AMERICAN LOBSTER RESEARCH PROGRAM 2024

Eight projects that advance our scientific knowledge of the American Lobster fishery and support the resiliency of fishing communities in the face of environmental change and economic uncertainty were selected for a total of $2,250,028 in federal funding.

A multi-disciplinary approach to investigating larval transport, settlement and recruitment in the Outer Cape Cod lobster fishery

Federal funding: $260,782

Project Lead: Owen Nichols, Center for Coastal Studies

The local fishing community and regional fishery managers want more data on when and where different sizes and sexes of American lobsters are found along the outer Cape Cod area. Scientists and fishermen will work together to study lobsters, collecting juvenile and undersized lobsters with specialized traps and recording detailed information about lobster catches on fishing boats (including sex, size, eggs and water temperature). Computer models using the above data will be used to predict when and where lobster larvae are found. Management of the lobster fishery will be improved by using this data to gain a better understanding of where lobsters caught by fishermen off Cape Cod come from, where they grow up and where they lay eggs.

Changing economic efficiency in the U.S. American lobster fishery and implications for management

Federal funding: $146,784

Project Lead: Alexa Dayton, Maine Center for Coastal Fisheries

This research provides the needed lobster harvester cost and effort data to assess the economic implications of and adaptations to ecosystem and/or regulatory changes for the Gulf of Maine American lobster industry. Researchers will administer a detailed socio-economic and fishing effort survey to the Maine lobster industry, which will allow the assessment of profit efficiency and harvester operating models for representative year fishing 2024. This project will generate a vital dataset to augment prior survey efforts and create a comprehensive long-term time series of socioeconomic surveys for the Gulf of Maine lobster industry. The results of this project will aid decision-makers and fishermen in their evaluation of proposed conservation and management alternatives as well as their understanding of the impacts of potential gear investments.

Characterizing hormone dynamics in the American lobster to predict molting probability: Insights for addressing knowledge gaps in the molt process

Federal funding: $272,084

Project Lead: Amalia Harrington, University of Maine

The study aims to develop a novel approach to assess molt probability in American lobsters based on key hormonal indicators. The project team will collect, observe and sample lobsters throughout the molt cycle to gather a suite of biological indicators of molting. These data will be used to inform machine learning to build a predictive model of molt probability that will be subsequently validated by expanded field sampling in year 2 of the project. The overarching goal of this work is to inform growth matrices utilized in the Atlantic States Marine Fisheries Commission American Lobster Stock Assessment process, particularly in the context of rising ocean temperatures.

Characterizing socioeconomic processes and impacts of change in the American lobster fishery

Federal funding: $190,493

Project Lead: Joshua Stoll, University of Maine

This research project aims to provide timely socioeconomic information to the American lobster industry, science community and managers to inform and support effective decision-making that helps to bolster the resilience of lobster fishing communities in the face of environmental change and economic uncertainty. This project will perform four interconnected activities: 1) integrating socioeconomic indicators of resilience into the American Lobster Stock Assessment process by expanding prior research funded by the American Lobster Initiative; 2) evaluating the socioeconomic implications of past regulatory change on the fishing fleet; 3) creating a rapid-response system to share information generated from the research with interested parties; and 4) providing training opportunities for early career researchers.

Genomic population structure of American lobster in U.S. waters for stock delineation

Federal funding: $277,578

Project Lead: Timothy O'Donnell, Gloucester Marine Genomics Institute

The purpose of the project is to conduct a genomic population structure evaluation on American lobsters collected throughout the Gulf of Maine, Georges Bank and Southern New England to establish biologically accurate stock boundaries. Project activities will include: 1) assembling an improved lobster genome; 2) collaborating with commercial lobstermen and regional lobster biologists to collect lobster tissue samples throughout New England and one Canadian location; 3) assessing the lobster genetic population structure and responses to environmental conditions recorded in the genome; and 4) sharing results with the Atlantic States Marine Fisheries Commission's American Lobster Technical Committee and soliciting feedback to improve stock boundaries and management strategies.

Recruitment building blocks: Understanding American Lobster (*Homarus americanus*) growth and environmental effects during the first year

Federal funding: $360,853

Project Lead: Heather Glon, Maine Department of Marine Resources

This research will expand and reexamine aspects of the Maine Department of Marine Resources's Larval Lobster Survey and Lobster Settlement Survey. Within the Larval Survey, researchers plan to expand seasonally and also collect additional environmental and biological data. Researchers will adapt and test a novel tagging method in small lobsters collected on the survey to understand how fast they grow during their first year of life. The data collected from the Larval Survey and the tagging experiments will be used to model the underlying mechanisms influencing lobster growth and will quantify if any phenological shifts have occurred that impact the Settlement Survey. The findings will provide critical data to inform estimates of recruitment developed through the Atlantic States Marine Fisheries Commission Lobster Stock Assessment process.

Shifting interactions in the microbiomes of lobster eggs and their implications for lobster health

Federal funding: $553,500

Project Lead: Jeff Shields, Virginia Institute of Marine Science

The broader goal of this project is to understand the role of microbiomes on lobsters from the perspective of lobster health and disease resistance. Researchers aim to identify beneficial bacteria that facilitate healthy lobster egg development and test them against pathogens that cause mortality or morbidity to lobster embryos. This research will characterize what microbes are present on lobster eggs and where they come from. Other objectives include examining egg mortality in relation to shifting microbiomes that develop during embryogenesis, and determining which members of the microbiome are beneficial probionts. Researchers will explore the feasibility of developing the findings for potential field applications to promote healthy egg development in lobsters. The findings will be used to inform fisheries managers about what constitutes healthy versus disease microbiomes on lobster embryos.