

# Gulf of Alaska Research

Scoping Paper for the NPFMC Ecosystem Committee  
March 2022<sup>1</sup>

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## 1 Introduction

In [May 2021](#), the Ecosystem Committee (Committee) tasked Council staff with developing a scoping paper on the *status of research initiatives taking place in the Gulf of Alaska (GOA) and the timelines associated with those projects. The Committee noted that the scoping paper should identify gaps in understanding, and list actions that the Council could take to address them (GOA Fishery Ecosystem Plan (FEP), etc.). The paper should also identify possible decision points such as structure of FEP Team, if BSFEP structure fits the GOA.* The Committee’s report from its May 2021 meeting indicated its interest in GOA research “to understand the effects of climate change and other issues,” therefore, while parts of this paper focus on GOA climate change research, other research topics being conducted in the area are also included. Readers are encouraged to browse the embedded links, refer to references, and appendices to learn more about each of the initiatives, products, or other sources of information included within this paper.

## 2 Status of Research Initiatives

Research on the GOA is widespread and conducted through many pathways. Researchers at Federal and State agencies, academic institutions, tribal organizations, and non-profit organizations conduct a significant portion of the research in the natural and social sciences across a variety of spatial and temporal scales in the GOA. This section provides a high-level overview of some of the research that has been highlighted recently within the Council process, and other research that is potentially relevant to Federal fisheries management in the GOA. The initiatives and research bodies referenced in this paper are by no means comprehensive of all research occurring on or in the GOA.

Several NOAA climate reports and approaches were highlighted at the [Council’s October 2021 meeting](#). In addition to the annual fish and ecosystem surveys, these included the NOAA’s Climate Science Strategy, the Climate Fisheries Initiative (CFI), Regional Action Plans (RAPs), and Climate Integrated Modeling research projects (CLIM).

[NOAA Fisheries Climate Science Strategy](#) is part of a proactive approach to increase the production, delivery, and use of climate-related information needed to fulfill NOAA Fisheries mandates. The Strategy responds to growing demands for information and tools to prepare for and respond to climate impacts on marine and coastal resources. The Strategy is designed to be customized and implemented

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through Regional Action Plans that focus on building regional capacity, partners, products and services to address the seven objectives.

[NOAA's Climate Fisheries Initiative](#) is a cross-NOAA effort which, when combined with existing programs, will enable the sustained operational ocean prediction and decision support system needed to reduce negative impacts and increase resilience of ecosystems and coastal communities.

The [GOA Regional Action Plan 2.0](#) identifies actions needed to make progress in implementing seven objectives in the NOAA Fisheries Climate Science Strategy over the next five years. Directed research is needed to assess the degree of climate-driven change to critical ecosystem components, evaluate potential effects on marine species, and to determine risks to the ecosystem and fishing communities. This research will guide policies to reduce climate impacts, to manage human involvement in changed ecosystems, and to capitalize on any novel opportunities that may arise for marine resource-dependent human communities. The RAP outlines a framework to initiate this process. Each of the RAPs takes a regional approach to which specifies goals and objectives for producing, delivering, and using climate-related information needed to reduce impacts and increase resilience with changing climate and ocean conditions. The RAPs focus on building regional capacity, partners, products, and services tailored to each specific region, and identify current and new climate research activities over the time period of the RAPs, as well as evaluating remaining key scientific gaps for each region.

The [GOA Climate Integrated Modeling Project \(CLIM\)](#) is a three-year project which started in Oct 2020 and extends to the end of September 2023. Continuation beyond then would require additional funding. GOA CLIM will examine how individuals, families, and communities may adapt to climate variability and associated changes in fisheries and marine ecosystems. It will also identify the factors underlying adaptation choices, and tradeoffs associated with those adaptations. Predicted fleet responses and adaptations will be coupled with regional economic models to understand potential economic impacts on fishing communities. In turn, fleet behavior will feed into biological models to understand changes in harvest patterns and species composition of catch. GOACLIM could provide insights into how climate and oceanographic changes propagate through the GOA ecosystem, fisheries, and communities. The project includes a wide range of institutional partners, and investigators would like further engagement with the Council and other parties on how to incorporate the potential findings of CLIM into current and future management strategies. The project is closely aligned with ongoing research at AFSC and is a major component of the GOA RAP.

