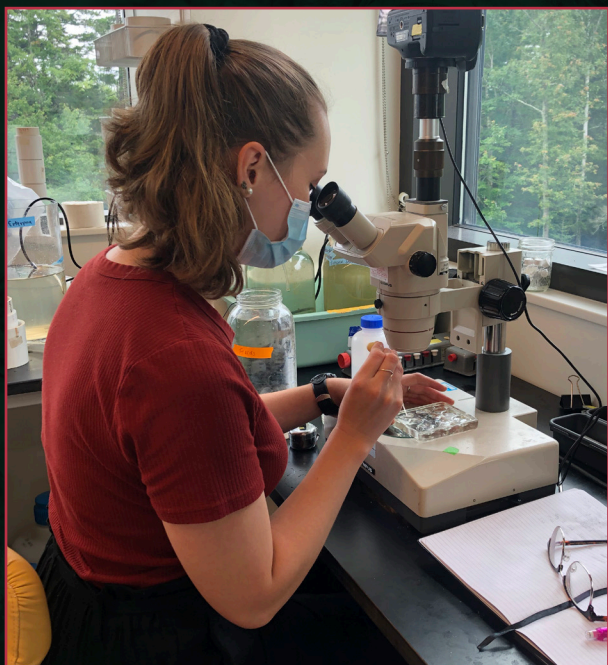# Sea Grant's
American Lobster Initiative

Addressing critical knowledge gaps about the American lobster and its iconic fishery in a dynamic and changing environment

Sea Grant
NORTHEAST

American Lobster Initiative

Tim Briggs

The American lobster supports one of the largest and most economically valuable single-species fisheries in the United States.[1] From harvesters and dealers to the restaurant and tourism sectors, thousands of people across the Northeast depend on a healthy and prosperous lobster fishery.

The American lobster's ocean habitat, however, is changing drastically. Rising ocean temperatures are a major concern for the growth and survival of lobsters. Changes in the food web, ocean chemistry (ocean acidification), and available habitat present additional challenges. The **Sea Grant American Lobster Initiative (ALI)** is working to better understand how these changes affect the American lobster and its iconic fishery. The ALI's long-term goal is to increase the industry's resilience to new challenges through collaborative research.

Funded by the National Oceanic and Atmospheric Administration's National Sea Grant College Program, the ALI has two components — the American Lobster Research Program and the Northeast Regional Lobster Extension Program. Together, the programs discover and share new knowledge with industry members and resource managers from Maine to New York.

Research

From southern New England to Downeast Maine, the environmental conditions that influence how lobsters grow and where they go are dynamic and changing quickly. Understanding the rate and scale of these changes is important for fisheries management. The ALI is also supporting research to help lobstermen prepare for changes in regulations.

Since 2019, the National Sea Grant Office has funded a total of **40 projects** to help us better understand:

Lobster biology and ecology

- Growth, maturation, larval development, and impacts of ocean acidification;
- Distribution and abundance, including ecosystem shifts; and
- Interactions with other species.

Lobster fishery management and technology

- Socio-economic lessons learned from the southern New England stock decline;
- Development of gear technology;
- Barriers to bringing new gear technology to commercial scales; and
- Bait alternatives.

The ALI supports teams of researchers and research partnerships between state agencies, academia, and industry. The Research Program priorities are informed by listening sessions with regional fishing industry partners; state and federal fisheries managers; and university, state, and federal fisheries researchers.

Extension

Sea Grant extension programs in six Northeast states work together to support and enhance the American Lobster Research Program. Extension agents ensure that industry and management partners across the region have the opportunity to contribute to and benefit from ALI research. Through industry interviews, social science efforts, stakeholder meetings, and multimedia science communication products, extension agents work to expand awareness of the effects of biological, social, and environmental change on lobster and its fishery. Broadly, the Extension Program aims to:

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- Increase understanding of biological, economic, and social impacts of ecosystem change in the region;
- Identify attributes of a resilient lobster industry;
- Identify research, technical assistance, and outreach needs; and
- Increase opportunities for cross-sector collaboration.

The ALI Extension Program strives to be nimble and respond to emerging lobster-related issues and challenges.

