

# Collaborations



Reference Guide to Collaborative Fisheries Research  
in New England (FY2001-FY2005)

## Collaborations

A report on cooperative fisheries research projects conducted in the Gulf of Maine and on Georges Bank. Published by the Northwest Atlantic Marine Alliance with funding provided by the Northeast Consortium. Copyright 2006

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# Fishing For Data

Since 2000, the Northeast Consortium (NEC) and NOAA Fisheries Cooperative Research Partnership Initiative (now known as the Cooperative Research Partnership Program, CRPP) have funded over 200 collaborative research projects in the Gulf of Maine and Georges Bank. Additionally, NOAA's Northeast Fisheries Science Center has been involved in numerous collaborative programs, such as the Shark Tagging Project, for over 40 years.

Additionally, in this guide approximately \$5 million in funding for various collaborative projects at the University of Massachusetts-Dartmouth School for Marine Science and Technology (SMAST) in conjunction with the Massachusetts Institute for Fisheries Research has been included.

Government support of the research has paid back dividends that far exceed the original investment. Approximately 75 percent of the funds have gone directly to the fishing industry at a time when decreased landings and increased regulations threaten to deteriorate the fleet and its onshore infrastructure. There are other measurable outcomes—building the fleet's capacity with scientific instruments, safety equipment, and training; developing conservation gear like the Nordmore grate, which has been proven to reduce bycatch in the shrimp fishery by over 97 percent; informing the management of critical species such as herring with industry-based acoustic surveys; and assessing inshore groundfish stocks with industry vessels in areas too shoal for traditional research platforms, to name just a few.

The investment has also paid dividends by building social capital. In the mid-1990s, few would have imagined that the rift between fishermen, scientists, and management, would ever close, but a recent Northeast Consortium poll revealed that 86 percent of fishermen believe collaborative research has improved their relationships with scientists, 77 percent reported that it had an important economic benefit to their community, and 88 percent believe collaborative research leads to better management. The partnerships are working.

This year a number of leading institutions outside of the New England, such as Cornell and New York University, are expanding the community of scholarship to include more of the country's very best laboratories and scientists.

*Collaborations* has assembled this guide, offering abstracts, funding levels, and contact information when available. In the past five years, research has increased in both number and scope, reflecting the dynamic nature of the ocean with which it is concerned, but the overall goal remains the same: to harness the knowledge and talents found in the region's fisheries community to restore and enhance a marine environment that supports the coastal economies that depend on them long into the future.

For more information, including final reports when available, please visit the following websites ([www.northeastconsortium.org](http://www.northeastconsortium.org); <http://coopresearch.nero.noaa.gov>; [www.nefsc.noaa.gov](http://www.nefsc.noaa.gov); [www.smast.umassd.edu/Fisheries/institute.php](http://www.smast.umassd.edu/Fisheries/institute.php)). As always collaborative research is as dynamic as its subject matter. Budgets, timing, and participants are subject to change. See the aforementioned websites whenever time sensitive information is required.

Good Fishing,



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**FY2005 Northeast Consortium Cooperative Research Projects.** For more information visit:  
[www.northeastconsortium.org](http://www.northeastconsortium.org)

**The Inshore Gulf of Maine Survey of Atlantic Herring Sentinel Spawning Grounds (\$192,919)**

The Gulf of Maine Research Institute (GMRI) requests support from the Northeast Consortium for a survey of Atlantic herring sentinel spawning grounds in the coastal portion of the Gulf of Maine. This project will identify the locations and use acoustic survey techniques to document the biomass of major spawning aggregations of herring on spawning grounds in the Gulf of Maine. This will lay the groundwork for developing an annual "sentinel" acoustic survey of the important spawning grounds in the Gulf of Maine.

Partners: John Annala (Gulf of Maine Research Institute), Mark Bichrest (F/V Jennifer and Emily; Harpswell, ME), Matthew Cieri (MEDMR), Shale Rosen (GMRI), and Patrick Sullivan (Cornell University). Contact: email: [jannala@gmri.org](mailto:jannala@gmri.org); phone: (207)228-1621; fax (207) 772-6855

**Genetic Identification of Atlantic Cod Spawning Stocks in U.S. Waters Using Microsatellite and SNP DNA Markers (\$432,836)**

Currently, considerable uncertainty exists about the stock structure and number of discrete spawning populations of Atlantic cod in U.S. waters. The proposed research is intended to determine the level of genetic similarity among cod spawning aggregations throughout the Gulf of Maine (GOM) and Georges Bank and waters to their south. Working together, fishermen and researchers will identify and sample fish from major extant spawning areas. Specifically, we propose to collect spawning cod from 4 sites in the GOM (eastern Maine, western Maine, Ipswich Bay, Massachusetts Bay), 3 sites on Georges Bank (northeastern and western), and 1 site south of Georges Bank (Block Island, Rhode Island-New York). Collections will be made at each site during each year consecutively, and seasonally at sites where spawning is known to occur more than once per/year. At each site, fin clip samples will be collected from 100 spawning fish and ovarian biopsies used to confirm spawning condition. After this non-lethal procedure, fish will be released alive to the extent possible. Multi-locus microsatellite and single nucleotide polymorphism (SNP) DNA analysis at 8-12 diagnostic loci will be used to investigate genetic differentiation among fish from each collection. Results will provide valuable, detailed information about the stock structure of cod in U.S. waters, including the existence of discrete spawning aggregations, levels of genetic differentiation among aggregations, and temporal stability of genotypes within individual spawning aggregations. If spawning aggregations are found to have significant genetic differences, future mixed stock analysis could be used to illuminate mixing and movement of adult fish from various spawning groups. These results could also be used to begin to evaluate the relationship between spawning and larval cod aggregations at individual sites. Results will be published and actively communicated to fishermen's groups, scientists, decision-makers and managers by an Outreach Coordinator and many project participants to ensure efficient and effective use of outputs for further

research and decision-making.

Partners: David Berlinsky (University of New Hampshire), David Goethel (F/V Ellen Diane; Hampton, NH), Adrienne Kovach (UNH), Frank Mirarchi (F/V Barbara L. Peters; Scituate, MA), Chris Odlin (F/V Lydia and Maya; Portland, ME), Vincenzo Russo (F/V Miss Triss II; Gloucester, MA), Rodman Sykes (F/V Debralee; Peace Dale, RI), Proctor Wells (F/V Tenacious; Phippsburg, ME), and Isaac Wirgin (New York University). Contact: email: [david.berlinsky@unh.edu](mailto:david.berlinsky@unh.edu); phone: (603) 862-0007

**Yellowtail Flounder Study 2006 (\$207,750)**

New England fishermen and the Northeast Fisheries Science Center request a grant to continue the yellowtail flounder tagging study for a fourth year, tagging approximately 10,000 more yellowtail from the Gulf of Maine to the Mid-Atlantic. The proposal is designed to charter commercial fishing vessels to tag yellowtail flounder with conventional disc tags and data-storage tags with the objective of estimating movement among stocks areas and mortality within stock areas as well as providing growth observations. Results are expected to provide valuable information for status determination of yellowtail flounder stocks and fisheries.

Partners: Steven Cadrin (NOAA Fisheries Northeast Fisheries Science Center), Rodney Avila (F/V Trident; New Bedford, MA), David Goethel (F/V Ellen Diane; Hampton, NH), Stacy Kubis (NEFSC), Fred Mattera (F/V Travis & Natalie; West Kingston, RI), Luis Ribas (F/V Blue Skies; Provincetown, MA), and Azure Westwood (NEFSC). Contact: email: [Steven.Cadrin@noaa.gov](mailto:Steven.Cadrin@noaa.gov); phone: (508)495-2335 Fax (508) 495-2393

**Employment, Income, Working Conditions and Vessel Safety in New Bedford Before and After Amendment 13 to the Multispecies Management Plan (\$102,731)**

Using data from interviews with dragger crews, captains, and vessel owners, reports from settlement houses and marine insurance companies, and landings and vessel data from NMFS, this study will estimate the changes in employment, income, working conditions, and safety for the New Bedford offshore dragger fleet since Amendment 13 went into effect in May 2004. Wherever possible, we will identify causes for these changes. More specifically, we will test the hypothesis that Amendment 13 caused these changes.

Partners: Daniel Georgianna (University of Massachusetts-Dartmouth) and Debra Shrader (Shore Support; New Bedford, MA). Contact: email: [dgeorgianna@umassd.edu](mailto:dgeorgianna@umassd.edu); phone: (508)999-8414 Fax: 508-999-8079

**Cooperative Random Stratified Ventless Lobster Trap Survey in Massachusetts Bay – Year 2 (\$246,687)**

Fishery dependent trap sampling has long been used to characterize commercially important crustacean populations. However, CPUE estimates can be biased and are potentially non-reflective of relative abundance because fishermen maintain optimal catch rates by moving fishing gear to coincide with seasonal movements of lobster. For this reason, lobster population assessments

are currently based on relative abundance indices generated from trawl surveys. Trawl survey data also have potential biases, mainly associated with the inability of the gear to fish in all productive lobster habitats, such as rock and ledge bottom. To account for the biases associated with standard abundance indices we have developed a cooperative random stratified ventless trap survey designed to generate a robust estimate of lobster relative abundance and recruitment. Preliminary data from the pilot effort suggest that lobster size and abundance varies by sediment type and depth. These results justify the need for our stratification scheme, and demonstrate the importance of accounting for habitat in population surveys. We propose adding two new components to our ongoing ventless trap survey. The first is a tagging study designed to estimate recapture rates in our experimental traps. Data collected for this component will be vital for calibrating relative abundance estimates. Second, we propose a sediment verification survey at our sampling sites in order to enhance the resolution of the sediment data used to stratify the survey. This work will ensure that the resolution of our habitat description matches the spatial scale of our sampling design. This survey presents a mechanism to improve the manner in which we monitor lobster stocks in the Northeast. The cooperative nature of this effort will serve to provide commercial lobstermen with more confidence in the science being used in lobster management. The ASMFC has adopted our survey design as a model for a coastwide survey. The proposed survey is designed to collect information that is necessary to fine tune a coastwide monitoring program and associated data analysis. Data of this type are critical to providing sound advice to resource managers and are the foundation to making good management decisions for American lobster.

Partners: Robert Glenn (Massachusetts Division of Marine Fisheries), John Barrett (F/V Susan T; Norwell, MA), John Carver (South Shore Lobstermen's Association), David Casoni (Massachusetts Lobstermen's Association), Susan Michaud (F/V Touch of Gray; Marblehead, MA), Fred and Wesley Penney (F/V Curmudgeon; N. Billerica, MA), Tracy Pugh (MADMF), Skip Ryan (F/V Finest Kind; N. Quincy, MA), Steve Voss (MADMF), and Steve Wilcox (MADMF). Contact: email: Robert.Glenn@state.ma.us; phone: 508-563-1779 ext. 113 Fax: 508-563-5482

### **The Development and Demonstration of Acoustic Height Control for Trawl Doors (\$130,776)**

Demersal otter trawls are known to cause impacts on the seabed but these effects vary depending on the type of gear being used. The most noticeable physical effects are the furrows created by the doors, which can be 20 cm deep while other parts of the trawl create only faint marks. As the importance of bottom habitat to biological productivity has been realized, trawl impacts, particularly the furrows left by trawl doors, are seen as undesirable on some bottom types. This project will develop innovative hardware and control methodologies for maintaining the height of trawl doors at a specified height above the seabed. We will implement this "Autodoor" concept in the haddock fishery as it applies to the Gulf of Maine. The system will be evaluated aboard the F/V Glenna & Jacob where a series of engineering tests, comparative fishing trials, and seabed impact assessments will be conducted. An off-bottom trawl door has a wide

range of potential applications in the trawl fisheries of New England and around the world. If successful in the haddock fishery, the development could allow the exploitation of this rebuilt fishery in areas where conventional demersal trawling would be disallowed due to habitat concerns.

Partners: Cliff Goudey (Massachusetts Institute of Technology), Robert Damus (MIT), Robert Kohl (F/V Glenna & Jacob; Hyannis, MA), and Gary Loverich (Applied Fishing Technology; Bainbridge Island, WA). Contact: email: cgoudey@mit.edu; phone: (617) 253-7079 Fax: (617) 252-1615

### **Evaluation of Closed Areas: Cashes Ledge as Juvenile Cod Habitat (\$281,374)**

Despite the recognized uniqueness of the Cashes Ledge Closure Area for groundfish, our understanding of the impacts of the recent closure on the ecological processes responsible for maintaining cod populations is limited. This proposal is designed to increase our knowledge of the habitats associated with Cashes Ledge that are critical nursery and adult grounds for cod. First, we intend to create GIS maps of the habitats and the historical distribution of juvenile cod on the ledge using existing information from the past two decades on the physical structure, oceanography, and cod data of the Cashes Ledge Complex. Second, we will seasonally survey habitats on the ledge (with video and grab sampling) and quantify cod population dynamics (with video, trap, and gill net sampling) in each habitat type. This approach will determine if habitat characteristics (e.g., the amount of kelp on the pinnacles) and/or cod populations have changed since previous studies were conducted. Findings from this study would also be coupled with available information from other groundfish projects to ascertain how closures throughout the Gulf of Maine are impacting rebuilding cod populations. Both the New England Fisheries Management Council and the Northeast Consortium have specified that evaluating the contribution of closed areas to rebuilding fish stocks is a current research priority. Specifically, greater historical and biological information is needed to determine how these areas influence fish population dynamics and subsequently the status of fishery stocks. This study would provide critical baseline data that would help managers assess the effectiveness of current area closures for rebuilding cod populations and refine future management actions.