More practically, the GOA CLIM uses the Regional Ocean Modeling System (ROMS) framework to model ocean circulation in the GOA marine ecosystem. It will allow projections of future conditions and how they relate to physical conditions in the ocean, system-level productivity, and ways that fisheries management can promote resilient fisheries and communities. Three current research pathways include:

- Development and application of an Atlantis model as a component of a multi-model ensemble to evaluate fisheries management strategies with respect to a changing climate.
- Evaluate and predict the impacts of environmental anomalies to the endangered Western DPS of Steller sea lions.
- Develop tools and a knowledge base to couple the ecosystem models to regional economic models to evaluate the impacts of climate change on fisheries and resource-dependent communities.

The [North Pacific Research Board \(NPRB\)](#) offers funding for research and long-term monitoring in the waters surrounding Alaska. Since 2002, 47.2% of NPRB funding went to GOA projects. A spreadsheet of GOA research recently funded by NPRB (including the themes of research, amount awarded, and the institution leading the project) is attached to the e-Agenda. NPRB's [GOA Integrated Ecosystem Research Program \(GOA IERP\)](#) was a multi-disciplinary project which examined the

oceanography, biology, and ecology of the GOA in an effort to better understand how the environment influences fish survival, and ultimately the success of fisheries in the GOA. NPRB communicated preliminary results in a variety of ways, including annual presentations at scientific conferences such as the Alaska Marine Science Symposium (AMSS), Western Groundfish Conference, American Fisheries Society meetings, and with the general public at public events. The staff paper on Forage Fish Ecology presented to the Ecosystem Committee in January 2022 summarized some of the final reports and listed the peer-reviewed publications that came out of the project (NPFMC 2021). A synthesis was initiated in September 2015 and continued through Feb 2018. The synthesis is building upon the results of the field program and developing products that apply the results to fisheries management.

Often when research is relevant to Federal fisheries management, results are either formally brought to the Council or advisory bodies directly through pathways such as: Alaska Fisheries Science Center (AFSC) scientist presentation of Ecosystem Status Reports (ESRs), industry members providing updates on Exempted Fishing Permit (EFP) projects or cooperative research, or stakeholders requesting space on committee agendas to present findings or recent developments. Other times, research is brought into the Council process indirectly through the expertise of scientists on the Council's Scientific and Statistical Committee (SSC) or fed into the body of research that ultimately influences stock assessments or ecosystem monitoring products. Research is often highlighted at symposia or conferences such as AMSS, which may not have a direct link to the Council process. However, many of these projects are authored by AFSC, Alaska Department of Fish and Game (ADF&G), or International Pacific Halibut Commission (IPHC) staff whose work already feeds into the Council process either through stock assessments, ecosystem products, Plan Team or SSC expertise, or presentations to Council or Council advisory bodies mentioned prior.<sup>2</sup>

The above projects provide a brief overview of major initiatives. Several other organizations that were referenced in discussions for this scoping paper are included in the Appendix. Some of these organizations occasionally conduct research in partnership with those involved in the Council process.

### 3 Gaps in Understanding

Staff have interpreted the Committee's ask for "identifying gaps in understanding" as falling into two categories: 1) gaps in understanding due to a lack of research or data, and 2) gaps in understanding due to a lack of on-ramps into the Council process and needs for further communication.

**Data gaps or gaps in research** are currently identified through several pathways in the Council process:

- The Council's triennial [research priorities](#) review process, which was just [updated](#) and is being improved for the next review in 2024.
- Internal AFSC documents and processes, such as inclusion of unfunded data needs through formats such as the RAP.
- The forthcoming data gap analysis from the Council's Social Science Planning Team. This analysis is currently in development and the Team is in the process of producing a working document to connect to different venues (e.g., research priorities, EDRs) for social science data needs and identifying ways to obtain data. The gap analysis is not specific to the GOA.

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<sup>2</sup> The 2022 AMSS meeting featured 98 different GOA-focused research projects (climate and oceanography (13), lower trophic levels (11), fishes and fish habitats (29), seabirds (8), mammals (21), humans (8), ecosystem (8)).

- Additionally, data gaps are also often highlighted in the more typical Council analytical documents (Environmental Assessments (EA), Regulatory Impact Reviews (RIR)) and through staff tasking when stakeholders highlight gaps in data.

