Fiscal Year 2024 Competition Information Sheet - Advancing an integrated NOAA capability for climate predictions and projections in support of NOAA's Climate Ecosystems Fisheries Initiative

Program Name

Modeling, Analysis, Predictions, and Projections (MAPP) Program.

Program Mission

The MAPP program supports advances in the development and application of Earth system models and analyses across NOAA for the purpose of building resilience to climate impacts, predicting and projecting change from years to decades in the future, and improving our understanding of and ability to simulate the Earth system. MAPP works with partner agencies in the U.S. Global Change Research Program, and focuses on engaging the non-NOAA research community to help advance NOAA's modeling capabilities and applications. MAPP is a program in the Earth System Science and Modeling (ESSM) division in NOAA's Climate Program Office. ESSM supports research to advance broad understanding of the Earth system through observations, monitoring, process science, and modeling; and to advance NOAA's mission through collaborations with the external community.

Focus for Fiscal Year (FY) 24

Advancing an integrated NOAA capability for climate predictions and projections in support of NOAA's Climate Ecosystems Fisheries Initiative

There is an additional coordinated solicitation through the Climate Variability and Predictability (CVP) Program. Please see the CVP Program's Information Sheet for details. Proposals may only address one program's solicitation.

Proposals may respond to only one of the FY 2024 MAPP competitions, which must be clearly identified in the proposal summary.

Funding for FY24

Pending the availability of funds in FY 2024, the MAPP program anticipates a funding allocation of $1,500,000 per year for this competition. Total funding for this competition may exceed this amount, depending on partners' contributions.

Proposals may be for up to three years, up to $190,000/year for projects responding to priority area A, described below, and $275,000 to $350,000/year for projects responding to priority area B, described below. A total of 5-8 projects may be funded; this number may be exceeded depending on partners' contributions and the mix of priority areas A or B projects selected. The MAPP program anticipates working with the National Marine Fisheries Service Office of Science and Technology to fund projects from this competition.

Competition Information

Title: Advancing an integrated NOAA capability for climate predictions and projections in support of NOAA's Climate Ecosystems Fisheries Initiative

A major component of NOAA's mission is to ensure an economically productive and sustainable domestic fishery. In 2020, United States Fisheries produced $253 billion in sales, created 1.7 million jobs, and added an additional $117 billion to the economy through broader impacts of the industry[1]. The sustainable operation of this industry requires abundant and accurate environmental information to ensure the setting of accurate catch limits enabling productivity now and into the future. Many factors impact the productivity of our Nation's fisheries including variability and change in our climate and oceans, which affect the nation's valuable living marine resources (LMRs) and the people, businesses and communities that depend on them[2].

From warming oceans and rising seas to droughts, ocean acidification, harmful algal blooms, and deoxygenation, these impacts are expected to increase with continued changes in the planet's climate system. Coastal habitats also help defend coastal communities from storms and inundation and provide the foundation for tourism and recreation-based economies in many coastal communities. Climate-related information is needed to fulfill NOAA Fisheries mandates[3] and provide decision-makers with the information they need to reduce impacts and increase resilience with changing climate and ocean conditions[4]. A key NOAA goal is to strengthen and apply climate-related science capacity regionally and nationally to fulfill NOAA Fisheries information requirements in a changing climate.

To address these issues and meet NOAA goals, the agency has embarked on an effort to develop predictions and projections from seasonal to multi-decadal timescales to inform fisheries management. This effort, called the Climate Ecosystems and Fisheries Initiative (CEFI)[5], is a cross-agency research and development initiative that is applying the agency's ocean and climate models and science to developing forward-looking products that can inform fisheries management decisions for the Nation's major ocean regions and the Great Lakes. The Initiative, which is aligned with NOAA's Strategic Vision and Plans[6,7], leverages NOAA GFDL's widely-used Modular Ocean Model (MOM)[8] through development of a regional implementation of this model coupled with ocean biogeochemistry. These regional implementations are being developed and configured to provide both near-term forecasts (e.g., daily to monthly) and longer term predictions and projections (seasonal to multi-decadal) at high resolution for integration into fisheries management decision making. The Initiative further builds integrated modeling and decision support teams to develop products and services and engage decision makers with this information.