Partners: Jonathan Grabowski (Gulf of Maine Research Institute), Robert Tetrault (T/R Fish; Portland, ME), Mathew Thomson (F/V Shear Water; Monhegan Island, ME), and Matthew Webber (F/V Griffin; Monhegan Island, ME). Contact: email: jgrabowski@gmail.org; phone: (207) 772-1628; fax (207) 772-6855

### **Modifying the Nordmore Grid to Reduce Fish Discards and Small Shrimps in the Gulf of Maine Shrimp Fishery (\$175,504)**

This proposal seeks support to carry out a comprehensive study to test a modified Nordmore grid and a shrimp size sorting system to reduce finfish bycatch and juvenile shrimps in the Gulf of Maine pink shrimp fishery. This proposal is a result of a NEC-funded development project completed at the end of March 2005. In that project, a modified grid showed promising results

of reducing important groundfish bycatch in the shrimp trawl. This follow-up proposal will further test the modification to the grid system and will carry out more comprehensive sea trials to provide more conclusive results for practical adoption of the design and better management of the fishery. Modifications to the grid section will include removing all netting just ahead of the grid to allow easier escape of fish and shellfish. That will lead to a reduction in grid blockages and will provide better unobstructed sorting area for shrimps, leading to an improved shrimp catch. A new size sorting grid installed in front of the main grid will also be tested in addition to the modified Nordmore grid. The project will involve two industry vessels from Portland, ME for comparative fishing trials, and collaboration between the University of New Hampshire and Maine Department of Marine Resources. Successful outcome of the proposed project will reduce finfish bycatch and juvenile shrimps in the shrimp fishery, contributing to healthier stocks of both groundfish and shrimps.

Partners: Jonathan Grabowski (Gulf of Maine Research Institute), Robert Tetrault (T/R Fish; Portland, ME), Mathew Thomson (F/V Shear Water; Monhegan Island, ME), and Matthew Webber (F/V Griffin; Monhegan Island, ME)  
8. Pingguo He (University of New Hampshire), Vincent Balzano (F/V North Star; Portland, ME), Tim Eddy (F/V Persistence; Portland, ME), and Dan Schick (Maine Department of Marine Resources). Contact: email: pingguo.he@unh.edu; phone: (603) 862-3154; fax: (603) 862-7006

#### **Activity and Distribution of Cod in the Ipswich Bay Spawning Area (\$254,551)**

Despite the economic importance of cod, little is known about their spawning habitat, their activities while on their spawning grounds, or their fine scale distribution as it relates to environmental attributes of the spawning areas. The overall goal of the project is to study the activity and fine scale distribution of cod in the Ipswich Bay spawning area. To accomplish this goal, 200 adult, pre-spawning cod will be equipped with data storage tags (DSTs), and 30 of these will also be equipped with an acoustic tag. Cod equipped with acoustic tags will be located approximately every other day by the fishing vessels engaged in the project. The position of each acoustic tag (fish) will be found using a towed, or handheld directional hydrophone. The receiver converts the coded pulses of each tag so that each fish is identifiable as an individual. Location, depth, substrate type, and notable bathymetric features will be recorded at each fish's position each time it is located. Tracking will occur for 8 weeks, during May and June. To gather information about the daily activities of adult cod, we will locate multiple individuals every 30 minutes over the course of 24h. Each time an individual is located we will record time, depth, location, substrate type, and any notable bathymetric features. This fine scale daily sampling will occur 8 times, beginning in May and extending through June, at approximately weekly intervals, allowing us to sample over two lunar, and associated tidal cycles. The DSTs detect and archive data on pressure (depth), water temperature, and time, at a user-programmed time interval. The DST archived data from all recaptured fish will be down loaded to a computer. Information from the DSTs will be used to supplement the information recorded each time the fish is located. In particular, DST data

will provide detailed information about the temperatures and depths occupied by each fish over time. For thirty of the fish, the combination of a DST and an acoustic tag will allow us to construct a positional history of the fish (acoustic tag), and relate this positional history to habitat features (depth, proximity to bathymetric features, substrate type, and temperature) recorded synoptically during acoustic tracking, and archived on its DST. The associations will allow us to determine how horizontal movements, activity (vertical movements), and fine-scale distribution relate to important spawning habitat attributes such as depth, bathymetry, substrate type, and temperature. Integration of the data from all fish will allow us to broadly characterize the spawning habitat of cod in Ipswich Bay, and to determine how the spatial distribution of spawning fish relates to attributes of the spawning habitat. Time series analyses of depth variation over time will be used to determine if there are diel cycles in vertical movements. Swimming speed will be estimated as the distances between successive positional fixes divided by the elapsed time between fixes. Similar analyses will be used to determine if activity rhythms and swimming speeds are associated with lunar or tidal cycles. Given that the long-term viability of marine resources depend on protection of their habitat, and that the Sustainable Fisheries Act requires regional fishery management councils to describe, identify, protect, conserve and enhance essential fish habitats (EFH), studies of cod spawning habitat are certainly warranted, and results of the research should also be useful to fisheries managers.

Partners: Hunt Howell (University of New Hampshire), Carl Bouchard (F/V Stormy Weather; Exeter, NH); Charles Felch, Sr. (F/V Lady Victoria; Seabrook, NH), David Goethel (F/V Ellen Diane; Hampton, NH), Pingguo He (UNH), and Marc Stettner (F/V Too Far; Portsmouth, NH). Contact: email: whh@cisunix.unh.edu; phone: (603) 862-2109; fax (603) 862-3784

#### **Building on Promise: Continued Investigation in Using a 4-Seam Bottom Trawl to Improve Escapement of Small Haddock and Cod (\$65,749)**

Traditionally, enhancement of selectivity in trawl nets has focused mostly on the cod end. Much of the escapement of finfish species occurs in that part of the net, but not exclusively and good examples exist of such modifications that reduce bycatch and discards. An innovative approach in this vein was tested in 2004, with excellent initial results. A two-seam trawl was converted to four seams, with square mesh side panels. Fishing trials revealed excellent rates of escapement for sub-legal cod and haddock. Rates of escapement of legal fish were high for haddock and moderate for cod. It is suggested that side panels of hexagonal mesh, 6" mesh size, would retain a high number of the legal-sized escapees while allowing sub-legal fish to escape. The proposed project will examine this, and will gather direct observations on escapes through the side panels.

Partners: Dana Morse (University of Maine Sea Grant), Claudia Coffin (F/V Bad Penny; Edgcomb, ME), Bill Lee (F/V Ocean Reporter; Gloucester, MA), and Kelo Pinkham (F/V Jeanne C; Trevett, ME). Contact: email: dana.morse@maine.edu; phone: (207) 563-3146

**The Use of Positively Buoyant Ground Cables and Sweep to Reduce Contact and to Enhance Species Selectivity (\$100,783)**

The goal of this project is to produce a net and frame system that is not only species selective but also much less harmful to the sea floor.

Partners: Kelo Pinkham (F/V Jeanne C; Trevett, ME), Dana Morse (University of Maine Sea Grant), and Gayle Pinkham (F/V Jeanne C; Trevett, ME). Contact: email: dana.morse@maine.edu; phone: (207) 563-3146

**Haddock Migration in New England Waters: Year Two Analysis of Closed Area and Stock Boundaries (\$198,180)**

With a second year of grant support from the Northeast Consortium, the Cape Cod Commercial Hook Fishermen's Association (CCCHFA) and Gulf of Maine Research Institute (GMRI) seek to continue the assessment of haddock movement between stock areas and across closed area boundaries. This project tests existing assumptions about movement rates between the Gulf of Maine and Georges Bank and movement from eastern to western Georges Bank. Furthermore, the project evaluates movement in and out of closed areas. CCCHFA will coordinate 15 fishermen to deploy 10,500 Hallprint T-bar tags over 12 months within and outside of closed areas on Georges Bank and in the Gulf of Maine. Information from this study will provide timely information on the appropriateness of current stock management units and this may impact how the haddock stock(s) are assessed. This proposal will be a continuation of an NEC FY 2004 funded project titled Haddock Migration in New England Waters: Analysis of Movements between Stocks and Closed Areas (Grant 05-018). While the commencement of tagging operations has been hindered by a lengthy Exempted Fishing Permit and NEPA process, significant progress has nonetheless been made in obtaining permits, developing various materials and methods for the project, and initiating tagging and technician training efforts. CCCHFA and GMRI request a Year 2 award of \$198,180 towards a total year 2 budget of \$210,368 to continue the implemented project. Projected revenues from the sale of fish on dedicated tagging trips will be used to offset total costs of the program to NEC. The first \$12,188 in revenue from fish sales will be used to balance the program budget and then 75% of all subsequent revenues will be returned for future use to NEC.

Partners: Tom Rudolph (Cape Cod Commercial Hook Fishermen's Association), Jon Brodziak (NOAA Fisheries Northeast Fisheries Science Center), and Shelly Tallack (Gulf of Maine Research Institute) Contact: email: tom@ccchfa.org; phone: (508) 945-2432

**New Generation Trawl for Efficiency and Conservation (\$262,564)**

The objectives of this project are to build the New Generation Trawl to demonstrate through video documentation how the trawl has limited contact with the bottom, show how the Sort V fish grate can reduce bycatch of undersized market species as well as non-market species. This project will demonstrate this with the comparison of two similar vessels towing side by side. Each vessel will tow a different net, one the New

Generation Trawl the other a traditional groundfish net. While conducting this study the data should also allow us to compare the fuel consumption difference between the two vessels.

Partners: Daniel Schick (Maine Dept. of Marine Resources), Hordur Honsson (VT Fishing Supplies; Iceland), Allyson Jordan (F/V Jamie & Ashley and F/V Theresa & Allyson; Portland, ME) and Les White (MEDMR). Contact: email: dan.schick@state.me.us; phone: (207) 633-9528; fax (207) 633-9579

**Continuation of the Maine/New Hampshire Inshore Trawl Survey (\$259,287)**

The Maine-New Hampshire Trawl Inshore Survey has completed five years of assessing fish and biological communities along the inshore waters of the Gulf of Maine. This proposal is intended to support the spring and fall 2006 surveys. Since the survey's initial funding by the Northeast Consortium in 2000, it has proven to be a successful example of fishermen and scientists working together to benefit fisheries management. The survey is intended to complement the National Marine Fisheries Service Gulf of Maine Trawl Survey using a combined fixed station and stratified random design. Two surveys of five week duration in spring and fall have produced a rich database on fish and invertebrate species that is available to fishery managers, academic researchers, fishing industry members, graduate students, non-government organizations, and general public. As the time series has developed, requests for and uses of these data have provided new insight into communities and populations in the Gulf of Maine.

Partners: Sally Sherman (Maine Department of Marine Resources), Yong Chen (University of Maine), Jeff Flagg (Portland Trawler Supply), Sam Galli (F/V Tara Lynn; Portland, ME), Douglas Grout (New Hampshire Department of Fish and Game), Linda Mercer (MEDMR), Curt Rice (F/V Robert Michael; Portland, ME), John Sowles (MEDMR), Keri Stepanek (MEDMR), and Robert Tetrault (T/R Fish, Inc.; Portland, ME). Contact: email: sally.sherman@maine.gov; phone: (207) 633-9503; fax: (207) 633-9579

**An Industry-Science Partnership Investigating the Short-Term and Long-Term Discard Mortality of Spiny Dogfish Using Hook Gear in Gulf of Maine Waters (\$155,433)**

This collaborative study aims to estimate the short term discard mortality of hook-caught dogfish in Gulf of Maine and Southern New England inshore waters using caging methods. An accurate discard mortality rate for hook caught dogfish has been requested by the Atlantic States Marine Fisheries Commission and will provide crucial data for stock assessments on a vulnerable species. This study will employ fishery-independent techniques to achieve its goal, thereby involving a team of approximately 19 fishermen and five scientists.

