Executive Summary

The NOAA Fisheries Climate Science Strategy (NCSS)\(^1\) was published in 2015 to increase the production, delivery, and use of the climate-related information needed to fulfill the agency’s mandates in a changing climate. The NCSS identifies a suite of objectives and specific actions to help achieve this goal. The NCSS objectives focus on supporting infrastructure, tracking change, understanding mechanisms, projecting future conditions, and informing and supporting management. Beginning in 2016, NOAA Fisheries worked with partners in each region to develop seven Regional Action Plans (RAPs) to implement the NCSS over a 3-5 year period. In 2020, NOAA Fisheries conducted an assessment of progress to implement the NCSS over the five years since the release of the NCSS.

This five year progress report highlights the goals, activities, and accomplishments of the seven RAPs and national efforts from 2016-2020. Chapters are devoted to each RAP and provide summaries of the progress made to date. The chapters also provide recommendations for future focus areas and actions for continued progress towards achieving the NCSS objectives in each region.

Each region has a unique set of capabilities and challenges for managing the Nation’s living marine resources under changing climate and ocean conditions. The individual RAP chapters herein provide the most appropriate and complete description of regional progress to implement the NCSS. Overall, a number of the priority goals listed in the NCSS have been met, while progress towards many continues, and others are in clear need of additional effort. A few trends in the types of activities and path to success are:

- Many activities and a majority of the progress overall tended to be associated with NCSS objectives related to maintaining infrastructure and tracking changes to provide early warnings. Products and tools such as Ecosystem Status Reports (ESRs) and Climate Vulnerability Assessments (CVAs) have been, or are nearly, developed in each region.
- Good progress was made on actions affiliated with the NCSS objectives focused on understanding mechanisms and projecting future conditions. There was a bit more regional variability in terms of effort and progress towards achieving these objectives.
- There has been some progress to improve the science and tools to help support climate-informed resource management. Increased effort is needed to fulfill the NCSS objectives focused on developing and evaluating management strategies robust to changing climate and ocean conditions.
- In general, the areas of progress and the amount of progress align with the availability of science information and/or technical capability, the support of RAP activities by regional leadership, and available funding from regional and national programs.

\(^1\) [https://www.fisheries.noaa.gov/national/climate/noaa-fisheries-climate-science-strategy](https://www.fisheries.noaa.gov/national/climate/noaa-fisheries-climate-science-strategy)
Establishment of NMFS Regional Climate Teams and RAPs has provided a framework that helped increase coordination, collaboration, and implementation of regional efforts to fulfill national goals.

While the many achievements and continued progress towards implementing the NCSS over the last five years should be celebrated, there is much still to be done to fulfill the NCSS and build a climate-ready NOAA Fisheries. A number of the NCSS recommended actions still need to be completed. Several of these recommendations are highlighted below within three categories of the NCSS objectives:

Support Essential Infrastructure and Track Change
- Rebuild and expand ecosystem surveys to fill in spatial and temporal gaps, and account for current and anticipated shifts in species distributions
- Work with partners to leverage capacity and resources
- Produce regular (e.g., annual) updates of Ecosystem Status Reports in each region
- Ensure adequate resources are dedicated to climate-related, process-oriented research to better understand, prepare for, and respond to future impacts

Understand Mechanisms of Climate Impacts and Project Future Conditions
- Identify regional data gaps and devise data collection and research programs to fill biological, physical, and socio-economic information needs
- Advance regional ocean, biogeochemical, ecosystem, and living marine resource models and model coupling
- Develop centralized databases and web tools to provide easy access to ecosystem and fisheries information, including species distribution shifts, ecosystem indicators, and stock status

Inform and Support Climate-Informed Management
- Establish climate-smart terms of reference for incorporating climate and ecosystem information into management and policy areas (e.g., fishery management and ecosystem plans, permitting, recovery plans, etc.)
- Work with fishery management councils to identify future climate and ecosystem scenarios (Scenario Planning) and evaluate risks and risk policies
- Operationalize management strategy evaluation frameworks. This includes working with fishery management councils to identify their needs and identifying strategies robust to anticipated climate, ecosystem, and socio-economic conditions
- Deliver Ecosystem Status Reports to fishery management councils and stakeholders on an annual basis to provide context and early warnings regarding ecosystem conditions
- Account for changing productivity and distribution within climate-smart biological reference points (BRPs) and develop “on-ramps” for incorporating climate information into living marine resource management

In summary, establishment and implementation of the RAPs has helped increase the coordination and execution of climate-related efforts called for in the NCSS. While progress has
been made in some areas, meeting the NCSS goals will require enhanced resources to support data collection and management efforts, IT infrastructure and modeling capacity, and fostering strong communication between scientists, managers, and stakeholders. Working together to support and address climate science and management needs will allow NOAA Fisheries to better meet its stewardship responsibility for the Nation’s living marine resources.