

Climate induced habitat changes in commercial fishery stocks

Authors: Brian Grieve, Richard Bell, Marta Ribera

Abstract

Due to ongoing climate change, many vital marine habitats are altering in ways unanticipated and unaccounted for in traditional fishery stock assessments. Other studies investigating future distribution and abundance of fish species in response to climate change are often strictly correlative, potentially limiting their use when projecting over space and time. One NOAA stock assessment has used established physiological relationships to model suitable habitat for butterfish. Here, we expand on that methodology, utilizing state and federal fisheries-independent data for twenty-six commercial fish species in the United States Northeast Shelf. Thermal habitat is modelled by fitting a modified Johnson and Lewin equation as a proxy mechanistic relationship between temperature and abundance. These responses are combined with habitat patch dynamics derived from high resolution benthic structure and sediment data to provide a spatially explicit, biologically relevant projection of thermal-benthic habitat suitability. These indices can be implemented over a variety of time scales and will be useful to help incorporate physiological and biological elements into stock assessments, allowing climate change to be empirically considered in fisheries management decisions.

Keywords:

fisheries, climate change, stock assessments, habitat, species distribution models

Contact author:

Brian Grieve
The Nature Conservancy
Narragansett, Rhode Island, USA
brian.grieve@tnc.org
401-874-6872