Partners: Shelly Tallack (Gulf of Maine Research Institute) and Melissa Sanderson (Cape Cod Commercial Hook Fishermen's Association); Michael Anderson (F/V Bad Dog; Chatham, MA), Christopher Andrews (F/V Survivor; Westbrook, ME), William Chaprales (F/V Rueby; Marstons Mills, MA), James Eldredge (F/V Yellow Bird; West Chatham, MA), Kenneth Eldredge (F/V

Fiasco; West Chatham, MA), Eric Hesse (F/V Tenacious; West Barnstable, MA), Roger Horne (F/V William Gregory; Chatham, MA), Bruce Kaminski (F/V Never Enough; Chatham, MA), Mark Leach (F/V Sea Holly; Harwich, MA), Glen Legeyt (F/V Miss Morgan; Hyannis, MA), Ted Ligenza (F/V Riena Marie; South Chatham, MA), Michael Russo (F/V Susan Lee; Orleans, MA), Peter Taylor (F/V Sea Hound; Chatham, MA), John Shusta (F/V Special J; York, ME). Contact: email: Email shelly@gmri.org; phone: 207-772-2321; fax 207-772-6855

#### **Ecological Role of Adult and Juvenile Anadromous Forage Fish in Downeast Maine Estuaries: Sea-Run Alewife and Groundfish Predators (\$16,939)**

Historically, alewife (*Alosa pseudoharengus*) were an extremely abundant seasonal resource in the nearshore Gulf of Maine, originally as a subsistence food and trade item for both Native Americans and European settlers, and later as a commercial commodity. Alewife link marine and freshwater systems through the transfer of marine- and freshwater-derived nutrients up and downstream. Historical evidence suggests that alewife were an important forage fish for nearshore groundfish stocks; we contend that without prey fish restoration, the rebuilding of commercial fish stocks will be an incomplete, and likely unsuccessful process. This proposal addresses what we think is a key component of this system – the role of alewife in estuarine food webs before, during and after spawning runs. Our objectives are to a) To assess the ecological role of alewife as predator and prey in downeast Maine estuarine food webs, and (b) to assess the relationship between spatial distribution, seasonal timing and densities of alewife in estuaries relative to their movement between freshwater and saltwater habitats. We propose seasonal sampling of adjacent estuaries in Downeast Maine, with low and high alewife returns (4 estuaries over 2 summers). We will use purse-seines to quantify densities of alewife along salinity gradient and collect fish diets, length, weight and age measurements. We will quantify predation on alewife by groundfish caught using drop-lining.

Partners: Karen Wilson (University of Southern Maine), Christopher Bartlett (University of Maine), David Turner (Herring Fisherman; Eastport, ME), Larry Waxler (USM), and Theodore Willis (Maine Rivers; Augusta, ME). Contact: email: kwilson@usm.maine.edu; phone:

#### **FY2005 Northeast Consortium Continuing Cooperative Research Projects (FY2004 projects funded in FY2005.)**

#### **The Influence of Water Temperature on the Distribution of Berried Females and Duration of Egg Development in American Lobsters (\$275,509)**

In order to more effectively manage the lobster fishery it is vital to understand the factors that influence their distribution and abundance. In simplistic terms, distribution and abundance in any area is a function of where larvae are released, the transport of those larvae to an appropriate settlement location and the subsequent movement of lobsters as they mature and become more active. A major goal of this project is to identify the factors

that influence when female lobsters release their larvae. If this question can be elucidated, it will greatly facilitate and improve models of larvae transport that are currently being produced by a number of marine biologists and oceanographers (Incze et al., 2003). As a result, scientists will each an improved understanding of the sources of the new recruits throughout the coastal and offshore waters of New England. Moreover, these data will be invaluable for aiding in the determination of potentially distinct regional lobster stocks, a critical component of an effective management strategy for the American lobster fishery.

Partners: Win Watson (University of New Hampshire), Diane Cowan (The Lobster Conservancy), Jason Goldstein (UNH), Bonnie Spinazzola (Atlantic Offshore Lobstermen's Association), and Michael Tlusty (New England Aquarium). Contact: email: win@unh.edu; phone: (603) 862-1629

#### **A High Opening Kite-Assisted Raised Footrope Trawl for Haddock and Pollack for the Gulf of Maine Multispecies Fisheries (\$154,766)**

This proposal seeks supports to design and test a trawl targeting haddock and pollack in the Gulf of Maine suitable for implementing "B" Days-At-Sea use as proposed in the Amendment 13 to the Northeast Multi Species Fisheries Management Plan. The key feature of the new trawl will be high headline assisted by kites and raised footrope with long drop chains to avoid capture of cod and bottom dwelling species, benthic organisms and "trashes". The substantial increases in haddock and pollack biomass in Gulf of Maine, and much slower increase in cod stocks provide basis for use of such trawls in the multi species fishery to reduce fishing pressure of cod and flounder species. We therefore seek support to conduct a two-year cooperative research to design, test and evaluate the new trawl to provide opportunities for the industry to utilize resources available to them. The project will involve conceptual design, flume tank model tests, at-sea trials, and information dissemination after successful completion of the sea trials. Conceptual designs and flume tank tests will involve Canadian partners at the Fisheries and Marine Institute of Newfoundland. Sea trials will be carried out onboard two commercial fishing vessels skippered by the industry partners. Sea trials will involve remote underwater video observations of fish and fishing gear interactions, acoustic gear geometry monitoring, as well as comparative fishing experiments using parallel tow methods. Fish behavioral knowledge gained during the sea trials will be incorporated into design modifications of the new species selectivity fishing gear.

Partners: Pingguo He (University of New Hampshire), Vincent Balzano (F/V North Star; Portland, ME), Tim Eddy (F/V Persistence; Portland, ME), and Paul Winger (Fisheries & Marine Institute; Newfoundland, Canada). Contact: email: pingguo.he@unh.edu; phone: (603) 862-3154; fax: (603) 862-7006

## FY2005 Northeast Consortium Outreach and Education in Support of Cooperative Research

### **Marine Resource Education Project (\$113,562)**

The Marine Resource Education Program has existed as a pilot project based at the University of New Hampshire for four years. During this period, the program has successfully demonstrated a curriculum and method of delivery targeted at commercial and recreational fishermen, and others with professional interest in marine resource management. The six-day curriculum is delivered in two parts: a Science Module that provides basic information on science that supports fisheries management; and a Management Module that provides an overview of the fishery management system and laws, and information and skills for engaging in that process. The program is in a transitional phase with a new administrative partner and development of a fresh outreach strategy. The project partners have secured partial funding from the National Marine Fisheries Service in support of the program. We seek the remaining funds from the Northeast Consortium to offer the program for another year as we transition into a permanent offering for the fishing public.

Partners: Laura Taylor Singer (Gulf of Maine Research Institute), Mary Beth Tooley (East Coast Pelagics' Association), and John Williamson (industry representative; Kennebunk, ME). Contact: [laura@gmri.org](mailto:laura@gmri.org); phone: (207) 772-2321

### **FY2005 Northeast Consortium Project Development Awards (awards of up to \$25,000 to help develop solid research concepts into full proposals.)**

#### **Workshop to Plan the Evaluation of Community Hatchery-Based Lobster Enhancement**

Partners: Ted Ames (Penobscot East Resource Center, Stonington, ME), Robin Alden (PERC), Brian Beal (University of Maine– Machias), Irv Kornfield (UMaine), Richard Wahle (Bigelow Laboratory for Ocean Sciences), and Carl Wilson (Maine Department of Marine Resources). Contact: email: [rwahle@bigelow.org](mailto:rwahle@bigelow.org); phone: 207 633 9600; fax: 207 633 9641

#### **Designing and Testing a Sublegal Lobster Sampling Trap**

Partners: Robert Bayer (Lobster Institute – University of Maine), Joseph Chalmers (Lobsterman; Southwest Harbor, ME), William Congleton (UMaine), William Fike (LI – UMaine), and John Riley (UMaine)

#### **Pilot Project to Test the Use of Side-Scan Sonar to Identify Seafloor Features Associated with Pre-Spawning and Spawning Cod Aggregations**

Partners: Kathryn Ford (Massachusetts Division of Marine Fisheries), Olivia Free (Massachusetts Fishermen's Partnership), Sam Novello (Commercial Fisherman; Gloucester, MA), and Michael Pol (MADMF). Contact: email: [mike.pol@state.ma.us](mailto:mike.pol@state.ma.us);

phone: (508) 563-1779 x116

#### **Pilot Project to Assess Need and Initialize a Methodology to Groundtruth Existing Multi-Beam and Side-Scan Sonar Seafloor Charts**

Partners: Salvatore Genovese (Northeastern University), Walter Barnhardt (United States Geological Survey), David Bergeron (Massachusetts Fishermen's Partnership), Olivia Rugo Free (MFP), B.G. Brown (Commercial Fisherman; Gloucester, MA), Madeleine Hall-Arber (Massachusetts Institute of Technology Sea Grant), and Anthony Wilbur (Massachusetts Coastal Zone Management) Pilot Project to Assess Need and Initialize a Methodology to Groundtruth Existing Multi-Beam and Side-Scan Sonar Seafloor Charts. Contact Olivia Free: phone: (978) 282-4847; fax 978-282-4798

#### **Design and Test a Monkfish Grid to Reduce Juvenile Monkfish in the Gulf of Maine Multispecies Trawl**

Partners: Pingguo He (University of New Hampshire) and Dennis Robillard (F/V Julie Ann II; Portsmouth, NH). Contact: email: [pingguo.he@unh.edu](mailto:pingguo.he@unh.edu); phone: (603) 862-3154; fax: (603) 862-7006

#### **To Explore the Potential for a Non-Trawl, Low Bycatch Means of Harvesting the Increasingly Abundant Haddock Resource**

Partners: Kelo Pinkham (F/V Jeanne C.; Trevett, ME), Kenneth La Valley (New Hampshire Sea Grant). Contact: email: [ken.lavalley@unh.edu](mailto:ken.lavalley@unh.edu); phone: 603-862-4343.

#### **Development of Tagging Methods for Monkfish, *Lophius americanus***

Partners: Anne Richards (NOAA Fisheries Northeast Fisheries Science Center), Bridget Dunnington (NEFSC), and John Our (F/V Miss Fitz; Chatham, MA). Contact: email: [anne.richards@noaa.gov](mailto:anne.richards@noaa.gov)

#### **Testing Raised-Webbing Gillnets to Reduce Bycatch of Cod While Targeting Pollack**

Partners: Shale Rosen (Gulf of Maine Research Institute), Dave Marciano (Angelica Fisheries, Inc.; Gloucester, MA), John "Spice" Montgomery (F/V Chandelle; Gloucester, MA), Mike Pol (Massachusetts Department of Marine Fisheries), and Pete Shoares (Commercial Fisherman; Gloucester, MA). Contact: email: [shale@gmri.org](mailto:shale@gmri.org); phone: (207) 772-2321

#### **Testing a Fixed Gear Resource Survey Method for Inshore Areas**

Partners: Catherine Salerno (Gulf of Maine Research Institute), Larry Knapp (F/V Lady Esther; Boothbay, ME), and Laura Taylor Singer (GMRI). Contact: email: [laura@gmri.org](mailto:laura@gmri.org); phone: (207) 772-2321

**Field Testing of a Novel Application to Examine Habitat Use and Migration Patterns of the Spiny Dogfish (*Squalis acanthias*) in the Western Gulf of Maine**

Partners: Paul Tsang (University of New Hampshire), Joe Jurek (F/V *Mystique Lady*; Andover, MA), and James Sulikowski (University of Florida, Gainesville). Contact: email: pct@cisunix.unh.edu; phone: (603) 862-3479

**Development of Video Exploration and Mapping Capability, Tools and Methods**

Partners: John Williamson (F/V *Sea Keeper*; Kennebunk, ME) and Bill Lee (F/V *Ocean Reporter*; Gloucester, MA). Contact: email: oceans@gis.net

FY 2005 National Marine Fisheries Service Northeast Cooperative Research Partners Program (NCRPP, formerly CRPI). For more information visit: [www.nero.noaa.gov](http://www.nero.noaa.gov)

**A Fisherman-led Fishing Gear Workshop for Non-fishermen (\$27,724)**

To improve understanding of commercial fishing gears and operational methods in use in the northeastern United States for those with personal and professional interests in fisheries but who are not fishermen, so that they can be more proficient in their dealing with fishing gear related issues.

PI: Kenneth LaValley (UNH). Contact: email: ken.lavalley@unh.edu; phone: 603-862-4343.

**Design and Test of a Topless Shrimp Trawl to Reduce Finfish Bycatch in the Pink Shrimp Fishery (\$131,237)**

The objective of the project is to modify the Nordmore grid to reduce fish bycatch and to test a new size sorting grid to reduce small shrimps.

PI: Pingguo He (UNH). Contact: email: pingguo.he@unh.edu; phone: (603) 862-3154; fax: (603) 862-7006

**An Assessment of Escape Vent Selectivity, Bycatch & Discard Survivability in the NE Fishery for Deep Water Red Crab**

To undertake a collaborative research study which will assess the discard survivability and escape vent efficiency in the deep water red crab fishery, off the New England continental shelf, in addition to quantifying bycatch composition of this fishery.

