclusions, and recommendations. All of these are for only this author and may not represent the views and opinions of other participants during this review.

In some form, ecosystem information has been incorporated into the decision-making process for the North Pacific Fishery Management Council (NPFMC) since 1995, when the first ESRs were introduced. At first, these reports represented a summary of the available information and the discussion of ecosystem-based fishery management.

Since then, the report length and the information contained have dramatically increased. In 2012, it was decided that the reports should focus on providing advice in setting acceptable biological catch (ABC) and resultant processes. The reports were split in 2016 such that one report covers each of the three Large Marine Ecosystems: the eastern Bering Sea (EBS), The Aleutian Islands (AI), and the Gulf of Alaska (GOA).

Starting in 2017, Ecosystem and Socioeconomic Profiles (ESP) were added to allow for species-specific ecosystem and socioeconomic data to start informing the process of the ABC setting. The main difference between ESR and ESP information flows can be seen in Figures 1 and 2, where ESP information is focused generally as specific input into the assessment process, while ESR information is generally contextual and is incorporated after the maxABC is determined (Figure 2). The main vector where the information from both the ESR and ESP affect the ABC setting is through the use of Risk

Tables (Table 1). These tables are used by the Assessment Teams, Plan Development Teams, and the SSC to determine if precautionary reductions from a maxABC to a lower final ABC are appropriate given assessment, population dynamic, ecosystem, or fishery performance uncertainties. However, information from both ESRs and ESPs can be used as data inputs into the assessment, or to provide supporting evidence for model configuration/life-history parameters.

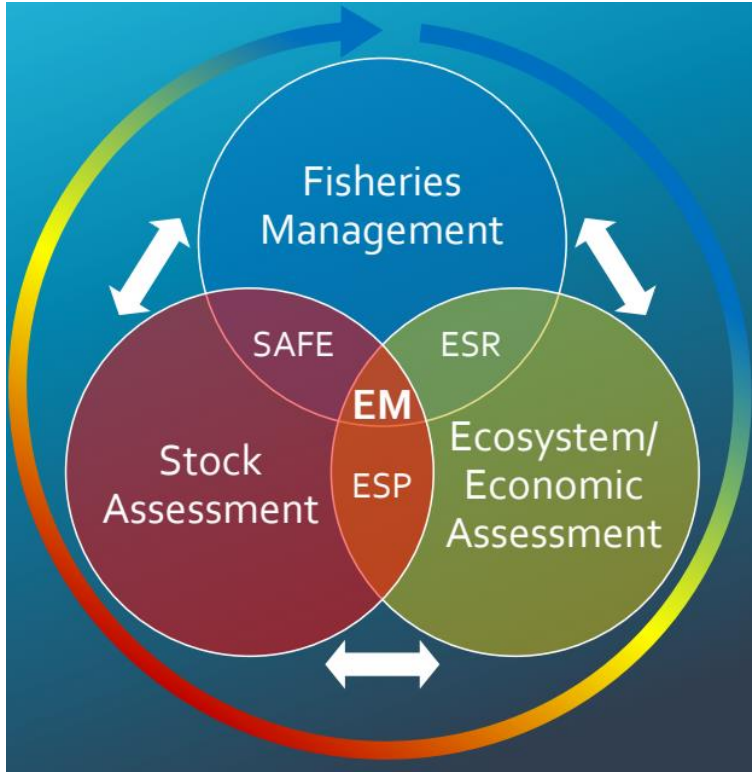


Figure 1: ESR and ESP connection to the Council's management process.

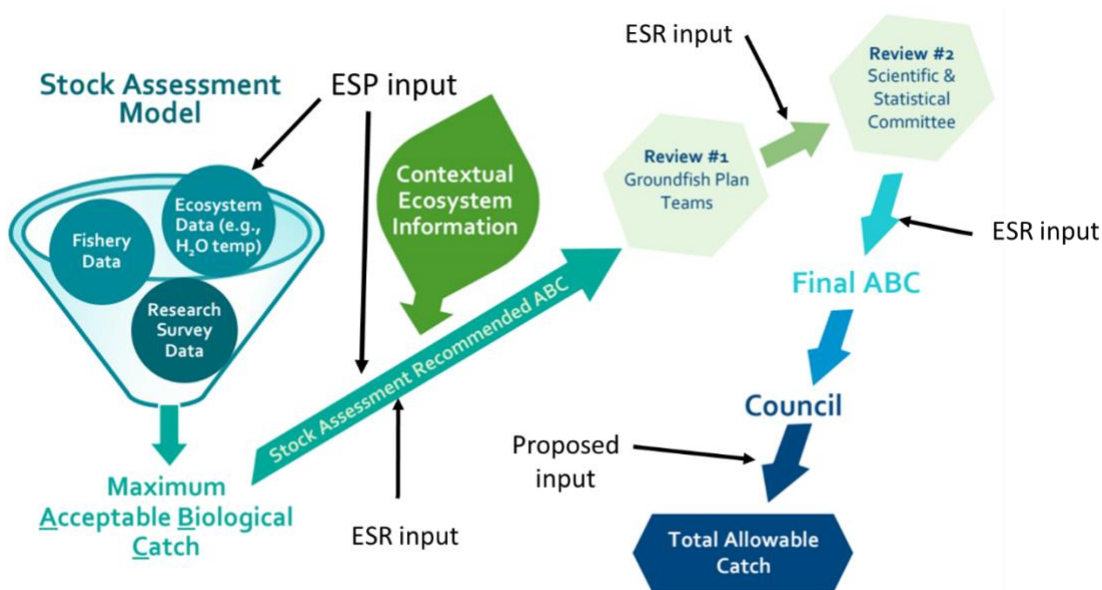


Figure 2: ESR on-ramps in the ABC setting process.

Table 1: How information from ESR and ESP influence the Risk Tables.

	Assessment-related	Population dynamics	Ecosystem	Fishery Performance
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 and/or ecosystem concerns relevant to the stock	No apparent fishery/resource-use performance and/or behavior 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 adverse signals for the stock, but the pattern is not consistent across all indicators.	Some indicators showing adverse signals 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 as the stock, and/or b) up or down trophic levels from the stock	Multiple indicators showing consistent adverse signals a) across different sectors, and/or b) different gear types
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 ever seen previously, or 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	Extreme anomalies in multiple performance indicators that are highly likely to impact the stock.

