Principal Investigators: Margaret E. Petruny-Parker, Executive Director, Commercial Fisheries Research Foundation; David Spencer, President, Commercial Fisheries Research Foundation, F/V Nathaniel Lee, Newport, RI; Anna Malek, Program Administrator, Commercial Fisheries Research Foundation

The American lobster fishery is a substantial and valuable fishery in the southern New England region, but there is agreement that the data used to manage the fishery is inadequate. Specifically, there is a marked mismatch between the location of primary lobster fishing grounds (>10 miles offshore), and the data used to assess the stock (<3 miles from shore). The natural history of this species and the impacts of climate change are also poorly understood. In response, the Commercial Fisheries Research Foundation has launched a collaborative pilot project aimed at developing an expedient, cost-effective way to fill these data gaps. Lobstermen use modern technologies such as Android tablets and digital calipers to efficiently and accurately record and transmit biological data (length, sex, eggs, shell-disease, V-notch) about retained and discarded lobsters, as well as the location (latitude/longitude), depth, and soak time of sampled trawls. Lobstermen are also able to make notes and record images using the tablets. State, regional, and federal managers and lobstermen worked together to develop the sampling protocol and data management policies. The potential exists to expand data entries to include environmental data. The pilot project involves 12 lobster vessels from the northeast coast (USA), and runs from January 2013 to June 2014. Feedback from participating lobstermen and scientists is encouraging, with other lobstermen in the area seeking to become involved. This pilot project can serve as a model for other fisheries, expanding fishermen involvement in data collection, and ultimately better informing resource management decisions.

#2: Environmental Monitors on Lobster Traps: building a low-cost observing system with help from lobstermen
James Manning, Oceanographer
NOAA-NMFS Northeast Fisheries Science Center

Beginning in 2000, nearly a hundred New England lobstermen have been attaching internally-recording temperature probes to their traps. In 2001, several of these individuals also deployed Seabird Microcat salinity sensors. These time series are now being used to validate numerical model simulations. Beginning in 2004, surface drifters built by local students, have been deployed by lobstermen at dozens of locations along the coast. These units, equipped with low-cost GPS transmitters, have been used by approximately 50 different institutions since that time and have now collectively logged close to a million kilometers of ocean. In 2008, a set of low-cost bottom-current meters, recently developed by Vitalii Sheremet, have been installed on dozens of traps. It is now possible, therefore, to examine the variability of surface and bottom water conditions on hourly to inter-annual time scales at locations throughout the Gulf of Maine and along the Southern New England shelf. Time series and drifter tracks are available at www.emolt.org.

Year-to-year bottom temperature variations have been documented at most sites. Inter-annual differences of several degrees are attributed to both local climate and remote source water. While this signal is fairly coherent throughout the Gulf of Maine, other shorter-time-scale processes such as those due to local tide and wind are documented as well. The primary purpose of eMOLT data is to feed a set of numerical circulation models currently under development around the region. Given the observations of temperature, salinity, and current velocity, models can be initialized and validated. Natural processes potentially affecting the growth, survival, and ultimate fate of lobster and other marine species can be addressed using model output.
#3: Expansion of the MADMF Southern New England Ventless Lobster Trap Survey
Massachusetts Division of Marine Fisheries
P.I.: Robert Glenn, Chief Marine Fisheries Biologist
Derek Perry, Marine Fisheries Biologist
Tracy Pugh, Marine Fisheries Biologist
Mike Trainor, Fisheries Technician
Steve Wilcox, Assistant Marine Fisheries Biologist

Participating vessels and captains:
F/V Sherri & Deke, Capt. Arthur DeCosta
F/V Andrea C, Aaron Cebula
F/V Cynthia Lee, Capt. Jarrett Drake

The ventless trap survey that occurred in Buzzards Bay (MA state waters portion of LMA 2) has provided MADMF with a valuable tool for monitoring a historically productive region since 2006. However, as effort in the fishery has shifted progressively further from shore, the survey did not spatially overlap with the bulk of the current fishery, nor did it well represent the deeper habitat which the lobsters appeared to be occupying. Expansion of the survey into federal waters was conducted with the intent to accurately monitor the portion of the population on which the fishery currently operates, and to provide the only high resolution fishery-independent monitoring program in the Federal portion of LMA 2. This expansion added potential sampling stations in the federal portion of NMFS SA 538, as well as stations in the northern-most portion of SA 537, for a total of 42 sampling stations in 2011 and 2012. Results indicated that there were few lobsters within the shallow interior of Buzzards Bay, with legals and sublegals caught primarily in deeper waters outside the Bay. Ovigerous females in particular were extremely rare inside the Bay, but were captured in the new expanded area sampling stations. We concluded that the complete expanded survey area (including the original and new areas) was a more appropriate survey area for monitoring the lobster resource in this region. Additionally, the expanded area allows us to more effectively monitor commercially important bycatch species such as whelk and Jonah crabs, as well as any emerging fisheries.