PI: Shelly Tallack (GMRI). Contact: email: shelly@gmri.org; phone: (207) 772-2321

**A Social Study of the Gulf of Maine Lobster Industry (\$98,491)**

Socioeconomic information will be collected through surveys with preparation assistance from a Stakeholder Steering Committee. The survey will be followed by a series of meetings throughout Maine, New Hampshire, and Massachusetts to report and interpret resulting data with stakeholders.

PI: Laura Singer (GMRI). Contact: email: laura@gmri.org; phone: (207) 772-2321

**Effects of the Western Gulf of Maine Closure on Boulder and Deep Mud Habitats (\$85,000)**

1. Sample haddock, cusk, eelpout, and redfish on boulder reefs inside and outside of the WGOMC by means of fish pots. Determine diet composition and utilize stable isotopes to assess feeding habitats and effective trophic level. 2. Expand the food web study into deep mud habitats, using trawl sampling. 3. Obtain one more time-point from a previously sampled habitat, gravel bottom, and make fuller use of food web (stable isotope and stomach) samples from shoal habitats that are already in hand from our earlier work

PI: Les Kaufman (BU) in cooperation with the Mass. fishermen's Partnership. Contact: email: lesk@bu.edu

**Staying Alive: Promoting a Culture of Safety at Sea in the New England Fishing Industry (\$124,440)**

1. Train fishermen in safety, damage control, rescue procedures, and first aid to improve their knowledge and skills. 2. Increase interaction between the Coast Guard and fishermen to improve communication and collaboration. 3. Work closely with the New Bedford Safety Task Force and the Coast Guard to develop a long-term program that will provide on-going opportunities for and participation in safety training for fishermen. 4. Explore potential for lowering the costs of safety equipment and/or insurance in part through active participation in safety training.

PI: David Bergeron (MFP). Contact: phone: (978) 282-4847; fax 978-282-4798

**A Cooperative Research Project to Develop Gear Modifications for the Herring Midwater Trawl Fishery to Minimize Haddock Bycatch (\$143,302)**

The project will investigate modifications to herring midwater trawl gear at the St. Johns, Newfoundland, Canada flume tank. The effectiveness of the modified gear will be tested at-sea while gathering information on the extent of midwater trawl interactions with haddock through video monitoring.

PI: Shale Rosen (GMRI). Contact: email: shale@gmri.org; phone: (207) 772-2321

**Evaluation of Hook Size and Shape in the Catch of Sublegal Cod and Haddock in the Recreational Fishery (\$82,200)**

This pilot project has six goals including: Provide information to management regarding typical catch of sub-legal cod and haddock in charter boat fisheries; comparison of catch using standard, oversize, circle and "J" hooks, and may involve up to 600 recreational fisherman via request for participation.

PI: Alan Michael (ADM Associates). Contact: email: admichael@adelphia.net; phone: (978) 525-2195

**Deploy and Host the Industry Based Survey Website (\$10,000)**

Perform necessary task to deploy and host IBS Trawl survey ArcIMS website on GMRI's server located at Northern

Geomantics in Hallowell, ME

PI: Bill Duffy (Geomantics). Contact: email: info@northgeo.com; phone: (207) 623-9226; fax: (207) 623-9229

**Pilot Industry-Based Survey for GOM Atlantic Cod Distribution (\$2,799,251)**

Survey of the GOM waters for Atlantic cod distribution. PIs: david Pierce and Bill Hoffman. Contact: email: david.pierce@state.ma.us; phone: (617) 626-1532

**Pilot Industry-Based Survey for Southern New England Yellowtail Flounder Distribution (\$1,555,515)**

Survey of SNE waters for yellowtail flounder distribution.

PIs: Mark Gibson & April Valliere (Rhode Island Department of Environmental Management - Marine Fisheries). Contact: email: mark.gibson@dem.ri.gov

**Building the Infrastructure for a Successful Cod Tagging Program in the Gulf of Maine, Georges Bank, and Southern New England (\$1,138,103)**

Coordination of Atlantic cod Tagging Program.

PI: Shelly Tallack (GMRI). Contact: email: shelly@gmri.org; phone(207) 721-2321

**Gulf of Maine Inshore Trawl Survey; ME/NH Inshore Trawl Survey (\$169,905)**

Establish foundation for strong long-term fishery independent monitoring program of near shore water of GOM.

PIs: John Sowles, Sally Sherman (Maine DMR). Contact: email: john.sowles@state.me.us; phone: (207) 633- 9518

**FY2005 NOAA Fisheries Northeast Fisheries Science Center (NEFSC) Projects:**

*NEFSC has partnered and coordinated a number of cooperative research projects for many years, including the a shark tagging project which has been ongoing for nearly 40 years. NEFSC funds allocated for research often come from a several sources specific to the projects. In FY 2005, NEFSC earmarked approx. \$1 million for cooperative research. Visit : [www.nefsc.noaa.gov](http://www.nefsc.noaa.gov) for more information.*

**Yellowtail Flounder Tagging Study**

On-going since 2003, this study involves fishermen throughout New England, the Massachusetts Division of Marine Fisheries, the School of Marine Science and Technology and Rhode Island Fish and Wildlife, in the tagging of yellowtail flounders to better understand their movements, mortality and ageing. The 2003 tagging season was made possible by the NOAA Fisheries Stock Assessment Improvement Program. Funding for 2004 and 2005 is provided by the Northeast Consortium, University of New Hampshire. Project will resume

in Spring 2006. Contact: Steven.Cadrin@noaa.gov

**Scup Tagging Study**

This year a tagging study for scup will commence in the Spring. Visit [www.nefsc.noaa.gov](http://www.nefsc.noaa.gov) for information soon.

**Cooperative Black Sea Bass Tagging Project**

The Cooperative Black Sea Bass Tagging Project was designed to examine the population size, exploitation rate and seasonal movements of the northern Atlantic coast black sea bass, *Centropristis striata*. Black sea bass have been divided into two separate populations along the Atlantic coast, with the northern population distributed north of Cape Hatteras, NC. This project is conducted through cooperation among NOAA's National Marine Fisheries Service (NOAA Fisheries) state fishery agencies, and both commercial and recreational fishermen. Tag recovery information is compared to release data to provide a basis for determining seasonal movements inshore and offshore as well as a better understanding of population dynamics and the ecological condition of the black sea bass.

During the fall of 2002, federal and state fishery employees began tagging and releasing black sea bass from Cape Cod, MA to Cape Henry, VA. Since that time the project has been dependent on commercial and recreational fishermen to report their encountered recaptures. This study requires a response on tag number, fish length, specific recapture location (Loran or lat/long preferred) and vessel information. Each tag holder is eligible to claim a reward after reporting the recaptured fish to the NOAA Fisheries office in Woods Hole, MA. Contact and report information: <http://www.cooperative-tagging.org> In 2006, tagging has ceased but they are still being collected and all returns will be honored. Contact: email: Joshua.Moser@noaa.gov; email: (508) 495 2246

**Cooperative Monkfish Survey**

On or about 1 March, 2004 - 22 May, 2004 in the area of the mid-Atlantic continental shelf and slope from Cape Hatteras through Georges Bank and the Gulf of Maine in U.S. waters. Stations may be occupied between and 55-460 meters (30-250 fathoms). Objectives: To collect research survey data on the monkfish resource (distribution, abundance, biological characteristics) in U.S. waters north of Cape Hatteras. The project is conducted every four years and will resume in 2008. However, in 2006 a pilot project tagging fish with archival tags will get underway.

Partners: NOAA Fisheries, F/V Mary K. Contact and report information: [www.nefsc.noaa.gov](http://www.nefsc.noaa.gov)

**NMFS Cooperative Shark Tagging Program**

The National Marine Fisheries Service (NMFS) Cooperative Shark Tagging Program (CSTP) is part of continuing research directed to the study of the biology of large Atlantic sharks. The CSTP was initiated in 1962 with an initial group of less than 100 volunteers. The Program has expanded in subsequent years and currently includes over 6,500 volunteers distributed along the Atlantic and Gulf coasts of North America, and Europe. The tagging methods used in the CSTP have been essentially unchanged during the past 30 years. The two principal tags that are in use are a fin tag (Jumbo Rototag) and a dart tag ("M" tag). Rototag

showing tag number and address. The rototag is a two piece, plastic cattle ear type tag which is inserted through the first dorsal fin. These tags were primarily used by NMFS biologists on small sharks during the first few years of the CSTP. As the Program expanded to include thousands of volunteer fishermen, the dart tag "M" tag displaying tagging needle (top) and legend (bottom) was developed to be easily and safely applied to sharks in the water. The "M" tag is composed of a stainless steel dart head, monofilament line, and a plexiglas capsule containing a vinyl plastic legend with return instructions printed in English, Spanish, French, Japanese and Norwegian. These dart tags, in use since 1965, are implanted in the back musculature near the base of the first dorsal fin. More recently, a Hallprint tag has been used on a limited basis for use on small sharks in the nursery areas. Numbered tags are sent to volunteer participants on self-addressed return post cards for recording tagging information (date, location, gear, size and sex of shark), along with a tagging needle, tagging instructions, an Anglers Guide to Sharks of the Northeastern United States, and a current Shark Tagger newsletter. This newsletter is an annual summary of the previous year's tag and recapture data and biological studies on sharks which is sent to all participants in the CSTP. Tagging studies have been mostly single release events in which recoveries are made opportunistically by recreational and commercial fishermen. When a previously tagged shark is re-caught, information similar to that obtained at tagging is requested from the recapturer. Initially, a five dollar reward was sent as an incentive for returning tags; since 1988, a hat with an embroidered logo has been used. Between 1962 and 1995, more than 128,000 sharks of 40 species have been tagged and more than 6,000 sharks of 32 species have been recaptured, as a result of the CSTP. Eighty-six percent of the tags are represented by eight species: blue shark *Prionace glauca*, sandbar shark *Carcharhinus plumbeus*, dusky shark *C. obscurus*, tiger shark *Galeocerdo cuvier*, shortfin mako *Isurus oxyrinchus*, blacktip shark *C. limbatus*, scalloped hammerhead *Sphyrna lewini* and Atlantic sharpnose shark *Rhizoprionodon terraenovae*. The number of sharks tagged varies from two for the small eye hammerhead *Sphyrna tudes* to 70,303 for the blue shark. Contact and report information: <http://na.nefsc.noaa.gov/sharks/intro.html>

**Cooperative Fisheries Research at the School for Marine Science and Technology (SMAST), UMass.-Dartmouth:** *SMAST administered approx. \$5 million in federal funding in FY2005 for cooperative fisheries research projects, including fisheries surveys, finfish and shellfish tagging studies, habitat mapping, and the development of ocean monitoring systems. The projects are coordinated in conjunction with the Massachusetts Marine Fisheries Institute, which draws on the resources of the state's university system, the commercial fishing industry, as well as state and federal agencies. The nature of the input and contribution from the fishing industry varies from project to project, but includes providing ships, personnel, fuel, stores, direct contributions, expertise, and in one case, coming up with the original idea for a research proposal that went on to become a funded research project. SMAST fisheries research also has a strong outreach component, which includes the development of educational programs at local schools and cooperative ventures with fishing*

*industry members based in New Bedford and throughout New England.*

### **Atlantic Sea Scallop Research Program**

The scallop research of the Marine Fisheries Field Research Group concentrates on the Georges Bank sea scallop (*Placopecten magellanicus*) resource. We study the population dynamics of sea scallops on Georges Bank, including their spatial distribution, local abundance, global abundance, life-history parameters, and habitat. We also study the impacts of harvesting, gear effectiveness, and developing alternative fishing strategies.

Partners: The research involves a wide segment of New Bedford's commercial scallop fleet in cooperation with Kevin Stokesbury and other SMAST staff. Contact: email: [kstokesbury@umassd.edu](mailto:kstokesbury@umassd.edu); phone: 508.910.6373. Website: <http://www.smast.umassd.edu/Fisheries/Scallops/index.php>

### **Groundfish Tagging Project**

Yellowtail flounder stocks and movement patterns throughout the waters of the Gulf of Maine and southern New England are poorly understood. Due to the uncertainty regarding these stocks, a cooperative yellowtail flounder tagging study was initiated in fall of 2003 by NOAA Fisheries' Northeast Fisheries Science Center (NEFSC). Fishermen throughout New England are working with NEFSC to tag and release yellowtail from the Gulf of Maine through Georges Bank and southern New England in an ongoing collaboration to better understand yellowtail movement, mortality, and aging. Flounder are tagged with either a pink disk tag or an archival data storage tag that records temperature and depth. Tagging by SMAST researchers is just one part of a larger multi-agency cooperative tagging program targeting yellowtail flounder. Yellowtail flounder are tagged throughout southern New England by the Massachusetts Division of Marine Fisheries (MDMF) and School for Marine Science and Technology (SMAST), under the guidance of the National Marine Fisheries Service (NMFS) Cooperative Research Partners Initiative (CRPI).

