

Incorporating thermal habitat to improve assessment and projections for temporal and spatial dynamics of American lobster (*Homarus americanus*) in a changing Gulf of Maine and southern New England

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Abstract

The pinnacle purpose of this project is to develop a modelling framework to quantify the influence that thermal habitat has on American lobster (*Homarus americanus*) recruitment dynamics and to incorporate these effects into stock assessment and projection models. The current length-structured assessment model for American lobster relies on estimated biological parameters and fishery data but could be improved by incorporating these environmental effects. Using output from the improved stock assessment model, as well as forecasted environmental parameters, a stock projection model will be developed capable of seasonally estimating the American lobster spawning biomass, catch, and sex ratios of the Gulf of Maine and Southern New England population. Alongside this model, a bioclimate model framework will be modified to spatially express the projected American lobster stock under different climate scenarios on a scale larger than what is capable of the stock projection model. These research facets will better the stock assessment for American lobster as well as provide short-term (<5 years) stock projections and long-term (>5 years) spatial projections for the Gulf of Maine and Southern New England population. The framework developed in this study can also be applied to other fisheries.

Keywords:

Homarus americanus, lobster, Gulf of Maine, environmental drivers, stock assessment, projection model, bioclimate model

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