#4: The Utility of Industry-Based Trawl Surveys for stock assessment: Examples from New England
Gregory DeCelles, Research Scientist
UMASS Dartmouth, SMAST

Our experience with industry-based surveys demonstrates that forming collaborative partnerships between scientists and fishermen can greatly improve the results of surveys and stock assessments. In our research, involving members of the fishing industry during each stage of the survey design and planning process was critical for improving survey results. While planning surveys, we solicited information from fishermen’s experience to define our study areas, and to choose the most appropriate times of year to sample the resource. We collaborated with fishermen to define the survey objectives, design survey trawls, develop practical protocols, and interpret results. The greatest benefits from collaborating with the fishing industry have been realized during field work. Fishing vessels provide a cost-effective platform for fisheries-independent surveys. The local ecological knowledge of our industry partners allowed us to extend the sampling area to habitats that are difficult to trawl and are typically undersampled by research vessels. Fishermen’s practical experience was also valuable for minimizing lost sampling time when problems arose, such as trawl damage. After field work and data analysis were completed, we found that it is important to share the results of the surveys with our industry collaborators, because their unique perspectives offered important insights into the results. By combining the skill sets of fishermen and fisheries scientists, collaborative industry-based surveys provide an important platform for collecting the information that is needed for accurate stock assessments.
#5: Replenishing Long Island Sound (LIS) with temperature tolerant and disease resistant Lobsters
M. Sanders, H. Laufer, N. Perlot, and S. Luongo
Lostagen LLC, 1084 Shennecosset Road, Groton CT 06340
The Southern New England (SNE) American lobster (Homarus americanus, H. Milne Edwards, 1837) stock is critically depleted, experiencing recruitment failure (Howell, 2012), and closed for the remainder of the lobster fishing season (Sept. 22-Nov. 14). The warmer than average water temperatures above 20°C caused respiratory and immune system distress of the mature and juvenile lobsters. This was compounded with a chronic wound infection referred to as epizootic shell disease (ESD) and other stressors that further depleted the stock in Long Island Sound (LIS, ASFMC, 2010). The warmer than normal water temperatures by the shoreline also caused the spawning females to migrate into deeper waters. This migration of spawning females and the mortalities due to ESD are hypothesized to account for the primary reasons why juvenile lobsters (stage 4) have lower than normal annual densities throughout LIS since 2001. The other concern is that the incidence of ESD is approaching 40% in Eastern LIS, making these lobsters completely unmarketable, and we are starting to see a higher incidence of ESD (although less than 3%) in Maine and Canada. Lostagen LLC is a new start up in the Technology Incubation Program at University of Connecticut (UCONN TIP) located in Groton CT. Lostagen LLC is dedicated to improving the sustainability and security of the American lobster through the development of innovative solutions to make lobsters temperature and epizootic shell disease resistant. The Lostagen team have over 50 years experience in the lab studying the cell and molecular biology of the American lobster, host pathogen biochemistry and 20+ years experience in starting and growing successful companies- from product concept to commercialization. In addition, the management team has hired some very bright and energetic UCONN marine science graduates and compiled a world-class team of lobster expert consultants that cover all aspects of best practices in lobster aquaculture, disease management, and etiology. The purpose of this project is to develop ten novel biomarker assays to screen for lobsters that are temperature and epizootic shell disease (ESD) resistant. Lostagen will use these biomarkers to develop a brood stock of temperature and disease resistant lobsters to replenish LIS and develop a world-class aquaculture facility for the American lobster.