Contact: Information about the overall project can be found at <http://www.cooperative-tagging.org/>. To learn more about the SMAST tagging effort, click on the items in the menu below and at left Haddock Separator Trawl Testing. Email: [rrountree@umassd.edu](mailto:rrountree@umassd.edu); phone: (508) 910-6327

### **The SMAST Cod Tagging Project**

The Cod Tagging Project at SMAST was developed through the Massachusetts Fisheries Recovery Commission (MFRC) and funded through the NOAA Fisheries Northeast Region Cooperative Research Partners Initiative (CRPI). The project was developed to provide a liaison with the fishing fleet and create an industry based program that will provide data on the abundance, distribution, and behavior of commercially fished species and the environment in which they are found. The program utilizes the knowledge and expertise of the local fishing industry to collect and tag cod under normal fishing operations in the Gulf of Maine, Georges Bank, and Nantucket Shoals.

Objectives of the project include:

- Determine the large-scale seasonal movement patterns of cod

throughout the Gulf of Maine and Georges Bank

- Measure growth rates and recruitment of cod in the wild
- Evaluate the environmental conditions (temperature, salinity, habitat) in areas where cod are found.

Vessels with homeports ranging from Monhegan Island, Maine to Montauk, New York have provided assistance with fish collection and tagging. SMAST personnel also accompany chartered vessels on trips solely dedicated to research activities. As fish are collected and tagged, the location and time of capture are recorded, along with the fish's length. A small yellow T-bar tag (3" in length) is inserted into the musculature at the base of the fish's first dorsal fin and the fish are released. The T-Bar tags have a yellow collar on which a unique identification number is printed for fish determination, along with the SMAST name and phone number for reporting recaptured tags. Archival tags are also attached in a similar location on a subset of fish to record environmental parameters such as temperature, depth, and salinity. Each tag contains a unique sequence of numbers that identify the fish and is used to link the tagging data with similar information collected once the fish is recaptured.

Contact: Project Manager: Rodney Rountree, email: rrountree@umassd.edu; phone: (508) 910-6327; website: www.smast.umassd.edu/Fisheries/Tagging/smast\_tagging.php

#### **SMAST Trawl Study Fleet Project: High-resolution, industry-based, groundfish fishery data**

The High Resolution Trawl Project at the School for Marine Science and Technology (SMAST) is a collaborative effort of the commercial bottom trawl fishing fleet, researchers at SMAST, and the Massachusetts Department of Environmental Protection, Division of Marine Fisheries. The primary focus of the project has been the development of methods of gathering fishery, oceanographic, and meteorological data through commercial fishing operations.

Contact: Project Manager: Rodney Rountree, email: rrountree@umassd.edu; phone: (508) 910-6327 website: www.smast.umassd.edu/Fisheries/Trawler/index.php

#### **Buzzards Bay Lobster Study**

Researchers from UMass Dartmouth's School for Marine Science and Technology (SMAST) are working with the scientists from the Massachusetts Division of Marine Fisheries (DMF) to improve the assessment of lobsters in Buzzards Bay by using a time-tested methodology counting. Although a hand count of every lobster in the bay is effectively impossible, SMAST researchers are moving fishery stock assessment decisively in that direction. On the heels of their very successful methodology for video surveys of scallop stocks, the Marine Fisheries Field Research Group is taking a similarly direct approach to lobster research. As Brad Harris, the group's operations manager, puts it, "The actual observation of what's on the bottom is always the best; it's an absolute measure." Fishery managers have long used catch data to estimate fish populations. But lobster populations in the bay have declined so much in the last decade that most lobsterman have had to move their traps offshore to catch enough to stay in business. Deprived of catch data, the DMF uses ventless traps, with no

escape vent for smaller lobsters, thus giving a more accurate representation of population structure. Over the course of the 2005 field season, the divers logged 198 dives, tagged some 800 lobsters, and working from commercial boats provided by Fairhaven lobstermen Tom Blier, Henry and Aaron Cebula, and Larry Fowler. As they tagged each lobster, researchers recorded its size, reproductive condition, apparent health, and so forth. This information will contribute to the overall picture of the bay's lobster population, including the portion ready to reproduce in the next year and the prevalence of shell disease, helping scientists to anticipate whether the population will rebound, continue falling, or maintain its current size for the near future.

Contact: Project Manager Brad Harris. Phone: 508-910-6359; email: bharris@massd.edu; website: www.smast.umassd.edu

## **FY2004 Northeast Consortium Projects**

### **Yellowtail Flounder Tagging Study 2005 (\$106,500)**

New England fishermen and the Northeast Fisheries Science Center request a grant of \$100,000 from the Northeast Consortium for a third year and approximately 5,000 more tag releases for the yellowtail flounder tagging study. The proposal is designed to charter commercial fishing vessels to tag yellowtail flounder with conventional disc tags and data-storage tags with the objective of estimating movement among stocks areas and mortality within stock areas as well as providing growth observations. The tagging study was designed to address the major uncertainties in the Cape Cod-Gulf of Maine, Georges Bank and southern New England-Mid Atlantic yellowtail stock assessments. Recent changes in management (e.g., more restrictive days at sea limits, and access to closed areas) will likely change fishing mortality as well as distribution and movement of yellowtail. Therefore, a third year of tag releases is proposed to monitor changes in movement and mortality, evaluating the effectiveness of groundfish management and stock status.

Partners: Cadrin, Steve (National Marine Fisheries Service, Northeast Fisheries Science Center; Woods Hole, MA); Rodney Avila (F/V Trident; New Bedford, MA); David Goethel (F/V Ellen Diane; Hampton, NH); Fred Mattera (F/V Travis & Natalie; West Kingston, RI); Luis Ribas (F/V Blue Skies; Provincetown, MA); Azure Westwood (Integrated Statistics; Woods Hole, MA). Contact: Steven.Cadrin@noaa.gov

### **Mapping the Spawning and Hatching Grounds of the American Lobster: Year III (\$105,175)**

The purpose of this study is to map the distribution of lobster spawning and hatching grounds, and test hypotheses related to where and at what temperatures females spawn, brood, and hatch the eggs that have sustained the Gulf of Maine's record lobster harvests. To follow the migratory movements of reproductively active female lobsters, we attach acoustic transmitters to the backs of the lobsters using superglue and duct tape. Lobstermen then track the lobsters by using hydrophones and receivers to "listen" and decipher the series of pulses emitted by each transmitter's unique code. A temperature recorder is attached to the "knuckle" of the claw with a cable tie. In a 2-year project supported by NEC, more than 65 lobstermen have helped us follow

the movements and record temperature profiles of hundreds of female lobsters equipped with acoustic transmitters and temperature recorders. Preliminary results from tagging in 2002 indicate that ovigerous females engage in multiple brooding strategies that differ with lobster size, which has important management implications. We are requesting a third year of support from NEC to maximize data collection from lobsters that were tagged in 2003. This will involve continued sonar tracking to gather location data, as well as SCUBA diving to recover tags and temperature recorders. We also propose to share data, results, and experiences with fishermen, researchers, educators and managers through written dissemination of results, public presentations, and by submitting our data to the Northeast Consortium Fisheries and Ocean Database.

Partners: Cowan, Diane (The Lobster Conservancy; Friendship, ME); Richard Barter (F/V Tammy Jean II); Kevin Benner (F/V Wanda Marie); Philip Bramhall (F/V Amanda Kate); Sara Ellis (The Lobster Conservancy); Mark Havener (F/V Sarah Ashley); Andrew Solow (Woods Hole Oceanographic Institution); Mark Wallace (F/V Pamela B); Winsor Watson, III (University of New Hampshire). Contact: dcowan@lobsters.org

#### **Is Closed Area I Serving as a Refuge for Haddock? A Prototype Study of Fine-Scale Movement through the Use of Acoustic Tagging Techniques (\$206,996)**

According to the fishing community, Closed Area I is very beneficial for rebuilding haddock and may be largely responsible for the current recovery of haddock. Today. However, we have done little fine-scale research to determine if haddock are making use of these areas of refuge and perhaps more importantly, if so, what it is about these areas that attract haddock. The success and targeting of time and area closures as management tools would be enhanced by increased understanding of haddock behavior in the areas where and during the times when haddock aggregate. This proposal seeks to identify links between presence and movement of fish versus habitat structure by acquiring fine scale data pertaining to haddock movement in the context of ambient oceanographic variables. Advances in acoustic tagging offer the potential to link individual haddock behavior and a limited number of ambient oceanographic conditions with associated habitat characteristics. The goals of this prototype project are to test acoustic technology using haddock and gather data to correlate fish behavior with oceanographic conditions and bottom habitat type. We propose to (1) tag and monitor 100 haddock with acoustic tags to document their movement across the northwestern edge of Closed Area I; (2) assess oceanographic (currents and temperature) conditions within Closed Area I; and (3) examine existing habitat information associated with areas being actively used by haddock within and outside Closed Area I.

Partners: Glass, Christopher (Manomet Center for Conservation Sciences; Manomet, MA); Shale Rosen and Laura Taylor Singer (Gulf of Maine Research Institute); Benedetta Sarno (Manomet Center for Conservation Sciences). Contact: laura@gmri.org

#### **Random Stratified Ventless Trap Survey Design for Pilot Study in Massachusetts Bay (\$84,550)**

Fisheries-dependent trap sampling data historically have not been used to generate relative abundance indices for American

lobster because of biases associated with the way these data are collected. The non-random fashion in which traps are commercially fished introduces a potential source of bias to CPUE estimates. Instead, trawl survey relative abundance indices have been used for lobster stock assessment purposes because of the random sampling design and non-selective nature of trawl gear. However, trawl surveys have potential biases associated with their inability to fish in all productive lobster habitats, such as rock and ledge bottom, as well as in areas where static fishing gear is deployed (traps and gillnets). To account for the biases associated with standard abundance indices we propose a cooperative random stratified ventless trap survey designed to generate a robust estimate of lobster relative abundance and recruitment. The objectives of this study are: to accurately characterize relative abundance and size-distribution of American lobster in Massachusetts Bay, to develop a pilot project for a coast-wide fishery dependent monitoring program for American lobster, to document the relative importance of substrate type and depth as it pertains to American lobster abundance and distribution, and to foster industry "buy-in" to the lobster stock assessment process. A random stratified design has never been applied to a ventless trap survey for American lobster and presents a mechanism to improve the manner in which we monitor lobster stocks in the Northeast. The cooperative nature of this effort will serve to provide commercial lobstermen with more confidence in the science being used in lobster management. This project will generate high-resolution estimates of relative abundance and recruitment for American lobster that eventually could be integrated into ASMFC lobster stock assessments once the time series attains sufficient length. Data of this type are critical to providing sound advice to resource managers and are the foundation to making good management decisions for American lobster.

Partners: Glenn, Robert (Mass. Department of Marine Fisheries); John Carver (South Shore Lobstermen's Association); David Casoni (Mass. Lobstermen's Association); Tracy Pugh (Mass. DMF). Contact: Robert.Glenn@state.ma.us

#### **Charting Anecdotal Information and Oral Histories on Stellwagen Bank from Local Fishermen (\$84,550)**

Because of the potential for increasingly stringent regulatory and management measures, commercial fishermen wish to craft an accurate record of their use of Stellwagen Bank. They have selected the Massachusetts Fishermen's Partnership (MFP) and its partners to demonstrate the collective effort of each gear type and seasonal variations in target species and fishing locales. The management of Stellwagen Bank requires a balancing of commercial use with the protection of resources and opportunities for scientific enquiry. The Stellwagen Bank Sanctuary is developing a new management plan, but no broad-based consensus has been achieved, due in part to a lack of data on the use of available resources and social and economic impacts of such use and/or loss of use. The State of Massachusetts has begun discussing the use of ocean zoning to resolve potential user conflicts. Rational management decisions concerning appropriate uses of areas require detailed, spatially based information that is not currently available. Commercial users of marine resources are concerned about marine protected areas and this broad approach to protection. Areas are closed to commercial fishing based on data aggregated at a level too general to accurately

identify critical habitat and little work has been done to analyze the social and economic impacts of such closures. The need for more accurate and finer scale resolution of data for reasonable, spatially based management is the motivation behind this proposal.