More recently the information from the ESRs has been delivered to the Science and Statistical Committee (SSC), the Council, and the stakeholder/public in a series of informative presentations as well as Brief reports. Like with the ESR full reports, this information is meant to bring context when discussing a particular species' ecosystem interactions and to provide an overview of ecosystem-level

issues and changes that are occurring. Of note, the “Noteworthy” sections (see below) of the “In Brief” reports are seen as especially useful by SSC and Council.

The ESR structure is consistent across LMEs and years. Each report contains a Report Card, an Ecosystem Assessment section, Noteworthy Topics, and Ecosystem Status Indicators. The Report Card uses a standard set of indicators to capture important trends in the ecosystem under examination (Figure 3) and is meant to provide a broad overview of ecosystem changes. The Ecosystem Assessment section provides a text format overview and qualitative analysis of ecosystem trends and overall health. The Noteworthy Topics examines new and “Hot” topics that may have important ramifications or have been in the news recently. Ecosystem Status Indicators is a rather lengthy section that looks at a multitude of ecosystem variables including Physical Oceanography, Habitat, Primary Production, Zooplankton, etc. through Emerging Stressors, and even bycatch and other human-induced impacts.

Given the length of these ESRs (often 200 pages or more), each LME also produces a Brief report (mentioned earlier) as well as a series of presentations to the SSC, Council, and public/stakeholders.

Objectives of the Review

Overall, the objectives of the Review are given below.

Objective 1: Are the ESRs’ goals to inform the development of ABC and OFL still appropriate or should the goals be broadened? The advantages of staying focused on ABCs and OFLs include having a narrowly defined, targeted on-ramp for ecosystem science into the Council process that helps define the timing, interpretation, and communication of the reports. Challenges of the narrow focus include a limitation of the application of ESRs to other Council decisions, and limited application to other interested parties outside of the Council process (e.g., industry, local communities, Tribes).

Objective 2: How can we better achieve these ESRs goals? This objective can be divided into multiple subcomponents:

1. A review of the content of the reports, specifically how the ecosystem science is selected, incorporated, and synthesized.
 - a. How data and indicators are selected, developed, and displayed.
 - b. The structure of the reports.
 - c. The balance of information across the reports and web content.
2. A review of the process of how the reports are disseminated in the council process.
 - a. Timing and number of presentations, balancing crowded agendas with ESR presentations.
 - b. Integrating ESRs in the stock assessment development and harvest specification process (communication with individual stock assessment author, Groundfish Plan Team, and Council).
 - c. The use of stock-specific risk tables to directly connect ESRs to the maximum ABC recommendation.
3. A review of the ESRs’ role in an evolving ecosystem information space as new data needs, capabilities, and products are developed.
 - a. Balance of ESRs with stock-specific Ecosystem and Socio-Economic Profiles (ESPs) and longer-term Fishery Ecosystem Plans in communicating ecosystem information to the Council.
 - b. Integration of climate information, model-based products, forms of risk assessments, social and economic information, etc.

4. A review of ESR staff organization
 - a. Costs and benefits of ESR staff in multiple or one programs.

To accomplish these objectives, a series of Terms of Reference (TORs) were constructed to aid in the review process. These included:

1. Should the ESR continue to tailor efforts to inform the ABC and OFLs? (Obj.1)
2. How can the function of the ESR team better meet the Council's needs? (Obj.1, Obj.2.3)
3. How can the ESRs better meet the needs of the contributing scientists and other knowledge holders? (Obj.1, Obj.2.3)
4. How can the way the ecosystem science is selected, incorporated, and synthesized in the ESRs be improved? (Obj.2.1)
5. How can the process of disseminating the information in the ESRs be improved? (Obj.2.2)
6. How can the ESRs maximize uptake into fisheries management decisions? (Obj.2.2)
7. What are the costs, benefits, and prioritization of new and/or additional ESR-related products? (Obj.2.3)

Workflow

To accomplish the tasks of this Review, the first day consisted of a number of presentations including a history of how the ESRs were developed and how they are currently implemented and organized, a background on the AI, EBS, and GOA ESR systems, the use of ESRs in other regions of the US, How both the Council and the SSC use ESRs in this region, how the ESRs contribute to the Risk Tables for setting ABCs, and how the ESRs are used by others outside the Council system. The second day was an in-depth discussion by the Reviewers and staff (both physically present and online remotely) for each TOR. The third and final day was for writing the Reviewers' individual reports. During the meeting, this Reviewer asked if there would be a joint report to the Council, and the response was that Staff would transform the meeting notes from the first two days and use that to write a report for Council review.

Current role and priorities

After discussion during both days 1 and 2, it was clear that there were many, sometimes conflicting priorities for the ESR teams. These include outreach, education, support for SSC and Council, as well as information sources for assessment teams.

Based on further discussion, three main priorities seemed apparent.

- 1) Support for the assessment and plan teams in creating the Risk Tables to inform ABCs.
- 2) Providing ecosystem context and general information on ecosystem trends to the Council and SSC.
- 3) Education and outreach to stakeholders, partners, and the public at large.

All of these priorities were conducted in very short timeframes, often yearly, prior to the December Council/SSC meetings.

Role of the Reviewer

For this Review, the role of the reviewer was to read the materials provided and provide a review of the ESR report organization and process in accordance with the TORs. The Review is to be independent of the other Review panel members and serve as a standalone document separate from any consensus document created during the review process.

Summary of Findings

Introduction

To meet the objectives of this Review, a series of seven TORs were developed. Each of these are discussed in detail below. Under each TOR several strengths and weaknesses are reported, as well as recommendations. A full list of the recommendations by this reviewer are also given in a dedicated section of this report.

TORs

1. Should the ESR continue to tailor efforts to inform the ABC and OFLs? (Obj.1)

There was general acknowledgment that informing the ABCs and OFLs should be the highest priority, particularly through the Risk Tables as is the current process. However, it should not be the only priority of the ESR team. Both the Council and SSC presentations highlighted how meaningful ESR team information was in those processes. Additionally, while the ESR teams should continue to inform assessment and plan teams, the ultimate assignment of risk should still lie within the assessment and plan teams as well as the SSC.