**Gaps in on-ramps/communications** are less clearly identifiable, but exist, nonetheless.

Social scientists who frequently engage in conversations with GOA fishery stakeholders have indicated one gap that is consistently identified is the lack of conversations surrounding climate change in the GOA. The current Climate Change Task Force (CCTF) is focused on the Bering Sea and there is currently no venue for coastal communities, fishery participants, and other stakeholders to engage in continued discourse surrounding climate change in the GOA. There exists a need to link what scientists are learning about changes in the marine environment in the GOA with ways to respond and strategize for resilience. For example, scientists have indicated that there will likely be more heatwaves of longer and more intense duration. These heatwaves have impacted certain fish stocks, but scientific expertise has not always reached coastal communities or the fishing industry in ways that help to strategize for the future (or for the present, as environmental changes are already apparent and occurring). NPFMC 2021 described how the marine heatwave and coincident decline in GOA Pacific cod stocks prompted several organizations to encourage the Council to identify needs and opportunities to manage fisheries in the context of environmental change. Peterson Williams et al. (2021) conducted conversations and directed interviews with commercial fishers, Alutiiq fishers, and fishery managers to explore early warning signs and management challenges preceding the decline of Pacific cod and recommend tools to enhance the adaptive capacity of management to address climate related changes. This demonstrates the need for insertion of GOA climate information into the Council process (which is beginning to occur through some of the initiatives described above), and further into the potentially affected communities and fishing industry.

In its list of key gaps and unfunded needs, the GOA RAP 2.0 identified a number of projects that will require additional funding but were viewed as being important for addressing the National Climate Science Strategy objectives. While most of these gaps and unfunded needs relate to data collection and AFSC-driven research, one of the gaps that was identified was improving community decision support tools. *“This project will support 1) new staff to develop and coordinate a variety of adaptation activities at Federal, State, municipal, and Tribal levels, 2) workshops in fishery-dependent communities, and 3) development of public-facing tools to increase awareness of local and regional changes in the environment and help the public prepare for the future.”* Council staff see this as one gap where the Council, its advisory bodies, and staff could begin addressing the gap of GOA climate change dialogue. This is carried into Section 4, Next Steps.

While developing this scoping paper, discussions with those involved in the Council process indicated that another gap in communications appears to be related to the purpose, use, and connections between many ecosystem-related products and tasking that are produced by or occur within various AFSC or Council bodies. There continues to be some uncertainty about the goals of these products and tasks, and/or how and when they are intended to be used in scientific or management related decision-making. Examples include but are not limited to: ESRs (multi-species, near-term advice for annual harvest specifications), ESPs (in development with assessments, species-specific near-term advice for annual harvest specifications), and the Ecosystem health report card (in development by FEP Team, reflects longer-term indicators of change in the ecosystem).

## **4 Next Steps**

This section includes items for consideration related to development of a GOA FEP Team and actions that the Council/Committee could take to address the gaps described above. This scoping paper is intended to

be informational and provide an overview of potential avenues that could be explored further, and the Committee is not required to take any action. At the point the Committee or Council is ready to consider moving forward in recommending a GOA FEP, there are several points to take into consideration:

- *Current status of BS FEP:* [P44 of the BS FEP core document](#) describes the action modules for the BS FEP. Two of these action modules are underway (CCTF and Local Knowledge, Traditional Knowledge, and Subsistence (LKTKS) Task Force), and three additional action modules have not yet been initiated. The initial two action modules are taking a considerable amount of staff time and resources as well as time on the Council agenda. The BS FEP team is still reflecting on how action modules/task forces work. The Council/Committee should consider whether they would like to first see further progress or completion of these action modules and whether there is a need to learn from the outcomes of the BS FEP prior to initiating a new FEP. (Other organizations have taken a similar approach when applying research across areas, for example, the NPRB originally decided to delay further development of the (GOAIERP) until it had more experience with the BSIERP.)
- *Goals and objectives of a GOA FEP:* The unique goals and objectives of a GOA FEP that cannot currently be achieved through other means should be clearly identified. Questions to be answered: What is the purpose of the FEP? Will it use the same structure (core document, action modules) as the BS FEP? If so, are there specific action modules that Committee/Council members have in mind? How will success be measured? For the BS FEP, there was a clear, comprehensive scoping process which refined these topics. Additionally, the Committee could discuss whether development of on-ramps for GOA climate information and ongoing dialogue could occur through a GOA FEP or other means (e.g., a series of workshops, a standalone action module, etc.).
- *Connections among FEPs:* As part of the discussion about next steps, the Committee/Council may want to consider how work that is already underway through the BS FEP, action modules, and task forces could be applied or developed for other regions.
  - In [May 2021](#), the BS FEP Team discussed how there is overlap among the different regions with respect to EBFM processes, however the different ecological and human community characteristics also keep the regions very distinctive. While current task force efforts are tailored to the Bering Sea, there are elements of both action modules which may be applicable to other regions. Input from the task forces and GOA stakeholders would be valuable in determining applicability of work and products across regions.
  - Given the status of ongoing scientific efforts including GOA-CLIM, if the Council is interested in pursuing a GOA FEP, it might consider timing coincident with the end of that project, which also correlates approximately with the conclusion of the two existing Bering Sea action modules.
  - In terms of staff resources and FEP Team composition, many of those involved in the previously described research initiatives, FEP Team, and task forces would likely be involved in developing a GOA FEP. The BS FEP Team does see potential value in the idea of having an all-regions FEP team in the future, perhaps with some core members and regional experts, especially compared to the alternative of multiple region-specific FEP teams. The BS FEP Team has highlighted that if the Council is considering development of a GOA FEP, even if it is supported by an all-regions FEP team, it would be important to bring in GOA experts for a broad scoping and development process.