Amalia Harrington

Regional Steering Committee

A Regional Steering Committee consisting of industry and management representatives provides input on their needs and partner engagement. Committee members have represented the following organizations:

Maine Lobstermen's Association, ME

Maine Department of Marine Resources, ME

Maine Lobster Dealers' Association, ME

Connecticut Department of Energy & Environmental Protection, CT

Rhode Island Department of Environmental Management, RI

New York State Department of Environmental Conservation, NY

Atlantic States Marine Fisheries Commission, NY

Massachusetts Lobstermen's Association, MA

NOAA Fisheries Greater Atlantic Regional Fisheries Office, MA

Atlantic Offshore Lobstermen's Association, NH

1. National Marine Fisheries Service (2022). Fisheries of the United States, 2020. U.S. Department of Commerce, NOAA Current Fishery Statistics No. 2020. Available at: fisheries.noaa.gov/national/sustainable-fisheries/fisheries-united-states

American Lobster Initiative Research and Extension Projects
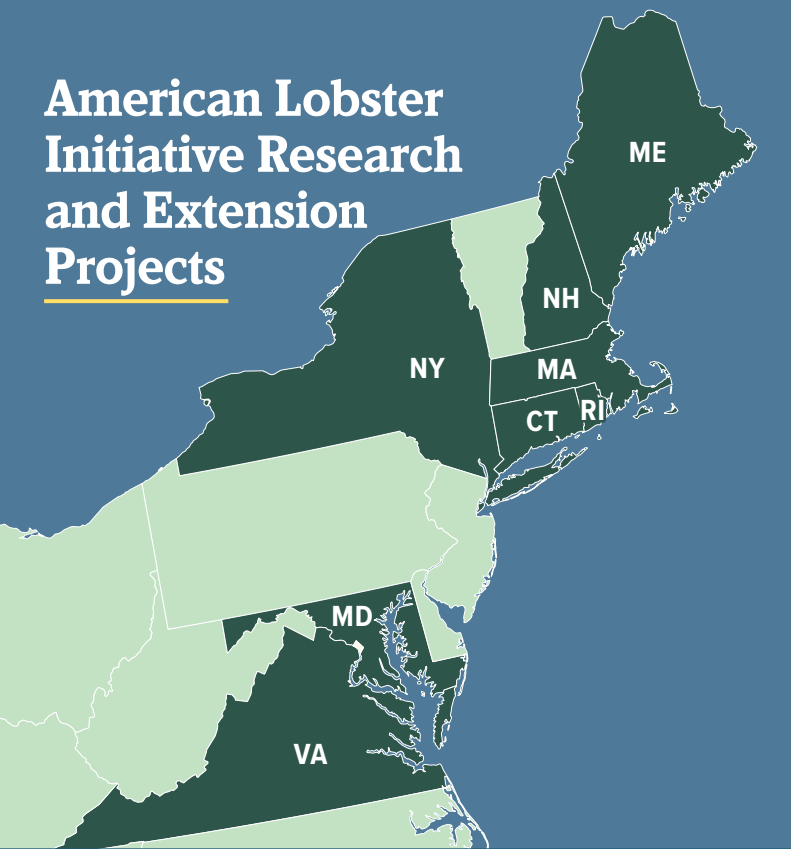
CONNECTICUT

Connecticut Sea Grant (Concepcion), 2019 • Sea Grant Northeast Regional Lobster Extension Program: Connecticut

MAINE

Gulf of Maine Research Institute (Mills), 2019 • Resilience, adaptation, and transformation in lobster fishing communities

Gulf of Maine Research Institute (Tokunaga), 2019 • Fish less, earn more: assessing maximum economic yield effort levels in Gulf of Maine's lobster fishery

Maine Sea Grant (Harrington), 2019 • Sea Grant Northeast Regional Lobster Extension Program: Maine

University of Maine (Brady), 2019 • Projecting climate-related shifts in American lobster habitat and connectivity

University of Maine (Wahle), 2019 • Linking the Gulf of Maine pelagic food web to lobster recruitment dynamics

Wells National Estuarine Research Reserve (Goldstein), 2019 • Potential influence of increased water temperatures on the distribution of female American lobsters and shifts in larval recruitment

Department of Marine Resources (Waller), 2020 • Testing and developing effective non-invasive female maturity assessment methods and protocols

Gulf of Maine Research Institute (Mills), 2020 • Understanding and improving spatial distribution projections for lobster

University of Maine (Golet), 2020 • Incorporating changes in thermal habitat and growth to improve the assessment of American lobster stocks and spatial distribution