That said, informing ABCs and OFLs appears to be a strength of the current system. There were numerous examples given during the Review of how helpful ESR team input was in risk table development. However, there was no centralized database or list of what those risk table scores were by stock, nor if they affected the outcome of ABCs. As such it is **recommended that periodically, perhaps every three to four years, the ESR teams produce a list of advice given by stock, the risk scores associated, and if the ABC was reduced from the maxABC.** Such a list by stock will allow for the documentation of the ESR teams' contribution to the ABC setting, and thereby document their progress toward this important priority.

There are a number of ways in which the ESR teams can increase their input into not only Risk Table development, but into the assessment process as a whole. While informing the Risk Tables should be a priority, serving as support for the many ecosystem-related decisions that go into the assessment could be a useful and vital function. While the current process indicates that this is mostly a duty of the ESPs, contextual information at the assessment level stage could be very important. For example, changes in the food web dynamics could inform decisions on priors for natural mortality. Similarly, sea ice extent could affect the catchability and selectivity of the target stock in both the bottom trawl survey and fishery. Given this, it is **recommended that ESR team members be involved in the assessment process at key stages, potentially being members of the assessment team, to facilitate the uptake of contextual ecosystem information into stock assessments.**

2. How can the function of the ESR team better meet the Council's needs? (Obj.1, Obj.2.3)

Currently, it appears that there are two products that the ESR provides the full Council: the contributions to the single species Risk Tables, and the Council presentations on recent ecosystem-wide trends. Both of these are vital sources of information to the Council, just packaged differently; one focused on individual species during the ABC setting process, and one on overall ecosystem trends and happenings during the past year.

Presentations from Council members during the Review highlighted the importance of this information, though there were also comments that the full ESRs were quite long and too detailed to be useful for a general audience. However, the “Noteworthy” sections of the reports were seen as extremely useful to Council members as these kept them informed on big-picture issues facing stakeholders and the fish stocks they depend on. As such, it is **recommended that the ESR teams continue to provide this information to the Council yearly to keep them informed of major trends and new potential issues within the ecosystem.** Additionally, the ESR teams should attempt to keep the information as concise as possible.

But there is a third product that might be explored, using the ESR teams’ information in guiding the allocation of Optimum Yield (OY). Currently, there is an overall OY cap on the harvest of groundfish stocks, such that the sum of groundfish ABCs equal the overall OY. In some ecosystems under management, however, the sum of groundfish ABCs is greater than the ecosystem OY, such as in the EBS ([NPFMC 2020](#)). This is different from other regional councils which set OY on an individual stock basis, rather than on a multi-stock level. This OY seems to be set for multiple years at a time. While the process of how OY is set was beyond the scope of this review, it is assumed that some sort of ecological modeling was used to determine the overall 1.4 to 2.0 million metric ton OY for the EBS.

When the sum of groundfish ABCs is greater than the ecosystem OY, the Council uses socio-economic factors to decide how to distribute catch among the groundfish stocks to achieve the ecosystem OY. As such, how this OY is distributed among the relevant groundfish stocks could be better informed by the ESR process as well as the ESR teams. While it is not proposed that a full ecosystem model is used each year to determine the distribution of OY by stock, qualitative and in some cases quantitative information might be developed by the ESR teams to aid in the decision-making process. As such it is **recommended that during the process of allocating the OY by groundfish stock, the ESR teams prepare a short report of presentation on relevant information, to aid the Council in decisions making by making ecosystem information readily available during that process.** This report should contain a mixture of both single species and ecosystem information to better inform the Council.

3. How can the ESRs better meet the needs of the contributing scientists and other knowledge holders? (Obj.1, Obj.2.3)

During the Review, a Panel member asked, “Maybe a better question is how can contributors better meet the needs of the ESRs”? While this might sound outside the technical wording of this TOR, it is important to recognize that the relationship between the ESR teams and the contributors is both mutual and vital for the continuous flow of information. Both ESR teams and contributors gain from the experience, and it is important that they do so.

To meet the needs of the contributing scientists much can be done. Letters of acknowledgment for grant reports and tenure track processes are one way. Additionally, formal recognition of contributions to supervisors, and even during Council events are also ways to reward participation. But perhaps the biggest way of incentivizing contribution is through the collaboration itself. Often scientists come

together to accomplish goals, not for any professional recognition, but because it builds collaboration and connection with colleagues. In short, scientists contribute to growth, and because of the professional relationships the collaboration fosters.

Often the process is hectic for both the contributors and the ESR teams. Perhaps the best service the ESR teams could render is to be the repository of the information generated during the process so that researchers can look back and use the information in future investigations without having to further track down that information and data. As such it is **recommended that the ESR teams explore ways to archive data and analysis generated during the process and serve as a repository for future investigations of both the contribution of scientists and other interested parties with proper acknowledgment.** Additionally, to make the gathering of data and analysis easier, standard templates might be useful. These can be tailored to the types of information regularly gathered, as well as other contributions, such as text, tables, or figures. Therefore, it is **recommended that the ERS teams explore the use of standardized templates that will aid in data gathering/compilation, as well as archiving.** These are likely difficult tasks as proprietary data and research often makes contributors hesitant to make contributions. But if these issues can be surmounted, the science itself will be improved as data-sharing and collaboration increases, benefiting all who participate.

Serving other contributors can be more problematic, as often the traditional incentives for scientists are less effective for traditional knowledge holders. But again, the answer may lie in collaboration and the understanding that indigenous knowledge is heard and respected. Having a meeting with traditional knowledge holders and scientists, away from Council discussions of allocation and politics, could go a long way in rewarding contributions, fostering relationships, and growing understanding. As such it is **recommended that regular meetings, every three to four years, with invited (and reimbursed) traditional knowledge holders and scientists be explored.** Such meetings could be by ecosystem, including representatives from multiple indigenous groups, and take the format of a multi-day presentations/discussions. Such a meeting could foster two-way communication between collaborating scientists and traditional knowledge holders, with the goal not being a consensus, but rather understanding and relationship building.