Partners: Hall-Arber, Madeleine (MIT Sea Grant); David Bergeron and Olivia Rugo (Mass. Fishermen's Partnership); Judith Pederson and Rhonda Ryznar (MIT Sea Grant); Richard Taylor (Gloucester, MA). Contact: arber@mit.edu

#### **A High Opening Kite-Assisted Raised Footrope Trawl for Haddock and Pollack for the Gulf of Maine Multispecies Fisheries (\$154,766)**

This proposal seeks supports to design and test a trawl targeting haddock and pollack in the Gulf of Maine suitable for implementing "B" Days-At-Sea use as proposed in the Amendment 13 to the Northeast Multi Species Fisheries Management Plan. The key feature of the new trawl will be high headline assisted by kites and raised footrope with long drop chains to avoid capture of cod and bottom dwelling species, benthic organisms and "trashes". The substantial increases in haddock and pollack biomass in Gulf of Maine, and much slower increase in cod stocks provide basis for use of such trawls in the multi species fishery to reduce fishing pressure of cod and flounder species. We therefore seek support to conduct a two-year cooperative research to design, test and evaluate the new trawl to provide opportunities for the industry to utilize resources available to them. The project will involve conceptual design, flume tank model tests, at-sea trials, and information dissemination after successful completion of the sea trials. Conceptual designs and flume tank tests will involve Canadian partners at the Fisheries and Marine Institute of Newfoundland. Sea trials will be carried out onboard two commercial fishing vessels skippered by the industry partners. Sea trials will involve remote underwater video observations of fish and fishing gear interactions, acoustic gear geometry monitoring, as well as comparative fishing experiments using parallel tow methods. Fish behavioral knowledge gained during the sea trials will be incorporated into design modifications of the new species selectivity fishing gear.

Partners: He, Pingguo (University of New Hampshire); Vincent Balzano (F/V North Star; Saco, ME); Tim Eddy (F/V Persistence; Portland, ME); Paul Winger (Fisheries & Marine Institute; Newfoundland, Canada). Contact: pingguo.he@unh.edu

#### **Further Tests on Low Profile Flounder Gillnets to Reduce Cod Catch in the Gulf of Maine (221,247)**

This proposal seeks funding to conduct cooperative research to reduce cod bycatch in flatfish gillnets in the Gulf of Maine (GOM), including Stellwagen Bank. The project will involve testing two designs of low vertical profile gillnets of 8 meshes deep (MD) of different floatation and hanging ratios compared with regular 25 MD cod gillnets, foamcore flounder nets and tie-down flounder nets. This project is a continuation of projects conducted independently by the University of New Hampshire (UNH) and Massachusetts Division of Marine Fisheries (DMF) on low-profile flounder gillnets, which were funded by the Northeast Consortium. The nets with lower vertical profiles have been shown to reduce cod catch while maintaining comparable

flounder catch. Low profile nets may also reduce probability of entanglement of porpoise and other marine mammals in gillnets. We propose to further test the nets to fine tune designs to improve flounder catch rates so that they can be commercially viable. The nets will be tested in three different locations involving three fishing vessels in Maine, New Hampshire and Massachusetts to demonstrate their suitability under different fishing conditions.

Partners: He, Pingguo (University of New Hampshire); Randy Gauron (F/V Capt. Al; Hampton, NH); Peter Innis (F/V Barbara & Lynn; Portland, ME); Thomas Moth-Poulsen and Michael Pol (Mass. Department of Marine Fisheries); Steve Welch (F/V American Heritage; Scituate, MA). Contact: pingguo.he@unh.edu

#### **Testing the Effectiveness of Various Escape Panel Configurations on Urchin Drags (\$31,509)**

Concern over recent declines in green sea urchin (*Strongylocentrotus droebachiensis*) stock biomass and landings has prompted the implementation of various regulatory measures. One such measure is the mandatory incorporation of a culling mesh (escape panel) on the back of all urchin drags. By culling during dragging, the stress of exposure to extreme air temperatures and other adverse conditions from on-deck culling is minimized, thus increasing survivorship. The escape panel must be at least 24 inches deep, extend across the full width of the drag, and consist of 2-inch, square-hung mesh, but there are no specific requirements for where this panel should be placed along the back of the drag. To this date there have been no studies evaluating the effectiveness of said escape panel, and there have not been any investigations pertaining to the placement of the panel along the back of the drag. This project aims to demonstrate the effectiveness of a culling mesh by testing three escape panel configurations (full length, front half of drag, back half of drag) against a control of standard 4" diamond mesh (no escape panel). The findings from this study will be presented to fishermen and scientists alike so that they may better manage the urchin fishery.

Partners: Hunter, Margaret (Maine Department of Marine Resources); Stephen Patryn (F/V Northern Eagle; Jonesboro, ME); Keri Stepanek (Maine DMR). 9. Incze, Lewis (University of Southern Maine); D. Brooks (Texas A&M University); James Manning (Northeast Fisheries Science Center); Proctor Wells (F/V Tenacious; Phippsburg, ME). Contact: margaret.hunter@state.me.us

#### **Drifter Study of a Front in the Maine Coastal Current System off Penobscot Bay, Maine (\$134,134)**

We request funds to support a 14-day drifter cruise to investigate flow patterns of near-surface (upper 6 m) water in the mid-coast region of Maine where the Eastern and Western Coastal Currents meet. Much of the flow in the outer part of the Maine Coastal Current system appears to follow the coastal shelf edge near the 100 m isobath off Penobscot Bay. Over shallower parts of the shelf, there is a steep surface temperature gradient, which suggests that residence time of water and associated plankton west of the front (the warm surface layer) has a longer residence time. Flow patterns in the region of this front have implications

for general planktonic as well as larval (such as lobster) transport and connectivity of populations from east to west along the coast. A small research vessel and modified drifters give us a chance to examine the inshore part of the front, which is virtually impossible to do with larger vessels, especially during summer months when there is a great deal of fixed gear in the area. Partners: Incze, Lewis (University of Southern Maine); D. Brooks (Texas A&M University); James Manning (Northeast Fisheries Science Center); Proctor Wells (F/V Tenacious; Phippsburg, ME). Contact: lincze@usm.maine.edu

### **Stock Intermixing and Migration of Atlantic Herring (*Clupea harengus*) in the Gulf of Maine, Georges Bank and Southern New England (\$212,080)**

The Maine Department of Marine Resources (DMR), in cooperation with David Reingardt (owner/operator of the F/V Thunder Bay), Mark Bichrest (owner/operator of the F/V Jennifer and Emily) and Barry Matthews (owner/operator of the F/V Ocean Venture), request consideration of a \$212,080 grant to implement a comprehensive Atlantic herring tagging project. This proposal seeks to expand the current tagging initiative in the Gulf of Maine by providing contracted vessel time for the capture of high quality, live herring on Georges Bank and in southern New England. Results from this study will be directly incorporated into herring management by providing an understanding of stock intermixing and migration patterns that will help in determining area allocations, resource sharing and exploitation rates.

Partners: Kanwit, J. Kohl (Maine Dept. of Marine Resources); Mark Bichrest (F/V Jennifer and Emily; Harpswell, ME); Barry Matthews (F/V Ocean Venture; Hampden, ME); David Reingardt (F/V Thunder Bay; Wakefield, RI). Contact: Barry Matthews (207) 862-6774.

### **A Biological Study of Sand Lance in the Southern Gulf of Maine (\$129,238)**

Sand lances, along with herring, are key to the huge concentrations of marine life for which Jeffrey's Ledge, Stellwagen Bank, and other prominent topographic features of the Western Gulf of Maine are famous. Sand lances shelter by burying on sand banks and shores, but feed in the water column in immense schools. Thus, sand lance are likely a significant link between the benthic and pelagic compartments of the Gulf of Maine ecosystem and offer a key to understanding large-scale biomass movements in the Gulf of Maine: onshore-offshore, north-south, and up-down. The cyclical abundance of sand lances profoundly impacts commercial and recreational fishermen, the whale watch industry, endangered and protected species, and the biological dynamics of the ecosystem that supports these and other marine resources in our region. Immediately, the data gleaned from this project would inform the New England Fisheries Management Council's Habitat Omnibus Amendment process by discerning how, where and when vital habitat areas are used by this important keystone species, which will contribute information on both critical habitat and potential research areas.

This preliminary study of sand lance biology has two primary objectives. Objective One is to obtain data on distribution and abundance, feeding habits, and basic biology that are essential to identifying the right questions to ask to understand, and someday

predict, sand lance abundance. In eight inshore and offshore areas, we shall examine sand habitat and the vicinity of oceanographic fronts. We will conduct stomach contents analysis and feeding and swimming mechanic studies to examine reasons for differences in the range and relative contribution of different types of prey to the diet of the two species. Outcomes will include (a) new empirical knowledge about Gulf of Maine sand lance, and (b) the basis for a predictive model of fluctuations in sand lance distribution and abundance.

The second objective is to develop new sampling gear to optimize the quantitative capture of sand lance in midwater and on the bottom to facilitate the effective observation and monitoring of sand lance biology. Working closely with our partner vessels, we will explore three approaches to the capture of sand lance: a towed beam trawl, a funnel-shaped hoop net, and traps, all designed for the quantitative monitoring of sand lance. Using video and various stimuli and towing speeds, we will determine the conditions under which they can be rendered vulnerable to capture. In addition, video observations of undisturbed sand beds to quantify the densities of burrowed sand lance and how they respond on initial disturbances will be undertaken.

Following the successful completion of this scope of work, a more integrative study will be proposed, to culminate in an actual model to predict sand lance distribution and abundance in the Stellwagen-Jeffreys region as a function of climate, oceanography, and ecological factors. In doing so as a collaborative effort with fishermen, we can pave the way for use of the commercial fleet as the primary observer platform for studying large-scale food web dynamics and climatological effects on fisheries in the Gulf of Maine.

Partners: Kaufman, Les (Boston University); David Bergeron and Olivia Rugo Free (Mass. Fishermen's Partnership); Cliff Goudey (MIT); Bill Lee (F/V Ocean Reporter; Gloucester, MA); Phillip Michaud, Jr. (F/V Susan C III; Eastham, MA). Contact: dbergeron@fishermenspartnership.org

### **Haddock Migration in New England Waters (\$216,500)** (Pending completion of NMFS NEPA review)

With grant support from the Northeast Consortium, the Cape Cod Commercial Hook Fishermen's Association and Gulf of Maine Research Institute seek to assess haddock movement between stock areas and across closed area boundaries. The proposed project will test existing assumptions about movement rates between Gulf of Maine and Georges Bank and movement rates from eastern to western Georges Bank. The program will also evaluate movement in and out of closed areas. The program will coordinate 15 fishermen to deploy 21,000 Hallmark T-bar tags over 24 months within and outside of closed areas on Georges Bank and in the Gulf of Maine. Information from this study will provide timely information on the appropriateness of current stock management units and this may impact how the haddock stock(s) are assessed.

Partners: Parker, Paul (Cape Cod Commercial Hook Fishermen's Association); Jon Brodziak (Northeast Fisheries Science Center); Shelly Tallack (Gulf of Maine Research Institute) Contact: pparker@ccchfa.org

### **Commercial Vessel Acoustic Survey of Coastal Herring Spawning Units (\$168,900)**

The Gulf of Maine Research Institute requests \$162,400 from the Northeast Consortium to support the annual acoustic survey of spawning and pre-spawning aggregations of Atlantic herring in the inshore section of the Gulf of Maine. Funds are requested to pay for the charter of commercial fishing vessels. Project objectives are to conduct a 2004 spawning stock survey using commercial fishing vessels equipped with scientific grade echosounders, analyze the acoustic data, and make peer-reviewed survey results available to the stock assessment and management processes and industry. This survey will be undertaken in coordination with the National Marine Fisheries Service acoustic survey of herring on Georges Bank and the Canadian Department of Fisheries & Oceans acoustic survey of herring in the Bay of Fundy. Information collected by GMRI in previous years has been used by U.S. and Canadian managers at the 2003 Trans-boundary Resource Assessment Committee (TRAC) meeting for Atlantic herring, the Atlantic States Marine Fisheries Commission in its Stock Assessment and Fishery Evaluation (SAFE) report for Atlantic herring, and the New England Fishery Management Council's Plan Development Team as part of the amendment process presently underway by the Atlantic States Marine Fisheries Commission and New England Fishery Management Council.

Partners: Scheirer, Kevin (Gulf of Maine Research Institute); Bryan Bichrest (F/V Safe Haven; Harpswell, ME); Mark Bichrest (F/V Jennifer and Emily; Harpswell, ME); Matthew Cieri (Maine Dept. of Marine Resources); Shale Rosen (Gulf of Maine Research Institute). Contact: kscheirer@gmri.org

### **The Influence of Water Temperature on the Distribution of Berried Females and Duration of Egg Development in American Lobsters (\$275,509)**

In order to more effectively manage the lobster fishery it is vital to understand the factors that influence their distribution and abundance. In simplistic terms, distribution and abundance in any area is a function of where larvae are released, the transport of those larvae to an appropriate settlement location and the subsequent movement of lobsters as they mature and become more active. A major goal of this project is to identify the factors that influence where female lobsters release their larvae. If this question can be elucidated, it will greatly facilitate and improve models of larvae transport that are currently being produced by a number of marine biologists and oceanographers (Incze et al., 2003). As a result, scientists will reach an improved understanding of the sources of the new recruits throughout the coastal and offshore waters of New England. Moreover, these data will be invaluable for aiding in the determination of potentially distinct regional lobster stocks, a critical component of an effective management strategy for the American lobster fishery.