#6: Electronic Monitoring in the Northeast
Glenn Chamberlain, Fishery Biologist
NOAA-Northeast Fisheries Observer Program
The National Marine Fisheries Service’s (NMFS) Fisheries Sampling Branch (FSB) of the Northeast Fisheries Science Center (NEFSC), is conducting a project in conjunction with Archipelago Marine Research Ltd., to investigate the utility of Electronic Monitoring (EM) technology as a monitoring tool in the Northeast Multispecies Fishery. The project relies on participating fishermen to collect high quality data using the EM system. Fishermen provide input to project staff on catch handling, vessel operations, and equipment performance throughout the study. Data collected by fishermen are compared to EM data and dockside monitor data during the study as well. Results of the EM study will be provided to fishery managers and policy makers to determine whether EM will be approved as a monitoring and data collection alternative.

#7: Developing a Tool for Collaborative Stock Assessment of Quahogs in Narragansett Bay
Dale Leavitt, Research Scientist
Roger Williams University
Accurate stock assessment is important for keeping commercially fished resources at a sustainable yield. In Rhode Island, the bay quahog (Mercenaria mercenaria) is one of the most important commercial fisheries in Narragansett Bay. The state fisheries management agency assumes the job of stock assessment of these shellfish as part of their management process. However, due to increased responsibilities coupled with decreased staff, the RI Department of Environmental Management is hard pressed to undertake large-scale quahog stock assessments. The goal of this research is to improve the annual quahog stock assessment by establishing groundwork for cooperation between commercial bull rake fisherman and the RI DEM Marine Fisheries Division. We will work to determine a method to
assess quahog standing stock through calibrating and standardizing the catch efficiency of a bull rake.

#8: Eastern Gulf of Maine Sentinel Survey Fishery

Aaron Dority, Downeast Groundfish Initiative Director
Penobsot East Resource Center

Penobscot East Resource Center, in partnership with Dr. Yong Chen at the University of Maine, Orono and area fishermen is currently operating the fourth year of the Eastern Gulf of Maine Sentinel Survey Fishery. Participating fishermen fish with jig or longline gear for cod, cusk, haddock and other key groundfish stocks, gathering spatially-explicit catch data from a largely data-poor region of the Gulf of Maine to improve the stock assessment, and examine whether segmenting the assessment is warranted. This program augments data collected from both the spring and fall inshore trawl survey and the annual National Marine Fisheries Service survey by allowing access via fixed gear to areas that are untrawlable due to density of lobster trap gear and rocky bottom.

#9: iSnapper
Michael Miglini
Great Sage LLC, Out to Sea LLC, Going Pelagic LLC, Charter Fisherman's Association

#10: 1) Wicked Good Tuna:Partnering with bluefin fishermen leads to a wealth of new biological knowledge 2) Science Informing Management-How Fishermen and Scientists Lead the Way Towards a Sustainable Future for Atlantic Bluefin Tuna

Walter Golet
University of Maine, Research Scientist

Highly migratory species (tunas, billfish, sharks) are the most sought after fish in the sea. They are both valuable and an important source of protein and omega fatty acids for a large percentage of the world's population. Despite decades of research into their life history, much of their basic biology is unresolved. This includes age, growth, migration patterns, reproductive strategies, and population structure. These biological attributes are key inputs for stock assessments models. Given the lack of data we have for these areas it is not surprising that stock assessments for highly migratory species contain a high degree of uncertainty. This in turn makes management decisions very difficult, particularly since assessments are only done every four years. Gathering this biological information is not easy given these animal use most of the Atlantic basin each year to satisfy foraging and reproductive requirements. To adequately address these issues it is imperative to involve all sectors of the fishery. To that end, we have engaged the highly migratory species fishing community (recreational and commercial) in a comprehensive sampling program which allows us to sample Atlantic bluefin tuna (Thunnus thynnus) from Maine to Rhode Island with limited personnel. This program has proved highly successful, sampling at times up to 20% of the entire U.S. catch in the region. During the past three summers we have sampled over 1,300 bluefin tuna ranging in size from 68 to 310cm curved fork length. We have even trained individual fishermen to extract tuna otoliths themselves (no easy task). This program has provided samples to national and international scientists to better understand bluefin age, growth, population structure, contaminants, reproduction, distribution, and fisheries dynamics. The outputs from projects related to the collection of these samples will be used in the upcoming 2015 bluefin tuna assessment and should provide a more robust biological framework with which to build the assessment. It has resulted in the formation of significant partnerships between industry, science and management. The sampling model used for this project is currently being expanded to include many other highly migratory species along the eastern U.S. (yellowfin, bigeye, swordfish) and would be suitable for groundfish and other near coastal pelagic species.