

NOAA Fisheries Northeast Habitat Climate Vulnerability Assessment

Project leads: Mark Nelson, Mike Johnson, Emily Farr, Jon Hare

Objective of the Northeast Habitat Climate Vulnerability Assessment (HCVA) Project

The goal of this project is to provide regional fisheries, habitat, and protected species managers and scientists with a practical tool to efficiently assess the relative vulnerability of habitats to climate change. The results of the assessment may be used to improve essential fish habitat (EFH) designations and aid in EFH consultations, set habitat conservation priorities, understand cumulative impacts of fishery management actions, and provide long-term context for the management of protected and fishery species.

Project Scope

The Northeast HCVA is focused in the Northeast U.S. coastal region (Cape Hatteras, NC to the Maine/Canada border) with the aim of building a framework that can be applied to other U.S. regions. The assessment includes fifty habitat subclasses in the riverine, estuarine, and marine systems, based on a modified Cowardin classification. These sub-classes correspond to the range of habitats used by fishery and protected species managed by NOAA Fisheries.

Assessment Framework

The HCVA uses a similar framework as the [Northeast Fish and Shellfish Climate Vulnerability Assessment](#) (Hare et al. 2016). The HCVA considers the overall vulnerability of a habitat to climate change to be a function of two main components: exposure and sensitivity. Exposure is a measure of the predicted environmental change that a habitat may experience within the study area. It is the overlap between the current distribution of habitat and the magnitude and spatial distribution of the expected environmental change. The sensitivity component is composed of habitat attributes that are believed to be indicative of the response of a habitat to potential changes in climate. The assessment relies heavily on expert opinion to score the sensitivity and exposure of each habitat, in addition to published literature, spatial habitat distribution data, and climate projections.

The HCVA is assessing climate exposure under end-of-century projections based on the Intergovernmental Panel on Climate Change RCP 8.5 emissions scenario using two climate models—the Regional Ocean Modeling System: Northwest Atlantic Dynamical Downscaling (ROMS-NWA) and the Coupled Model Intercomparison Project 5 (CMIP5). The **exposure factors** used in this assessment are: sea surface temperature, bottom temperature, surface salinity, bottom salinity, pH, sea level rise, precipitation, stream temperature, and streamflow. The **sensitivity attributes** used in this assessment are: habitat condition, habitat fragmentation, distribution/range, mobility/ability to spread or disperse, resistance, resilience, sensitivity to changes in abiotic factors, sensitivity/intensity of non-climate factors, and dependency on ecological linkages.

Assessment Outputs

The assessment will develop a ranked list of the relative vulnerability of the fifty assessed habitat subclasses. Detailed results for each habitat will be discussed in a short narrative to describe the key drivers of vulnerability. The results will be written up in an article to be published in a scientific journal, in addition to more tailored products for end users as needed.

Project Timeline

The project kicked off in Fall 2017, and is anticipated to be completed by Summer 2020.