Climate Program Office (CPO) programs are uniquely positioned to advance climate science, modeling, social science, prediction and projection development needs, and integrated R&D work across these themes in support of fisheries and living marine resources, accelerating, extending, and complementing research at OAR Research Laboratories and NMFS Fisheries Science Centers via the engagement of the broader research community. CPO has identified changes in marine and freshwater ecosystems as a major societal challenge[9], and is organizing its research efforts around addressing this challenge. In FY 2024, the CVP program and the MAPP program are coordinating research to address climate-marine ecosystem/fishery needs with the following foci: process understanding and predictability (CVP); and modeling, and prediction and projection system development (MAPP).

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[1] https://www.fisheries.noaa.gov/s3/styles/media_750_x500/s3/2022-11/FEUS2020-Infographic-final-v2.png?itok=MqzuqNMq

[2] Fourth National Climate Assessment, Oceans and Marine Resources chapter https://nca2018.globalchange.gov/chapter/9/

[3] https://www.fisheries.noaa.gov/topic/laws-policies

[4] NOAA Fisheries Climate Science Strategy
https://www.fisheries.noaa.gov/national/climate/noaa-fisheries-climate-science-strategy

[5] https://www.fisheries.noaa.gov/topic/climate-change/climate,-ecosystems,-and-fisheries

[6] NOAA Strategic Plan FY22-FY26

[7] NOAA Weather Water and Climate Strategy FY23-FY27

[8] https://www.gfdl.noaa.gov/mom-ocean-model/

[9] https://www.cpo.noaa.gov/Initiatives/Climate-Risk-Areas-Initiative

A number of preceding activities funded by the former Coastal and Ocean Climate Applications (COCA)[10], the current Climate and Fisheries Adaptation Program (CAFA)[11], CVP[12], and MAPP programs, in addition to OAR and laboratory investments, have supported the application of climate, social, and process science; and modeling systems to the CEFI goals articulated above. The National focus on marine ecosystem predictions and projections has grown over the past decade, as evidenced by the productivity of the scientific community in this research area, and through U.S. CLIVAR, organizing around this challenge to synthesize current understanding and highlight research needs through the recent Daily to Decadal Marine Ecological Forecasting Workshop[13]. The MAPP program previously supported research to explore the feasibility of using climate predictions to inform future conditions of our marine environments[14], and to explore prediction system development, model coupling, physical climate-biogeochemistry interactions, projection fidelity, and prediction skill for various Large Marine Ecosystems[15]. This research laid the foundation for the emerging modeling capabilities and forward-looking derived information that is central to CEFI.

As of mid 2023, implementations of the MOM6 regional model are planned or under development for five regions: the Northwest Atlantic (NWA; Caribbean to southern edge of the Labrador), Northeast Pacific (Baja through the Bering Sea), Great Lakes, Pacific Islands region (Hawaiian Islands and potentially outlying regions relevant to NOAA management responsibilities), Arctic Ocean. Of the five regions, the MOM6-NWA implementation is most mature.

In FY 2024, MAPP, in partnership with the NMFS Office of Science and Technology, solicits proposals to advance the regional implementations of MOM6 and to perform research that lays the groundwork for the application of regional modeling data to seasonal to multi-decadal prediction and projection products and services. Please see the CVP program solicitation Information Sheet for related research opportunities. Proposals can focus on one of two FY 2024 priority areas:

A. Advance methodologies for the prediction of Large Marine Ecosystems (LMEs), tackling key issues such as the applicability and utility of bias correction methods, developing and delivering diagnostics that can be used for process-level evaluation and benchmarking of models built for the prediction and projection of LMEs, experimenting with or analyzing model configurations that may help advance the representation of known sources of skill for seasonal to decadal LME prediction, and improving data assimilation processes and the use of applicable observational datasets for initialization. Proposals in this priority area do not need to use MOM6; however, research results should be generalizable and useful for the configuration of MOM6 in the regions described above, if not potentially directly applicable.