University of Maine (Stoll), 2020 • Defining indicators of resilience in the American lobster fishery

Department of Marine Resources (Peters), 2021 • Answering an industry question, "Who's eating juvenile lobsters?" using predator stomach content analysis

University of Maine (Brady), 2021 • An ecosystem-based approach to modeling climate-related impacts on American lobster habitat

Wells National Estuarine Research Reserve (Goldstein), 2021 • Understanding environmental drivers of egg production and stability

Department of Marine Resources (Staples), 2022 • Integrating and evaluating non-traditional gear technologies to reduce the risk to whales from fixed-gear fisheries

Gulf of Maine Lobster Foundation (Pelletier), 2022 • Providing the lobster industry new gear technology in response to regulatory and environmental changes

Gulf of Maine Research Institute (Mills), 2023 • Ecosystem regime shifts and American lobster populations

Bigelow Laboratory for Ocean Sciences (Groner), 2023 • In hot water? Predicting how shifting temperatures and molting phenologies will impact regional patterns of epizootic shell disease in American lobster

Maine Center for Coastal Fisheries (Dayton), 2024 • Changing economic efficiency in the U.S. American lobster fishery and implications for management

University of Maine (Harrington), 2024 • Characterizing hormone dynamics in the American lobster to predict molting probability: Insights for addressing knowledge gaps in the molt process

University of Maine (Stoll), 2024 • Characterizing socioeconomic processes and impacts of change in the American lobster fishery

Maine Department of Marine Resources (Glon), 2024 • Recruitment building blocks: Understanding American Lobster (Homarus americanus) growth and environmental effects during the first year

Wells National Estuarine Research Reserve (Gutzler), 2024 • The role of foraging and diet in determining energetic availability for female lobsters

MARYLAND

University of Maryland Center for Environmental Science (Nesslage), 2023 • Development of comprehensive, time-varying growth transition matrices for American lobster

MASSACHUSETTS

Massachusetts Division of Marine Fisheries (Pugh), 2019 • Growth in large offshore lobsters: addressing a critical data gap in the US Lobster Stock Assessment

Woods Hole Sea Grant (Rheuban), 2019 • Sea Grant Northeast Regional Lobster Extension Program: Massachusetts

Massachusetts Department of Fish and Game (Pugh), 2020 • Understanding the cause of low dissolved oxygen in Cape Cod Bay and initiating a hypoxia warning system for the lobster fishery

University of Massachusetts (Jordaan), 2020 • Bait alternative development and future visioning in the New England lobster fishery

Woods Hole Oceanographic Institution (Pineda), 2020 • Surface convergences: a critical pelagic microhabitat for American lobster postlarvae?

Northeastern University (Grabowski), 2021 • Investigating the impacts of range-expanding species to the American lobster fishery

NEW HAMPSHIRE

New Hampshire Sea Grant (Bradt), 2019 • Sea Grant Northeast Regional Lobster Extension Program: New Hampshire

Atlantic Offshore Lobstermen's Association (Henninger), 2020 • Assessing the broad-scale distribution and abundance of lobster larvae and their potential food sources

New Hampshire Fish and Game (Carloni), 2021 • The influence of season and temperature on the distribution and abundance of juvenile lobsters

NEW YORK

New York Sea Grant (Clemetson), 2019 • Sea Grant Northeast Regional Lobster Extension Program: New York

Stony Brook University (Chen), 2021 • How warming waters could change the American lobster stock dynamics under different management regulations

RHODE ISLAND

Rhode Island Sea Grant (Cygler), 2019 • Sea Grant Northeast Regional Lobster Extension Program: Rhode Island

University of Rhode Island (Collie), 2020 • Early life history of American lobsters in coastal southern New England waters

Rhode Island Department of Environmental Management (Truesdale), 2023 • Assessing American lobster distribution, movement, and shell disease impacts in a changing Southern New England system

VIRGINIA

Virginia Institute of Marine Sciences (Rivest), 2019 • Effects of multiple stressors on American lobster reproduction, egg development, and emerging larvae

Virginia Institute of Marine Science (Shields), 2024 • Shifting interactions in the microbiomes of lobster eggs and their implications for lobster health

For additional information on the ALI, questions, or comments, please contact Michelle Brown (michelle.l.brown@maine.edu), the Lobster Research and Extension Coordinator based at Maine Sea Grant.