Partners: Watson, Winsor (University of New Hampshire); Diane Cowan (The Lobster Conservancy); Jason Goldstein (University of New Hampshire); Bonnie Spinazzola (Atlantic Offshore Lobstermen Association); Michael Tlusty (New England Aquarium). Contact: win@unh.edu

### **Manipulative Trapping Experiments in the Monhegan Lobster Conservation Area (\$257,110)**

We propose to conduct manipulative trapping experiments in September 2005 in the waters surrounding Monhegan Lobster Conservation Area and to monitor landings and catch composition during the 2004/2005 MLCA fishing season. Over 10,000 fishermen have been affected by trap limits or effort reductions directly or indirectly in the expectation of increased biological benefit. Unfortunately, the relationship between the number of traps and the associated fishing mortality rate is poorly understood, raising questions about the effectiveness of limiting traps to control fishing mortality. We will begin to empirically determine how the number and spatial arrangement of traps affects exploitation rates and fishing mortality. Understanding how traps influence fishing effort is fundamental to our understanding of the assessment and management of the lobster resource in the Northwest Atlantic.

Partners: Wilson, Carl (Maine Dept. of Marine Resources); Michael Bell (Lowestoft Laboratory; Suffolk, UK); Yong Chen (University of Maine); Ross Claytor (Bedford Institute of Oceanography; Dartmouth, Nova Scotia); Richard Wahle (Bigelow Laboratory; West Boothbay Harbor, ME); Monhegan, ME, Vessels: David Boegel (F/V Kathleen); Robert Bracy (F/V Pandora); Lucas Chioffi (F/V Fenris); Dan Murdock (F/V Sylvia Anne); Sherman Stanley (F/V Legacy); Matthew Thomson (F/V Shearwater II); Matt Weber (F/V Griffin).  
Contact: carl.wilson@state.me.us

### **Marine Resource Education Project (\$197,518)**

The Marine Resource Education Project (MREP) was initially funded by the Northeast Consortium in 2000 as a three-year program. In the subsequent period, the project has developed a curriculum, tailored specifically for fishermen and relevant stakeholder groups, in two topic areas: a three-day Fishery Science Module, followed by a three-day Fishery Management Module. The pair of modules has been offered five times during the period, at six-month intervals, the most recent being on April 12 -14 and May 3 -5. With completion of this final pair of workshops funded under the initial project grant, 137 marine resource professionals have taken part in the course curriculum, either as participants or presenters (or both). Of these, 78 have been active commercial fishermen, and 17 others have been important members of the fishing community (commercial shore support, trade association leaders, fishery management council members or recreational fishermen). The remaining 42 participants and presenters came from regional institutions with backgrounds in education, science, fishery regulatory (state and federal), fishery management or environmental advocacy. Participation was well distributed geographically, with individuals coming from five New England states and New York; the full diversity of commercial gear-types and vessel size-classes were well represented; and commercial and recreational ground fishermen, scallopers, herring fishermen and lobstermen all contributed to the learning environment. Evaluations have been universally positive and strongly supportive. There is a waiting list of participant applications. After consultation with participating agencies (NMFS Northeast Fisheries Science Center, NMFS Regional Office, and the New England Fishery Management Council) and course graduates, the MREP Board of Directors has set the goal of

establishing an ongoing program based on the curriculum developed under the NEC support. The Project Principals are pursuing a strategy for long-term funding consistent with this goal and have met with key potential Agency Co-Sponsors to initiate such actions. As an interim step, MREP is requesting of the Northeast Consortium funding for a fourth year (the sixth and seventh offerings of the paired modules) in the amount of \$195,900. This additional year of funding will allow the Project to accommodate community demand, allow continued development of the curriculum, and enable a thorough project assessment designed to identify the explicit benefits gained by program participants. This will provide data for potential funding partners and others an opportunity to evaluate the program's specific benefits first-hand.

**Partners:** Becker, Mimi (University of New Hampshire); Andrew Rosenberg and William Fleeger (UNH); John Williamson (Fishing Community Coordinator). Contact: mlbecker@cisunix.unh.edu

#### **A Fishing Gear Workshop by Fishermen for Non-Fishermen (\$27,510)**

In the past decade, fishing gear and harvesting related issues have become topics among those who have interests in fisheries but are not commercial fishermen. This group of people includes federal and state scientists and professors who work with fishermen in cooperative research projects, staff and volunteers working for fishermen associations and organizations, fisheries managers and staff members who work for various committees, councils, commissions and congressional delegations, and representatives of conservation organizations. While they have various strengths in their respective professions, lack of knowledge on fishing gears and their operations is evident. We propose to organize a pilot three-day workshop for sixteen such participants so that they will have better understanding of fishing gears, operational methods, and conservation issues of commercial fishing gears in use in New England. The workshop will be primarily instructed by active commercial fishermen with at-sea and on-the-dock components. Two trawl skippers and two gillnet skippers will be involved in on-the-dock instructions and discussions, practical demonstrations of gears, and fishing demonstrations at sea.

**Partners:** He, Pingguo (University of New Hampshire); Erik Anderson (F/V Kris 'n' Kev; Portsmouth, NH); David Goethel (F/V Ellen Diane; Hampton, NH); Joe Jurek (F/V Mystique Lady; Seabrook, NH); Tom Lyons (F/V Marion J; Hampton, NH). Contact: pingguo.he@unh.edu

#### **Workshop on Trawl Selectivity and Conservation (\$62,967)**

This joint outreach project aims to promote cooperation and collaborative planning among fisheries researchers in fishing gear selectivity, conservation engineering and option to reduce bycatch and discard in the marine fisheries in the northeast United States. The project consists of two components: 1) broad-scope cooperation, training and outreach effort - the Conservation Engineering Working Group, and 2) specific activities in analyzing trawl codend selectivity data obtained by project participants and planning for future selectivity projects in the region - the Selectivity Analysis and Planning Workshops. The

two components complement each other and will overlap activities, meeting venues and project participants. Effort will be made to coincide and/or coordinate selectivity analysis and planning workshops with conservation engineering group meetings. Draft findings of the former may therefore be presented at the larger group for comments and input. The selectivity analysis and planning group is an example of how focused subgroups of the broader conservation engineering community can deal with and cooperate on specific challenges and opportunities facing commercial marine fisheries in the northeastern U.S.

**Partners:** He, Pingguo (UNH), fishing industry representatives. Contact: pingguo.he@unh.edu

## **FY 2004 Northeast Consortium Project Development Awards (awards up to \$25,000 each)**

### **Flatfish Cage System for Bycatch Studies**

A cage system for holding flatfish for studying bycatch mortality will be developed. They aim to design small cages and a deployment system that can emulate conditions for flatfish discard from fishing operations for later observation of survival or mortality. A short-term application of the system is proposed to evaluate tag-induced mortality of yellowtail flounder, a necessary component of the Yellowtail Flounder Tagging Study funded by the Northeast Consortium in FY03 and FY04. The application will also provide background information on survival of healthy, untagged yellowtail from short tows for context on survival in the holding system. The objective of the short-term study is to test the feasibility of the system for future bycatch mortality studies for improved assessment and management of New England flat fish resources.

**Partners:** Cadrin, Steve (Northeast Fisheries Science Center); David Goethel (F/V Ellen Diane; Hampton, NH). Contact: Steven.Cadrin@noaa.gov

### **Utilizing Genetic Techniques to Discriminate Atlantic Cod Spawning Stocks in U.S. Waters: A Pilot Project**

The utility will be determined of using microsatellite and single nucleotide polymorphism (SNP) DNA analyses in determining if Atlantic cod at Georges Bank and the inshore Gulf of Maine comprise one or two genetic stocks and if stock subdivisions exist within the Gulf of Maine, Georges Bank, and south of Georges Bank. Unlike previous efforts, this study will focus on actively spawning cod, with spawning state confirmed through gonad biopsies, and on spawning aggregations thought most likely to have genetic differentiation, based on the best available information regarding ecological differences, movements, and expected stock delineations. Thus, comparisons will be made of winter-early spring spawning cod from Georges Bank with both winter and spring spawning cod from inshore, western Gulf of Maine. The project will also collect, record, and synthesize information on the location and timing of cod spawning aggregations as a resources for future research, including the identification of stock structure using genetic techniques.

**Partners:** Deese, Heather (Northwest Atlantic Marine Alliance); David Berlinsky (UNH); Ike Wirgin (NYU). Contact: deese@tidewater.net

### **Design and Preliminary Testing of an Innovative Scallop Dredge**

A novel approach to harvesting scallops will be tested aimed at reducing the habitat impacts associated with current scallop dredging methods. Preliminary testing showed, for example, that passage of a circular disk over a 6" scallop can move and lift the scallop 6-12" off the seafloor. Hydrodynamically speaking, the plate acts as a low-aspect-ratio, fully-stalled lifting surface and a large scale vorticity generator. If the size, shape, orientation, and spacing of such vorticity generators can be optimized, it may be possible to develop a dredge that does not rely on formidable contact with the bottom, but instead is towed over the bottom, inducing scallops to rise up for capture by a mesh bag that does not drag along the seabed, but rolls instead. In addition to reducing the bottom impact of the steel shoes on conventional dredges, the reduced towing resistance of a rolling device may result in less fuel costs and less wear and tear on the vessel and winch. The research will include the design, construction, and laboratory and ocean testing, of a prototype that has a high probability of leading to a larger-scale investigation.

Partners: Goudey, Cliff (MIT); David Bergeron (Mass. Fishermen's Partnership); Paul Tasha (Provincetown, MA). Contact: cgoudey@mit.edu

### **Species-Selective Gillnets for the Winter Flounder Fishery**

This project aims to develop and demonstrate a gillnet design that will be effective on winter flounder, while specifically avoiding cod. We plan fishing trials in areas where and when winter flounder and cod are known to exist in significant quantities to assure that our results are as meaningful as possible given the duration of the project. A uniquely designed, low profile experiment gillnet will be compared to a normal flounder gillnet in commercial trials in Massachusetts Bay. This project will make progress towards a clean winter flounder fishery that can occur through a combination of gear, time, and area restrictions. Once an acceptable bycatch rate is achieved and rigorously quantified, a strong case can be made for allowing areas to be open for winter flounder gillnetting or allow its prosecution under Amendment 13 using B-days.

Partners: Goudey, Cliff (MIT); Louis Williams (F/V Pretty Girl; Swampscott, MA). Contact: cgoudey@mit.edu

### **Developing a Protocol for Sampling Juvenile Groundfish in Rocky Habitat**

There is a need to assess the effectiveness of marine closures such as the Western Gulf of Maine (WGOM) area closure on fish habitat and groundfish populations. Most routine groundfish sampling protocols (e.g. NMFS groundfish survey) mainly rely on bottom trawling. Trawls may be rigged for a range of bottom types, but they are not effective on rocky bottoms with substantial vertical structure. Hence, groundfish monitoring and research programs in rocky habitats must use other types of gear. The proposed project is to test methods for sampling juvenile groundfish in rocky habitats using small mesh gillnets, with the long-term aim being development of a protocol for assessing the WGOM area closure as nursery habitat. The proposed project is designed to meet the following major objectives: (1) determine the effectiveness of small mesh gillnets for capturing juvenile

groundfish in rocky habitats; (2) develop a general protocol for the use of small mesh gillnets in sampling juvenile groundfish in rocky habitats; and (3) provide preliminary data on how the WGOM closure may be protecting juvenile habitat.

Partners: Grizzle, Ray (UNH); David Berlinski (UNH); Mike Leary (Hampton Falls, NH). Contact: david.berlinsky@unh.edu

### **Modifying the Nordmore Grid Rigging to Reduce Fish Discards in Shrimp Trawls in the Gulf of Maine**

This research will modify the rigging of the Nordmore shrimp grid to reduce fish catch in the inshore pink shrimp fishery of the Gulf of Maine. Modifications to the grid selection include more escape areas for fish and shellfish, including extra openings on the side and bottom in front of the Nordmore grate. Escapement of fish and shellfish reduces grid blockages, so that shrimp may pass through more easily. The research will involve conducting full scale trials of the modified grid rigging onboard a commercial trawler, conducting underwater video camera observations of the behavior of fish that exit the grid openings under fishing conditions, and evaluation of the rigging for more extensive sea-trials and/or flume tank tests in the future.

Partners: He, Pingguo (UNH); Vincent Balzano (F/V North Star; Saco, ME). Contact: email: pingguo.he@unh.edu; phone: (603) 862-3154; fax: (603) 862-7006

### **Design and Testing of Trap for Assessment of Abundance and Distribution of Juvenile Shrimp in the Western Gulf of Maine**

A trap design will be developed and tested that will serve as an effective sampler for juvenile shrimp 2 years old. Ancillary information, such as observations of juvenile shrimp (<17 mm CL) in the bait bags of local fishermen's lobster traps in Penobscot Bay, supports the idea that juvenile shrimp behavior is similar to adults and that they are able to be trapped. However, the design that will be most efficient and economical for sampling juvenile shrimp is not known. Existing lobster traps will be modified in different ways and their effectiveness at catching juvenile shrimp will be compared in field trials. Our objective is to come up with a standard design that can be used in the development of trap-based surveys of juvenile shrimp in the Western Gulf of Maine, for both management and research purposes.