4. How can the way the ecosystem science is selected, incorporated, and synthesized in the ESRs be improved? (Obj2.1)

Currently, it appears that much of the science that goes into the ESRs are from contributing scientists. The outline of the report shows each of the trophic levels/physical hierarchies are generally well represented with some exceptions. What data and analysis that goes into those sections appears to be selected by the editor rather than a team via consensus. While this may be appropriate given the time constraints, ideally these should be a group, rather than individual decision. Therefore, it is **recommended that an internal vetting process be explored to examine what each report's data needs are, and which of the submitted data/analysis would best fit into that year's report.** Additionally, well-developed criteria for inclusion should be disseminated to potential contributors to help them understand how selection occurs.

Overall, the way that these contributions were incorporated into the report seemed appropriate. Each contribution appears as a stand-alone "paper" within the ESR, allowing for both credit to be given, as well as acting as a stand-alone source of information on the topic. This can be very helpful for external researchers looking into a particular topic.

That said, there was a lack of overall analysis that crossed multiple topics within any given LME. For example, it was expected that trophic and food habits data would have appeared prominently in the ESRs, to connect the information across trophic levels, and that was not the case. The difficulty of having many individual contributions is that it is difficult to see the “Bigger Picture” and the overall ecosystem trends. Even with the Report Cards and other sections of the document, it can be hard to see the overall ecosystem trends. Ideally, there would be time and resources to have runs of fully vetted ecosystem models, updated yearly with new information, to guide the Council and SSC in their decisions.

Sadly, this is simply not feasible. However, the current qualitative assessment could be improved. While full ecosystem models updated yearly might be too resource intensive, there has been much work done with Models of Intermediate Complexity (or MICE). These are less intensive models used to track changes in an ecosystem (Plagányi et al. 2014, Angelini et al. 2016). Results for these, even if updated every other, or every third year, could provide important information to the Council and SSC. Additionally, data on food habits and energy flow in the LMEs could also provide a way of cutting across trophic levels/physical hierarchies and bridging the gap between the information presented in the contributions and the overall trends in the ecosystem. As such it is **recommended that the ESR teams explore more quantified ecosystem models (including MICE) as a tool to provide a synthesis of information across trophic systems and physical hierarchies**. These may not need to be conducted yearly, and more qualitative summaries can be used in the “off” years to provide information when a model is not used.

5. How can the process of disseminating the information in the ESRs be improved? (Obj2.2)

As presented during the Review, dissemination is in the form of many different products. There are the full ESR documents, the “In Brief” reports which summarize the full reports, the full reports, Risk Table input, presentations to the Council and SSC, a number of outreach materials on the website, as well as presentations to various stakeholder groups and at scientific conferences. Overall, this is a good diversity of different products, each of which is targeting a different audience with tailored information.

Some improvements can be made, however. One improvement for both the public, as well as interested researchers (or potential collaborators), is to use online resources more effectively. The North East Fishery Science Center (NEFSC) has a number of online tools using Shiny apps, to display and disseminate data and information (see <https://github.com/NOAA-EDAB?language=html> and <https://nefsc.github.io/NEFSC-shiny-book/shiny-apps.html>) which can be very useful for researchers. Having these online like <https://fwdp.shinyapps.io/tm2020/> could be useful even for the public as it allows for data and visualizations to be readily available. While some of these are available (see <https://www.integratedecosystemassessment.noaa.gov/index.php/regions/alaska/alaska-eastern-bering-sea-integrated-ecosystem-assessment-modeling>), they are not highlighted on the main page and more could be done to promote the tools already available, as well as to develop new tools and visualizations for an increasingly online world. Additionally, having presentations made to the Council and SSC archived online would also be very helpful. As such it is **recommended that the ESRs explore their online presence to better organize, develop new tools, and provide more focus for disseminating information**.

A second way improvements can be made is by being involved more in the data acquisition phase during the assessment. The ESRs have a lot of important contextual ecosystem information to share and being involved in the input process for stock assessment may be a good avenue to improve the dissemination of information. While not as public as a web-based presence, reports, or Council presentations, being

involved in the data acquisition phase should be an important aspect of the ESR team's services. Therefore, it is **recommended that the ESR teams explore tools and visualizations that could help inform the single-species assessment process, attend these meetings if possible, and work collaboratively with the single-species stock assessment staff.**

6. How can the ESRs maximize uptake into fisheries management decisions? (Obj2.2)

Bringing ecosystem information into a single species focused fishery management regime can be very difficult ([Karp et al. 2023](#)). Fortunately, there are many on-ramps in the NPFMC process that can help. In particular, the setting ABC from maxABC and the associated Risk Tables (Figure 2). Input into this process is important as it informs the overall quota-setting process. But there are at least three other avenues where ecosystem information and analysis could provide valuable support to decision-makers, at the data stage for individual assessments and in the OY allocation process.

As mentioned above, bringing the ESR teams' products to the data and early formulation stage of a single-species assessment could provide needed ecosystem contextual information to help inform data, set priors on parameters, and help inform the projections that result from single-species assessments. A recommendation to increase the ESR teams' input into that process has already been made (above) and being involved in that process could be very useful.

A second avenue for input would be at the allocation phase of distributing the OY among different groundfish stocks and the Council level. This could be very important to include at that level, as the current allocation seems to be more driven by socio-economic factors rather than ecosystem-based factors. A recommendation for the ESRs to support this process is made elsewhere (above), but it is important to emphasize that engaging in this process could be a valuable addition in increase uptake. Additionally, the ESR team could help in supporting the Council's long-term goals for ecosystem management.

A third path would be to include an SSC standing committee on ecosystem issues. It was not clear if such a committee within the SSC was currently in place. If not, it is **recommended that a standing sub-committee of the SSC be explored to help funnel ESR (and other) ecosystem products during fishery management decisions as well as provide some oversight of the ESR and ESP processes.**

7. What are the costs, benefits, and prioritization of new and/or additional ESR-related products? (Obj.2.3)

A number of costs and benefits were laid out during the Review (see Table 2).

Table 2: Costs and benefits of the current approach used by the ESR teams.