B. Accelerate the development of MOM6 configurations for any of the following LMEs: Northeast Pacific, Great Lakes, Pacific Islands, and Arctic Ocean. Projects may focus on one of these regions and may build on or leverage prior work. Proposal teams should operate in a co-development fashion with NOAA and include collaborators from OAR Laboratories and/or Cooperative Institutes, and NMFS Science Centers toward creating potentially durable regional modeling teams as part of the multi-Line Office CEFI effort. Projects may focus on development and analysis of MOM6 configurations including how well these configurations represent critical fisheries-oriented processes, and how that representation translates into prediction skill.

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[10] https://cpo.noaa.gov/Divisions-Programs/Climate-and-Societal-Interactions/The-Adaptation-Sciences-Program/COCA/About-COCA

[11] https://cpo.noaa.gov/Divisions-Programs/Climate-and-Societal-Interactions/The-Adaptation-Sciences-Program/CAFA

[12] https://cpo.noaa.gov/Meet-the-Divisions/Earth-System-Science-and-Modeling/CVP

[13] US CLIVAR Daily to Decadal: North American Ecological Forecasting Working (Recordings)

[14] https://cpo.noaa.gov/Meet-the-Divisions/Earth-System-Science-and-Modeling/MAPP/MAPP-Task-Forces/Marine-Prediction-Task-Force

[15] https://cpo.noaa.gov/Divisions-Programs/Earth-System-Science-and-Modeling/Modeling-Analysis-Predictions-and-Projections-MAPP/MAPP-Task-Forces/Marine-Ecosystem-Task-Force

Across Priority Areas A-B above, proposals must:

- Identify research relevance to NMFS and CEFI.

- Ensure proposed modeling work adequately leverages useful observational data. This includes the use of historical in situ observations, process field campaign data, satellite data. Proposers should demonstrate the availability and suitability of the data for proposed research. Exploratory work demonstrating the use of emerging new data such as BGC-ARGO floats[16] and other instruments which will contribute to TPOS[17] is encouraged. Proposers will pay particular attention to the use of data from NOAA Research Laboratories and other NOAA entities.

- Leverage existing relevant model datasets available from CMIP6 and/or hindcast experiments; may also propose mechanistic model experiments as justified by proposed research goals.

Across Priority Areas A-B above, proposals may consider:

- How their research complements and extends research done within NOAA Research Laboratories, including key collaborations in the proposals, as appropriate.

- Engagement with NMFS Science Centers as appropriate.

- Research needs at a regional scale, considering NMFS regions of interest.

- High profile-well documented case studies, either past or ongoing, in a broader statistical context.

- Exploratory use of artificial intelligence methodologies to examine/synthesize/emulate observational/model behavior, ensuring approaches are supplemented by physical understanding.

- The applicability of their work to the downstream interdisciplinary projects funded by the CAFA program, and the CAFA program's goals. MAPP generally sits between CVP and CAFA in the R&D value chain and CPO programs encourage connectivity and continuity between program efforts.

Applicants should only submit one application either to the CVP or MAPP CEFI-related competitions as lead Principal Investigator. Applicants may be included as Co-Investigators on multiple proposals submitted to the CVP and MAPP CEFI-related competitions. If applicants are submitting coordinated proposals to both the CVP and MAPP competitions, applicants may articulate this in the relevance section; however, proposals should be able to be funded independently of each other.

Investigators of proposals selected via the CVP and MAPP FY 2024 competitions on marine ecosystems research (as referenced above) will participate in a series of coordination and communication activities in order to share research methods and results, support collaboration and information exchange across proposals, and optimize the outcomes of this joint initiative. Participation in the Marine Ecosystem Task Force (METF)[18] will be expected, and proposals may describe the participation of their team in the METF and the potential contributions they may make to the TF.