## 5 Persons Consulted

Martin Dorn (AFSC)

Diana Evans (NPFMC)

Bridget Ferriss (AFSC)

Jo-Ann Mellish (NPRB)

Marysia Szymkowiak (AFSC)

Chang Seung (AFSC)

Stephani Zador (AFSC)

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North Pacific Research Board:

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## **Appendix 1. Additional resources for GOA research and helpful links**

[Alutiiq Pride Marine Institute](#) (Seward)- conducts research on numerous topics focusing on coastal and marine ecosystem health. APMI is particularly focused on issues affecting native peoples, animals, and the environment. These topics include ocean acidification, animal behavior and physiology, harmful algae, marine pathogens, mariculture development, habitat restoration, and preservation of subsistence and recreational harvest opportunities.

[Sitka Tribe Resource Protection Department](#) is championed with protecting cultural and natural resources within the traditional territory of Sitka Tribe of Alaska (STA) and protecting the rights of tribal citizens to access those resources. It staffs the Kayaani and Sitka Marine Mammal Commissions (SMMC) along with the Cultural, Customary and Traditional (CC&T), Herring, and Commercial Fisheries Committees. The Department houses the Herring Program, the Southeast Alaska Tribal Ocean Research Program and additional program.

[Chugach Regional Resource Commission \(CRRC\)](#) is an inter-tribal fish and wildlife commission. The seven member Tribes of CRRC are located in Prince William Sound and Lower Cook Inlet. CRRC was involved in the research, monitoring, and restoration projects resulting from the Exxon Valdez Oil Spill, and has since expanded its programs to include management of the subsistence harvest of migratory birds, shellfish aquaculture and ocean acidification research, tribal natural resource education, climate change, and food sovereignty.

[Alaska SeaLife Center-Science and Research](#). The overall goal of the Science Program is to develop an understanding of the role of marine mammals, birds and fish in the arctic and subarctic marine ecosystems, and to generate scientific knowledge relevant to resource management and policy.

[Sitka Sound Science Center- Current and Past Research](#). The Sitka Sound Science Center, an official member of the Organization of Biological Field Stations and the National Association of Marine Laboratories, is involved in a wide variety of locally-relevant aquatic and terrestrial research. They are partnered with numerous universities, organizations, and government departments and current research includes climate change and ecosystem impacts, bioenergetics of Pacific cod, and community collective action to respond to climate change influencing the environment-health nexus.

[Alaska's Integrated Ecosystem Assessment Program](#)- facilitates the delivery of assessments, provides ecosystem science to management, relevant stakeholders, and community members in the Alaska region to support effective Ecosystem-Based Management. They are carried out as a collaboration with the Alaska Fisheries Science Center (AFSC,) and the OAR Pacific Marine Environmental Laboratory (PMEL), community and university partners, and regional management councils to integrate field research, data, and models to inform management decisions.

[Gulf Watch Alaska](#) is the long-term ecosystem monitoring program of the Exxon Valdez Oil Spill Trustee Council for the marine ecosystem affected by the 1989 oil spill.