Current Process Benefits	Costs
● Info included early on stock assessments (informs model selection and risk table)	● Timed for October - December ABC (e.g mismatch crab specifications for AI)
● Highly tailored and integrated into ABC process	● Lack of specificity to each Council body
● Multiple, tiered on-ramps of information enhances non-ABC uses	● Misses other non-ABC on-ramps
● Same info to SSC, AP, Council	● Ecosystem Assessment and contributions selected to inform ABCs, other issues secondary
● High level of collaboration with contributors and stock assessment authors	● Time consuming coordination and editing
● Year-specific highlights/ story	● Non standardized annual ecosystem assessment
● Known structure and content	● No evaluation of Council goals (example of other products)
● Contributions perceived as valued product	

Based on discussions at the Review the three main priorities (in order) are:

- 1) Support for the assessment and plan teams in creating the Risk Tables to inform ABCs.
- 2) Providing ecosystem context and general information on ecosystem trends to the Council and SSC.
- 3) Education and outreach to stakeholders, partners, and the public at large.

Three more priorities could be added.

- Supporting assessment teams at the data and early assessment stage to inform model inputs and parameters.
- Advising the Council during the process of allocating the overall groundfish OY.
- Serving as a repository and archive of ecosystem data and analysis for use in future research and analysis.

Leaving a full list of priorities, as recommended here and in order of importance as

- 1) Support for the assessment and plan teams in creating the Risk Tables to inform ABCs.
- 2) Supporting assessment teams at the data and early assessment stage to inform model inputs and parameters.
- 3) Providing ecosystem context and general information on ecosystem trends to the Council and SSC.
- 4) Advising the Council during the process of allocating the overall groundfish OY.
- 5) Education and outreach to stakeholders, partners, and the public at large.
- 6) Serving as a repository and archive of ecosystem data and analysis for use in future research and analysis.

Given the discussions at the Review, as well as the presentation of the information in Table 2, it is clear that under the current organization and resources, the full list of priorities is unlikely to be attainable. It is argued that the first four priorities from the list above are likely the most important. While that does move the outreach priority lower in favor of supporting the assessment teams in the early stages of single-species assessments, the trade-off for such prioritization is necessary if single-species assessments are to become more ecosystem-based. In short, fulfilling the needs of the assessment teams, SSC, and Council should take priority over others. In hand with this list of priorities, performance metrics need to be devised under each priority in keeping with Council goals.

Should other resources become available, either because of a re-prioritization at the AFSC or due to recommended reorganization/increased communication (see below), the rest of the priorities could be added.

Conclusions

Discussions during the Review suggest that many things are going well. SSC and Council seem pleased with the products thus far. The ESR team input into the Risk table and the process of deriving ABC from maxABC has appeared to help the process greatly. Moreover, the “In Briefs” reports and “Noteworthy” section of the full ESRs were well regarded during the Review meeting. Additionally, there seem to be good mechanisms to incorporate ecosystem-based information into the ABC setting process. The various on-ramps provided good ways for this knowledge to get to Council members, the various assessment teams, the SSC, and the public. And the focus should always be on the ABC setting process.

That said a number of improvements can be made. In the preceding section of this report, many recommendations were made which might help the process become more efficient, and more relevant to Council priorities. But perhaps the most important recommendation is a better sense of organization and communication.

It was unclear during the Review, how the ESR teams fit into the AFSC organization, how the Resource Ecology and Ecosystem Modeling Program (REEMP) is structured, and how the different work products mesh together to provide clear ecosystem-based advice in the Council process. Parts of this process were highlighted, the ESR reports, and the ABC setting process, but not how they all fit together. The Council’s presentation during the Review highlighted the plethora of information and struggles with how it all fits together.

Additionally, it appears that there is a lack of resources for the ESR teams to draw on, both in terms of personnel as well as financial. It was surprising to learn that the ESR teams we had been discussing were only one or two people per LME to cover the vast number of products produced in a very short amount of time. It was also surprising to see that many data products from the ESPs were not incorporated. It is as if there are two separate processes that tend to not share information, personnel, or resources.

As such it is **recommended that the AFSC re-examine the organization of the REEMP to better structure it to fulfill its priorities, the priorities of the Council, and to facilitate the sharing of resources to accomplish goals.** It is hoped that this reorganization will increase communication, help to put the process in line with the priorities, and help to alleviate some of the personnel bottlenecks to the process. A well-organized workgroup could better meet the challenges found in this report, and

increased communication and resource sharing could lighten the load of the short deadlines and large amount of work involved.

Overall it is suggested that the ESR teams should still focus much of their efforts on supporting the ABC determination process, but that it also expands its activities, as resources permit, to supporting the Council/SSC in the allocation of the OY among the groundfish stocks, serve as a repository for presentations to the Council and of collaborative research, increase its online presence, and support assessment teams at the data/early assessment phase. These new tasks are unlikely given current resources, however. It is hoped that the AFSC would re-examine the structure of the REEMP so that better communication and more resource sharing occur to aid in these tasks.

List of Recommendations

1. That periodically, perhaps every three to four years, the ESR teams produce a list of advice given by stock, the risk scores associated, and if the ABC was reduced from the maxABC.
2. That ESR team members be involved in the assessment process at key stages, potentially being members of the assessment team, to facilitate the uptake of contextual ecosystem information into stock assessments.
3. That the ESR teams continue to provide information to the Council yearly to keep them informed of the major trends and new potential issues within the ecosystem.
4. That during the process of allocating the OY by groundfish stock, the ESR prepares a short report or presentation on relevant information, to aid the Council in decisions making by making ecosystem information readily available during that process.
5. That the ESR teams explore ways to archive data and analysis generated during the process and serve as a repository for future investigations of both the contribution of scientists and other interested parties with proper acknowledgment.
6. That the ERS teams explore the use of standardized templates that will aid in data gathering/compilation, as well as archiving.
7. That regular meetings, held every three to four years, with invited (and reimbursed) traditional knowledge holders and scientists be explored.
8. That an internal vetting process be explored to examine what each report's data needs are, and which of the submitted data/analysis would best fit into that year's report.
9. That the ESR teams explore more quantified ecosystem models (including MICE) as a tool to provide a cross-ecosystem synthesis of information.
10. That the ESR teams explore their online presence to better organize, develop new tools, and provide more focus for disseminating information.
11. That the ESR teams explore tools and visualizations that could help inform the single-species assessment process, attend these meetings if possible, and work collaboratively with the single-species stock assessment staff.
12. That a standing sub-committee of the SSC be explored to help funnel ESR (and other) ecosystem products during fishery management decisions as well as provide some oversight of the ESR and ESP processes.
13. That the AFSC re-examines the organization of the REEMP to better structure it to fulfill its priorities, the priorities of the Council, and to facilitate the sharing of resources to accomplish goals.