MAPP Program and Competition Manager: Daniel Barrie (daniel.barrie@noaa.gov)
NMFS Point of Contact: Roger Griffies (roger.griffies@noaa.gov)

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[16] http://biogeochemical-argo.org/

[17] http://tpos2020.org/

[18] https://cpo.noaa.gov/Divisions-Programs/Earth-System-Science-and-Modeling/Modeling-Analysis-Predictions-and-Projections-MAPP/MAPP-Task-Forces/Marine-Ecosystem-Task-Force

Additional General Guidelines for Applicants

- Principal Investigators submitting a proposal in response to this MAPP Announcement are required to follow the Letters of Intent (LOI) and Proposal preparation and submission guidelines described in the Climate Program Office FY 2024 Federal Funding Opportunity announcement.

- Investigators are strongly encouraged to submit an LOI prior to developing and submitting a full proposal using the FY24 MAPP Letter of Intent submission form[19]; investigators unable to submit via the form should email their LOI to oar.cpo.mapp@noaa.gov. Investigators will be notified by the MAPP Program Competition Manager as to whether a full proposal is encouraged based on the LOI within 30 days of the LOI due date.

- Proposals must clearly identify in their summary which MAPP competition is being targeted (only one competition may be targeted by a given proposal) and which sub-element of the competition is being targeted, if applicable.

- We encourage investigators to consider how their projects may engage individuals from underserved communities including internships or other opportunities, K-12 outreach, etc.

- Administrative questions regarding the Federal Funding Opportunity (e.g. proposal formatting or submission guidelines) should be directed to Diane Brown (diane.brown@noaa.gov).

A webinar will be offered to potential applicants for background on the MAPP program and this solicitation soon after publication of this announcement. For Information on webinar timing and registration procedures please check the MAPP website[20]; prior to when the webinar is held, potential applicants can also sign-up to receive an email notification.

Data Archiving and Computational Resources

Computational Resources

Computational resources on NOAA's high-performance computing platforms may be requested for research sponsored as a result of this solicitation. Proposals should indicate the availability of alternative computing resources should NOAA resources not be available for the project. Proposers who choose to request computational allocations on NOAA's platforms must include in their proposal a request describing the computational resources and data storage required, as well as a description of how they will port their methodology to the NOAA platforms. Proposers must submit an HPC Request Form with their proposal in order to apply for computational resources[21].

Questions regarding the use of NOAA's high-performance computing platforms should be directed to Dan Barrie (mailto:daniel.barrie@noaa.gov).

Data Management Guidance

The MAPP Program requires that all products and deliverables produced via solicitation will reside in the open access / open source domain, freely available to the public.
Public access to grant/contract-produced data will be enabled in one of the following ways (select one):

- Funding recipients are planning to submit data to NOAA National Centers for Environmental

[19] Note, a Google account is needed to submit via this LOI submission form: https://drive.google.com/open?id=1puA8NnW5G7kY1IYiwQ3z254co90Yw_GdqWqjaiJ3J4w

[20] MAPP website: https://cpo.noaa.gov/MAPP

[21] HPC Request

Information (NCEI), which will provide public access and archiving[22]. Point of Contact for NCEI is Nancy Ritchey (Nancy.Ritchey@noaa.gov)

- Data are to be submitted to an International Council for Science (ICSU) World Data System facility: https://www.icsu-wds.org/community/membership/regular-members)
- An existing publicly accessible online data server at the funded institution is to be used to host these data (describe in proposal).
- An existing publicly accessible online "cloud" service is to be used to host the data (describe in the proposal).

The Competition Manager (above) is the responsible NOAA Official for questions regarding this guidance and for verifying accessibility of data produced by funding recipients.

[22] NCEI supports the creation of adequate metadata and data ingest into long term repository holdings using tools such as Send2NCEI (www.nodc.noaa.gov/s2n), for small volume, one-time only data collections) and Advanced Tracking and Resource tool for Archive Collections or ATRAC (www.ncdc.noaa.gov/atrac), for recurring and/or large volume data collections).