

# NOAA Climate, Ecosystems, and Fisheries Initiative

*The NOAA Climate, Ecosystems, and Fisheries Initiative (CEFI) will build the end-to-end, operational ocean modeling and decision support system needed to safeguard the nation's marine resources and resource-dependent communities in a changing climate.*

More information at:  
<https://www.fisheries.noaa.gov/topic/climate>

## The Challenge

Climate change is significantly impacting the nation's valuable marine and Great Lakes ecosystems, fisheries and the many people, communities, and economies that depend upon them. Warming oceans, rising seas, melting sea ice and increasing acidification are affecting ecosystem structure and the distribution and abundance of marine species in many regions.

These changes affect many parts of NOAA's mission, from fisheries management and aquaculture to conservation of protected resources and habitats. The impacts are expected to increase and there is much at risk. In the U.S., for example, marine ecosystems annually contribute over \$210 billion and 1.7 million jobs from fisheries and provide a range of other vital services including recreation and protection from coastal storms and erosion.

To safeguard fisheries and other resources in the face of rapidly changing oceans, resource managers and stakeholders urgently need better information on what's changing, who's at risk and how to increase resilience. NOAA currently must develop the ocean modeling and decision-support system needed to produce, deliver and use information to sustain marine resources and resource-dependent communities in a changing climate.

## NOAA's Response

The Climate, Ecosystems, and Fisheries Initiative (CEFI) is a cross-NOAA effort to build the nation-wide, operational ocean modeling and decision support system (System) needed to reduce impacts, increase resilience and help marine resources and resource users adapt to changing ocean conditions. The end-to-end System will provide decision makers with the actionable information and capacity they need to prepare for and respond to changing conditions today, next year and for decades to come. The CEFI System addresses four core requirements for climate-ready decision-making for marine resources:

1. Delivery of state-of-the-art ocean and Great Lakes forecasts and projections for use in developing climate-informed management advice;
2. Operational capability to use ocean and Great Lakes forecasts and projections to assess risks, evaluate management strategies and provide robust management advice for changing conditions;
3. Continuous validation and innovation through observations and research; and
4. Capability to use climate-informed advice to reduce risks and increase the resilience of resources and the people that depend on them.

The CEFI is a timely, efficient, and effective way to address NOAA's requirements for climate-informed marine resource management. The CEFI System will leverage existing capabilities and make critical new investments in the following three System elements. Each of the three System elements include components essential for the System to be fully functional as illustrated in the next figure:

- Advancing Climate, Ocean, and Ecosystem Understanding
- Operational Decision Support Systems
- Climate Ready Decision Making

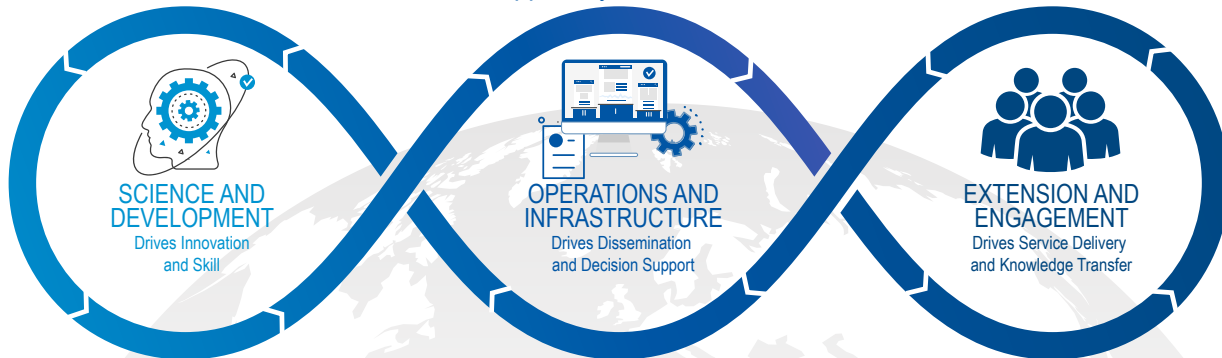


# CEFI Integrated Ocean Modeling and Decision Support System

▶ Advancing Climate, Ocean, and Ecosystem Understanding

▶ Operational Climate, Ocean, and Ecosystem Decision Support Systems

▶ Climate Ready Decision Making



## National Community of Practice

Convene a nationwide community of practice to harness broad community expertise to guide development of the CEFI ocean modeling and decision support system at regional and national scales.



## Enhanced Observations

Expand ocean- and marine-life observing systems to continuously improve early warnings, longer-term projections and management advice for climate-informed decision making.



## Targeted Research that Fuels Innovation

Support collaborative research and modeling to increase innovation and understanding of future oceans, impacts on marine resource and management options.



## Enhanced Ocean Modeling Capabilities

Enhance ocean and earth system models and High-Performance Computing (HPC) capacity building on a strong, sustainable national foundation for CEFI regional and global modeling efforts.



## Regional Ocean Modeling and Prediction

Regional Ocean Modeling Teams utilize the national ocean modeling framework to produce and deliver regional ocean hindcasts, forecasts, and projections for use by the FACSS and others in developing climate-informed management advice.



## CFI Information Hub

Build a comprehensive CEFI Information Hub to provide easy access to regional ocean model outputs (high spatial resolution reanalysis, hindcasts, predictions, and projections optimized for management applications), ecosystem projections and other information relevant to climate-informed resource management.



## Fisheries and Climate Decision Support System (FACSS)

Establish expert teams at NMFS Science Centers to accelerate the production of climate-informed assessments and management advice to help decision-makers sustain fisheries, conserve protected resources, and maintain ecosystem services in collaboration with existing programs and external partners.



## Ecosystem Prediction

The FACSS—in concert with cross-NOAA and external experts—will provide a variety of products and services for use in climate-informed management advice and decision making including robust projections of future ecosystem conditions.



## Increasing Capacity for Climate Ready Decisions

Increase the capacity of decision-makers to use climate-related information and management advice in decisions concerning marine resources and resource-dependent communities.



## Rapid Response

Provide forecasts, early warnings, and plans for effective response to near-term extreme events such as marine heat waves and toxic algal blooms.



## Climate Ready Decision Support Tools

Provide climate-enhanced risk assessments, stock assessments, management strategy evaluations, adaptation frameworks and other tools for climate-informed decision making.



## Improve Surveys and Research

Use climate and ecosystem information to improve the efficiency and effectiveness of fisheries research and surveys to adjust changing ocean conditions and shifting species distributions.



## Coordinated Science and Advice

Increase coordinated delivery of climate-related science and management advice internally and externally through national strategies aligned with regional priorities and efficient information sharing.

## The Takeaway

NOAA's Climate, Ecosystems, and Fisheries Initiative will provide the climate, ocean and ecosystem information and capacity needed to assess risks, identify adaptation strategies and safeguard both marine and Great Lakes resources and the communities that depend on them.