Comments on Review process

Despite the rather cold temperatures and the threat of bad weather delaying flights going home, this was perhaps one of my favorite reviews. This is despite the fact that the subject matter was rather different than what I'm familiar with. In this case, the review centered around a process and how to improve both its formulation and uptake, and there was something just very fulfilling about guiding this process even in a small way. More importantly, I have been considering how ecosystem information could be better incorporated into fisheries management for a while. And the NPFMC seems to have all of the necessary tools in place.

The staff did a wonderful job, especially given this was a hybrid, rather than a full in-person meeting. In addition, the ESR teams did a very good job organizing the information and keeping the review on track. If I had one wish, it was that there was better representation from the assessment teams that used the information. While some members were there, it would have been nice to have a dedicated presentation from some assessment folks.

The material prep for this review, however, could have been better. The information and publications were not available on the website until right before many of the Reviewers left to travel. Further none of the presentations were available prior to the first day of the meeting. While this is ok, it is best if the presentations are available at least a few days before the meeting. It just makes for a better discussion if the reviewers have had a chance to read, and fully digest the information prior to the meeting.

That said, it was clear that the staff had put a lot of thought into this Review and what they were hoping to achieve. They made this review very pleasant to attend because they were so accommodating, knowledgeable, and responsive to questions. It was also good to work with Yan again and finally meet Marta in person.

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Appendix 1: Bibliography of materials provided for review

[Dorn and Zador 2020](#)—A risk table to address concerns external to stock assessments when developing fisheries harvest recommendations.

[Barbeaux et al. 2020](#)—Marine heatwave Stress Test of Ecosystem-Based Fisheries Management in the Gulf of Alaska Pacific Cod Fishery

[Zador et al. 2017](#)—Ecosystem considerations in Alaska: the value of qualitative assessments

2022 Ecosystem Status Report - Eastern Bering Sea ESR EBS In Brief

2022 Ecosystem Status Report - Gulf of Alaska ESR GOA In Brief

2022 Ecosystem Status Report - Aleutian Islands (survey year) ESR AI In Brief

2021 Ecosystem Status Report - Gulf of Alaska (survey year) ESR GOA In Brief

2021 Ecosystem Status Report - Aleutian Islands ESR AI In Brief

Appendix 2: A copy of this Performance Work Statement

**Performance Work Statement (PWS)
National Oceanic and Atmospheric Administration (NOAA)
National Marine Fisheries Service (NMFS)
Center for Independent Experts (CIE) Program
External Independent Peer Review**

**Review of the Alaska Fisheries Science Center Ecosystem Status Reports for the Eastern Bering Sea,
Aleutian Islands, and Gulf of Alaska**

Background

The National Marine Fisheries Service (NMFS) is mandated by the Magnuson-Stevens Fishery Conservation and Management Act, Endangered Species Act, and Marine Mammal Protection Act to conserve, protect, and manage our nation's marine living resources based upon the best scientific information available (BSIA). NMFS science products, including scientific advice, are often controversial and may require timely scientific peer reviews that are strictly independent of all outside influences. A formal external process for independent expert reviews of the agency's scientific products and programs ensures their credibility. Therefore, external scientific peer reviews have been and continue to be essential to strengthening scientific quality assurance for fishery conservation and management actions.

Scientific peer review is defined as the organized review process where one or more qualified experts review scientific information to ensure quality and credibility. These expert(s) must conduct their peer review impartially, objectively, and without conflicts of interest. Each reviewer must also be independent from the development of the science, without influence from any position that the agency or constituent groups may have. Furthermore, the Office of Management and Budget (OMB), authorized by the Information Quality Act, requires all federal agencies to conduct peer reviews of highly influential and controversial science before dissemination, and that peer reviewers must be deemed qualified based on the OMB Peer Review Bulletin standards¹.

Scope

The Alaska Fisheries Science Center produces three Ecosystem Status Reports (ESRs) annually to provide ecosystem information for the North Pacific Fishery Management Council (Council). These reports are tailored toward supporting the Council's annual process to set groundfish harvest specifications. The reports specifically inform the setting of Acceptable Biological Catch (ABC) and Over Fishing Levels (OFL) through two primary pathways: by informing stock assessments' Risk Tables and by providing context for discussion by council committees that make the final ABC and OFL determinations. Both pathways can be used to support decisions to keep or reduce the recommended maximum ABC from each stock assessment model. ESRs are disseminated along with the stock assessments, and ESR presentations are given to numerous council committees annually during the fall groundfish quota-setting process.

¹ https://www.whitehouse.gov/wp-content/uploads/legacy_drupal_files/omb/memoranda/2005/m05-03.pdf

The effectiveness of the ESRs relies on timely production to maximize uptake into fisheries management decisions. Specifically, ESRs are produced at the same time as the stock assessments in order to use the most current data to inform the annual harvest specifications. The ESRs also serve as an on-ramp for ecosystem and climate research to get into the Council review process. While Alaska is known for having data-rich stocks, there are also many data-poor stocks that are also managed by the Council. The ESRs provide an important source of contextual ecosystem information for stocks for which there are limited available data. The ESRs are also used or referenced outside of the groundfish harvest specification process. For example, ESR presentations are given to the Council's eastern Bering sea crab specification process. Other examples include informing research gaps/priorities, identification of new indicators, and informing policy needs of the NOAA Fisheries Alaska Regional Office

The objectives in seeking this review are two-fold. First, we seek a review of the goals of the ESRs. Second, we would like feedback on how best to meet these goals.

Objective 1: Are the ESRs' goals to inform the development of ABC and OFL still appropriate or should the goals be broadened? The advantages of staying focused on ABCs and OFLs include having a narrowly-defined, targeted on-ramp for ecosystem science into the Council process that helps define the timing, interpretation, and communication of the reports. Challenges of the narrow focus include a limitation of the application of ESRs to other Council decisions, and limited application to other interested parties outside of the Council process (e.g., industry, local communities, Tribes).

Objective 2: How can we better achieve these ESRs goals? This objective can be divided into multiple subcomponents:

5. A review of the content of the reports, specifically how the ecosystem science is selected, incorporated and synthesized.
 - a. How data and indicators are selected, developed, and displayed.
 - b. The structure of the reports
 - c. The balance of information across the reports and web content
6. A review of the process of how the reports are disseminated in the council process.
 - a. Timing and number of presentations, balancing crowded agendas with ESR presentations.
 - b. Integrating ESRs in the stock assessment development and harvest specification process (communication with individual stock assessment author, Groundfish Plan Team, and Council)
 - c. The use of stock-specific Risk Tables to directly connect ESRs to the maximum ABC recommendation.
7. A review of the ESRs role in an evolving ecosystem information space as new data needs, capabilities, and products are developed.
 - a. Balance of ESRs with stock-specific Ecosystem and Socio-Economic Profiles (ESPs) and longer-term Fishery Ecosystem Plans in communicating ecosystem information to the Council.
 - b. Integration of climate information, model-based products, forms of risk assessments, social and economic information, etc.
8. A review of ESR staff organization
 - a. Costs and benefits of ESR staff in multiple or one program.

The specified format and contents of the individual peer review reports are found in **Annex 1**. The Terms of Reference (TORs) of the peer review are listed in **Annex 2**. Lastly, the tentative agenda of the panel review meeting is attached in **Annex 3**.

Requirements

NMFS requires 3 reviewers to conduct an impartial and independent peer review in accordance with this Performance Work Statement (PWS), OMB Guidelines, and the ToRs below. The reviewers shall have working knowledge and recent experience in incorporating ecosystem information into fisheries management decisions and using or producing ecosystem assessments for fisheries managers. Some expertise with ecosystem indicators is essential. Each CIE reviewer's duties shall not exceed a maximum of 14 days to complete all work tasks of the peer review described herein.

The chair, who is in addition to the three reviewers, will not be provided by the CIE. Although the chair will be participating in this review, the chair's participation (i.e. labor and travel) is not covered by this contract.

Tasks for Reviewers

Deliverables herein.

1. Pre-review Background Documents: Review the following background materials and reports prior to the review:

All of the Ecosystem Status Reports can be found at this url:

<https://www.fisheries.noaa.gov/alaska/ecosystems/ecosystem-status-reports-gulf-alaska-bering-sea-and-aleutian-islands#2018> At present, the latest versions available are from 2021. We request the reviewers to familiarize themselves with the three 2022 reports and read the In Brief pamphlets, which will be posted by January 2023. We also request the reviewers to familiarize themselves with the 2021 reports for the Gulf of Alaska and the Aleutian Islands to compare the impacts of alternating trawl survey years on data availability in these two large marine ecosystems. These are:

2022 Ecosystem Status Report - Eastern Bering Sea
ESR EBS In Brief
2022 Ecosystem Status Report - Gulf of Alaska
ESR GOA In Brief
2022 Ecosystem Status Report - Aleutian Islands (survey year)
ESR AI In Brief
2021 Ecosystem Status Report - Gulf of Alaska (survey year)
ESR GOA In Brief
2021 Ecosystem Status Report - Aleutian Islands
ESR AI In Brief

We also ask that they watch the video Alaska's Ecosystem Status Reports: A Collaborative Approach to Inform Fisheries Management, posted under the 2021 reports and also found here:

https://players.brightcove.net/659677166001/4b3c8a9e-7bf7-43dd-b693-2614cc1ed6b7_default/index.html?videoid=6287018070001

Regarding stock assessment Risk Tables, we ask that they read:

Dorn, M., and Zador, S.G., 2020. A risk table to account for concerns external to stock assessments when developing fisheries harvest recommendations. *Ecosystem Health and Sustainability*. 6 (1):1-11

Examples of risk tables can be found in stock assessments available here:

<https://www.fisheries.noaa.gov/alaska/population-assessments/north-pacific-groundfish-stock-assessments-and-fishery-evaluation>. We ask that they review some risk tables in stock assessments (primarily the ecosystem considerations sections, which are informed by ESRs) for stocks found in each Large Marine Ecosystem, for example:

Data-rich stocks:

Gulf of Alaska Walleye Pollock
Eastern Bering Sea Pacific Cod

Data-poor stocks:

Gulf of Alaska Demersal Shelf Rockfish
Aleutian Islands Northern Rockfish
Eastern Bering Sea Kamchatka Flounder

2. Attend and participate at the review meeting. The meeting will consist of presentations by NOAA and other scientists, stock assessment authors and others to facilitate the review, to answer any questions from the reviewers, and to provide any additional information required by the reviewers.
3. After the review meeting, reviewers shall conduct an independent peer review report in accordance with the requirements specified in this PWS, OMB guidelines, and TORs, in adherence with the required formatting and content guidelines; reviewers are not required to reach a consensus.
4. Each reviewer should assist the Chair of the meeting with contributions to the summary report.
5. Deliver their reports to the Government according to the specified milestones dates.

Foreign National Security Clearance

When reviewers participate during a panel review meeting at a government facility, the NMFS Project Contact is responsible for obtaining the Foreign National Security Clearance approval for reviewers who are non-US citizens. For this reason, the reviewers shall provide requested information (e.g., first and last name, contact information, gender, birth date, passport number, country of passport, travel dates, country of citizenship, country of current residence, and home country) to the NMFS Project Contact for the purpose of their security clearance, and this information shall be submitted at least 30-50 days before the peer review in accordance with the NOAA Deemed Export Technology Control Program NAO 207-12 regulations available at the [Foreign National Guest website](#). The contractor is required to use all appropriate methods to safeguard Personally Identifiable Information (PII).

Place of Performance

Each reviewer shall conduct an independent peer review during the panel review meeting scheduled in Seattle, WA or virtually dependent on conditions of the COVID 19 pandemic during the following dates: Feb 28, March 1-2

Period of Performance

The period of performance shall be from the time of award through April 2023. Each reviewer’s duties shall not exceed 14 days to complete all required tasks.

Schedule of Milestones and Deliverables: The contractor shall complete the tasks and deliverables in accordance with the following schedule.

Schedule	Milestones and Deliverables
Within two weeks of award	Contractor selects and confirms reviewers
Two weeks prior to the panel review	Contractor provides the pre-review documents to the reviewers
Feb 28, March 1-2, 2022	Each reviewer participates and conducts an independent peer review during the panel review meeting
Within two weeks of the panel review meeting	Contractor receives draft reports
Within three weeks of receiving draft reports	Contractor submits final reports to the Government

*The Chair’s Summary Report will not be submitted to, reviewed, or approved by the Contractor.

Modifications to the Performance Work Statement

Each reviewer will write an individual review report in accordance with the PWS, OMB Guidelines, and the TORs below. Modifications to the PWS and ToRs cannot be made during the peer review, and any PWS or TORs modifications prior to the peer review shall be approved by the Contracting Officer’s Representative (COR) and the CIE contractor. The PWS and TORs shall not be changed once the peer review has begun.

Applicable Performance Standards

The acceptance of the contract deliverables shall be based on three performance standards:

- (1) The reports shall be completed in accordance with the required formatting and content;
- (2) The reports shall address each TOR as specified; and
- (3) The reports shall be delivered as specified in the schedule of milestones and deliverables.

Travel

All travel expenses shall be reimbursable in accordance with Federal Travel Regulations (<http://www.gsa.gov/portal/content/104790>). International travel is authorized for this contract. Travel is not to exceed \$10,000.

Restricted or Limited Use of Data

The contractors may be required to sign and adhere to a non-disclosure agreement.

NMFS Project Contact(s)

Stephani Zador
Deputy Director Resource Ecology and Fisheries Management Division
NOAA Fisheries, Alaska Fisheries Science Center
7600 Sand Point Way NE
Building 4
Seattle, WA 98115
stephani.zador@noaa.gov
206-526-4693

Back up contact:
Bridget Ferriss
Research Fisheries Biologist
Resource Ecology and Fisheries Management Division
NOAA Fisheries, Alaska Fisheries Science Center
7600 Sand Point Way NE
Building 4
Seattle, WA 98115
bridget.ferriss@noaa.gov
206-526-4349

Annex 1: Peer Review Report Requirements

1. The report must be prefaced with an Executive Summary providing a concise summary of the findings and recommendations, and specify whether the science reviewed is the best scientific information available.
2. The report must contain a background section, description of the individual reviewers' roles in the review activities, summary of findings for each TOR in which the weaknesses and strengths are described, and conclusions and recommendations in accordance with the TORs.
 - a. Reviewers must describe in their own words the review activities completed during the panel review meeting, including a brief summary of findings, of the science, conclusions, and recommendations.
 - b. Reviewers should discuss their independent views on each TOR even if these were consistent with those of other panelists, but especially where there were divergent views.
 - c. Reviewers should elaborate on any points raised in the summary report that they believe might require further clarification.
 - d. Reviewers shall provide a critique of the NMFS review process, including suggestions for improvements of both process and products.
 - e. The report shall be a stand-alone document for others to understand the weaknesses and strengths of the science reviewed, regardless of whether or not they read the summary report. The report shall represent the peer review of each TOR, and shall not simply repeat the contents of the summary report.
3. The report shall include the following appendices:
 - Appendix 1: Bibliography of materials provided for review
 - Appendix 2: A copy of this Performance Work Statement
 - Appendix 3: Panel membership or other pertinent information from the panel review meeting.

Annex 2: Terms of Reference for the Peer Review

Terms of Reference for the Peer Review

Review of the Alaska Fisheries Science Center Ecosystem Status Reports for the Eastern Bering Sea, Aleutian Islands, and Gulf of Alaska

CIE reviewers are contracted to complete their independent peer review based on the ToRs. Therefore, the CIE-NMFS review and approval process is based on whether the CIE independent reports addressed each ToRs.

1. Should the ESR continue to tailor efforts to inform the ABC and OFLs? (Obj.1)
2. How can the function of the ESR team better meet the Council's needs? (Obj.1, Obj.2.3)
3. How can the ESRs better meet the needs of the contributing scientists and other knowledge holders? (Obj.1, Obj.2.3)
4. How can the way the ecosystem science is selected, incorporated, and synthesized in the ESRs be improved? (Obj.2.1)
5. How can the process of disseminating the information in the ESRs be improved? (Obj.2.2)
6. How can the ESRs maximize uptake into fisheries management decisions? (Obj.2.2)
7. What are the costs, benefits, and prioritization of new and/or additional ESR-related products? (Obj.2.3)

Annex 3: Tentative Agenda

Review of the Alaska Fisheries Science Center Ecosystem Status Reports for the Eastern Bering Sea, Aleutian Islands, and Gulf of Alaska

Feb 28, March 1-2, 2023

February 28

0900 Introductions and logistics

0930 Overview presentation: process, products, and presentations

1000 Eastern Bering Sea ESR

1100 Break

1115 Aleutian Islands ESR

1215 Lunch

1330 Gulf of Alaska ESR

1430 break

1445 Ecosystem and Socioeconomic Profiles

1500 Risk tables in stock assessments

1600 Council presentation

1700 End

March 1

0900 Review agenda

0915 Ecosystem indicator contributors

1030 Break

1045 Synthesis section contributors, including climate change task force

1200 Lunch

1330 ESR process presentations and discussion

1700 End

March 2

0900 Reviewer question and writing period

1200 Lunch

1330 Reviewer question and writing period

1700 End

Appendix 3: Panel membership

Participants

CIE review panel:

Stephani Zador, Chair, (NOAA Fisheries, AFSC),
Marta Coll Montón, (CIE)
Matthew Cieri, (CIE)
Yan Jiao, (CIE)

Ecosystem Status Reports Team:

Stephani Zador (NOAA Fisheries, AFSC)
Elizabeth Siddon (NOAA Fisheries, AFSC)
Ivonne Ortiz (NOAA Fisheries, AFSC)
Bridget Ferriss (NOAA Fisheries, AFSC)

Other presenters:

Chris Harvey (NOAA Fisheries, NWFSC)
Diana Evans (NPFMC)
Franz Mueter (SSC, NPFMC)
Kalei Shotewell (NOAA Fisheries, AFSC)
Sarah Gaichas (NOAA Fisheries, NEFSC)

Other participants:

Alex Andrews
Anne Vanderhoeven
Austin Eastenbrooks
Dana Hanselman
Emily Fergusson
Jacek Maselko
Jim Ianelli (NOAA Fisheries, AFSC)
Kerim Aydin (NOAA Fisheries, AFSC)
Lisa Eisner
Maggie Mooney-Seus
Ron Felthoven
Sara Cleaver
unknown caller