Partners: Jones, Rebecca (UNH); Jeffrey Runge (UNH); Daniel Schick (Maine Dept. of Marine Resources); Bryan Soares (Portsmouth, NH); Alan Vangile (Portsmouth, NH). Contact: jeff.runge@unh.edu

### **A Pilot Gillnet Survey of the Cashes Ledge Closed Area**

This project tests the use of gillnets to inventory fish populations in the Cashes Ledge Closed Area. Gillnets composed of panels of different mesh sizes are proposed as a sampling tool to effectively sample groundfish in a complex habitat, including species such as pollock that are not effectively sampled by otter trawls. The expected outcome from the project will be a sampling methodology using gillnets that will minimize damage to bottom habitat and sample a variety of species and habitats effectively. If this methodology is successful and additional funding is obtained, it may be possible to develop long term

standardized measures of relative abundance of target species in closed areas in collaboration with the commercial fishing industry.

Partners: Kelly, Kevin (Maine Dept. of Marine Resources); Mathew Thompson (F/V Shearwater, Monhegan Island, ME). Contact: stormlobster@yahoo.com

#### **Pilot Project to Test the Feasibility of the Use of Shrimp Traps as a Survey Tool for Both Adult and Juvenile *Pandalus borealis***

This project will test the potential for shrimp traps to serve as a means of sampling the Gulf of Maine northern shrimp (*Pandalus borealis*) population. Traps would offer several advantages over the traditional method of trawl sampling. They would sample both adult and pre-adult shrimp, they could be deployed in a wider variety of areas, and would be less subject to conflict with fixed gear. They are also less expensive and less prone to benthic interaction. For these reasons, we believe the development of traps as a means to sample the shrimp population is both important and timely.

Partners: Pinkham, Kelo (F/V Jeanne C; Trevett, ME); Pingguo He (UNH); Daniel Schick (Maine Dept. of Marine Resources). Contact: pingguo.he@unh.edu

#### **Winter Flounder Traps: Exploring the Potential for Environmentally-Friendly Access to Groundfish in Coastal Maine**

This research will examine the feasibility of a winter flounder (*Pseudopleuronectes americanus*) trap fishery in Maine's inshore and nearshore waters. Sixty traps will be deployed over 12 weeks. There will be two sets of thirty traps and the sets will have different entry designs to determine the efficacy of trap fishing for winter flounder and to examine the potential for a commercial trap fishery.

Partners: Pinkham, Kelo (F/V Jeanne C; Trevett, ME); Pingguo He (UNH). Contact: pingguo.he@unh.edu

#### **Testing a Method to Evaluate Deepwater Settlement of the American Lobster**

This project will evaluate the feasibility and effectiveness of postlarval lobster collectors for use in deep water and in areas otherwise unsuitable for diver-based sampling. While the end-use of the collectors is intended for deep-water, the experiments proposed herein will largely be conducted in shallow water accessible to divers (approx. 10 m) to enable more rigorous testing of their performance. The objectives are to determine losses of settlers during retrieval of the collectors and to determine the difference in settlement density to artificial collectors and immediately adjacent natural cobble nursery sites.

Partners: Wahle, Richard (Bigelow Laboratory for Ocean Sciences); John O'Leary (F/V Captain Bligh; Wakefield, RI); Matt Parkhurst (F/V Sea Spray; Boothbay Harbor, ME); Carl Wilson (Maine Dept. of Marine Resources). Contact: carl.wilson@state.me.us

### FY 2004 NOAA Fisheries Northeast Regional Office Cooperative Research Partners Initiative Projects

#### **Feasibility of Successful "B Regular Day" Programs: Social, Enforcement, and Data Factors (\$33,100)**

Employ interviews and three stage focus groups to identify social, enforcement, and data factors potentially impacting "B Day" programs.

Partners: Jackie Odell (NESFC), Sarah Robinson (MFP), Vito Giacalone. Contact: 617.384.2432/ website: <http://coopresearch.nero.noaa.gov>

#### **Testing the Selectivity of Gillnets to Target Haddock in the Gulf of Maine (\$77,917)**

Document reaction and behavior of haddock and other groundfish to gillnets of differing mesh sizes and determine optimal configuration to maximize selectivity.

Partners: Laura Taylor-Singer (GMRI), Thomas Moth-Poulsen (Mass. DMF), David Marciano. Contact: [laura@gmri.org](mailto:laura@gmri.org)/ 207.772.2321/ website: <http://coopresearch.nero.noaa.gov>

#### **Gulf of Maine Inshore Trawl Survey; ME/NH Inshore Trawl Survey**

Establish foundation for strong long-term fishery independent monitoring program of nearshore water of GOM.

Partners: John Sowles (Maine DMR), Sally Sherman. Contact: [john.sowles@state.me.us](mailto:john.sowles@state.me.us)/ website:

#### **Haddock-Separator Trawl in Georges Bank Closed Area I (\$297,614)**

Study the effect of three factors on net selectivity: 1) net type, 2) trawling time, 3) seasonal fish density.

Partners: UMASS-Dartmouth SMAST. Joachim Groeger, Brian Rothschild, Robert Lane. Contact: [www.smast.umassd.edu/](http://www.smast.umassd.edu/) 508.910.6357

#### **A Rope Separator Trawl for Haddock and Pollack using "B" Days-at-Sea in the Inshore Western Gulf of Maine (\$214,584)**

Use sea trials and flume tank to develop selective gear that will be available for use when Amendment 13 is implemented.

Partners: Pingguo He (UNH), Capt. Carl Bouchard. Contact: [pingguo.he@unh.edu](mailto:pingguo.he@unh.edu)/ website: <http://coopresearch.nero.noaa.gov>

#### **Examining the Efficacy of the Haddock Separator Trawl in Eliminating Cod Bycatch in Limited Areas within Closed Area I and Closed Area II (\$440,000)**

Monitor Closed Areas at a fine scale over a 10 month period to determine seasonal fluctuations in Groundfish abundance using a haddock separator trawl.

Partners: Laura Taylor-Singer (Gulf of Maine Research Institute) Chris Glass (Manomet), James Odlin. Contact: [laura@gmri.org](mailto:laura@gmri.org)/ website: <http://coopresearch.nero.noaa.gov>

#### **Using Hook and Line to minimize cod bycatch in a directed haddock fishery on Georges Bank and in the Gulf of Maine (\$300,000)**

Use hook and line to target haddock in closed areas with minimal bycatch of cod.

Partners: Paul Parker (CCCHFA) Linda Mercer (Maine DMR), Jon Brodzia. Contact: parker@ccchfa.org/ 508.945.2432/ website: <http://coopresearch.nero.noaa.gov>

### **Bycatch Reduction in the Directed Haddock Bottom Trawl Fishery (\$422,000)**

The difference in bycatch between a large mesh faced bottom trawl and regular trawl net in reduction of cod and other bycatch.

Partners: David Beutel (URI Sea Grant), Laura Skrobe, Phil Rhule Sr. & Jr. Contact: dbeutel@uri.edu/ 401.874.5138

### **Pilot Study Fleet**

In collaboration with New England groundfish fishing fleets, NOAA Fisheries has developed the CRPI Study Fleet Program. The CPRI Study Fleet Program is a pilot project to develop and implement state-of-the-art electronic data reporting devices for use aboard groundfish fishing vessels in the Northeast. The goal of the project is to design and field test electronic reporting hardware for collecting, recording, and transferring more accurate and timely fishery-based data. The vessels that participate in the Study Fleet will represent a stratified subsample of the entire fishing fleet. These vessels will collect more detailed information for use in management decisions. Three distinct pilot fleets comprising different vessel size categories are included in this pilot project. The first fleet is large Southern New England trawlers from New Bedford, Massachusetts, to Narragansett, Rhode Island. The second fleet is the small hook vessels based out of Cape Cod, Massachusetts. The third fleet is the medium-sized trawlers and gill-netters from Cape Ann, Massachusetts, to Mid-Coast Maine.

#### Partners:

Perot Systems Government Services has been contracted by NMFS to assist in the management of the CRPI Study Fleet Program. Three associations were awarded contracts to assist PSGS with this project. The Cape Cod Commercial Hook Fishermen's Association (CCCHFA) will manage the small hook and gillnet vessels. The Gulf of Maine Research Institute will manage the medium-sized trawlers and gill-netters. The Manomet Center for Conservation Sciences will manage the larger offshore trawlers. Contact and report information: <http://coopresearch.nero.noaa.gov/study.htm>

### **Industry-Based Resource Surveys**

The sampling designs used for cooperative resource surveys may range from traditional stratified random sampling similar to resource surveys conducted on research vessels to sentinel surveys where fisherman recommend sampling stations based on their empirical knowledge. It is important that the partners in the program understand that there are many variations in survey design, many different designs have merit, and all designs have limitations.

The Industry-Based Survey is a partnership between four New England states (Maine, New Hampshire, Massachusetts, and Rhode Island); NOAA Fisheries; and the fishing industry to collect data pertinent to Gulf of Maine cod and Southern New England yellowtail flounder stocks. The purpose of this program is for the fishing industry to assist in providing higher-resolution data in near-shore areas.

The focus of the Gulf of Maine Cod Assessment is to survey aggregations of cod in time and space, describe cod distributions by stock demographic characteristic (age structure, spawning, and variance), and develop a species aggregation map. These surveys of cod distribution are needed to monitor inshore stocks, assess the importance of these areas as nursery and spawning grounds, and may provide greater detailed information for management purposes. This program will be operational in late 2003.

The focus of the Southern New England Yellowtail Flounder Project is to derive precise estimates of the abundance of Southern New England yellowtail flounder at age using intense sampling with industry designed "flatfish" trawls. Work on this project is currently underway.

Partners: Maine DMR, Mass. DMF, R.I. Dept. Environmental Management. Numerous industry vessels. Contact and report information: <http://coopresearch.nero.noaa.gov/survey.htm>

### **Atlantic Cod Tagging**

Stock identification is an important foundation for stock assessments. In the Northeast, it is also a controversial foundation for several species, most notably cod and yellowtail flounder. The fishing industry strongly advocates tagging to test existing stock boundaries.

The purpose of the Northeast Regional Cod Tagging Program is to monitor movements and identify distributions of cod in inshore and offshore waters of the Gulf of Maine and Georges Bank. CRPI has formed a partnership among Island Institute, Maine Department of Marine Resources (DMR), Manomet Center for Conservation Sciences, University of Massachusetts Dartmouth's School for Marine Science and Technology (SMAST), and the Cape Cod Commercial Hook Fishermen's Association (CCCHFA). These groups have been awarded contracts to coordinate regional tagging operations with the local fishing industries; manage and present tagging information on a web-based Geographic Information System (GIS), and provide outreach to the fishing community to encourage the return of tags from captured fish.

The Gulf of Maine Research Institute (GMRI) is serving as the central coordinating organization for the five local cod tagging projects and will provide program consistency, maximize the return tags, and compile and make data readily available. More information is available on the Northeast Regional Cod Tagging Program website: [www.codresearch.org](http://www.codresearch.org)

### **FY 2004 NOAA Fisheries Northeast Fisheries Science Center (NEFSC) Projects:**

*NEFSC has partnered and coordinated a number of cooperative research projects for many years, including the a shark tagging project which has been ongoing for nearly 40 years. NEFSC funds allocated for research often come from a several sources specific to the projects. In FY 2004, NEFSC earmarked \$1 million for cooperative research. For more information visit:*

[www.nefsc.noaa.gov](http://www.nefsc.noaa.gov)

### **Yellowtail Flounder Tagging Study.**

On-going since 2003, this study involves fishermen throughout New England, the Massachusetts Division of Marine Fisheries, the School of Marine Science and Technology and Rhode Island Fish and Wildlife, in the tagging of yellowtail flounders to better understand their movements, mortality and ageing. The 2003 tagging season was made possible by the NOAA Fisheries Stock Assessment Improvement Program. Funding for 2004 and 2005 is provided by the Northeast Consortium, University of New Hampshire. Contact: Steven.Cadrin@noaa.gov

### **Cooperative Black Sea Bass Tagging Project**

The Cooperative Black Sea Bass Tagging Project was designed to examine the population size, exploitation rate and seasonal movements of the northern Atlantic coast black sea bass, *Centropristis striata*. Black sea bass have been divided into two separate populations along the Atlantic coast, with the northern population distributed north of Cape Hatteras, NC. This project is conducted through cooperation among NOAA's National Marine Fisheries Service (NOAA Fisheries) state fishery agencies, and both commercial and recreational fishermen. Tag recovery information is compared to release data to provide a basis for determining seasonal movements inshore and offshore as well as a better understanding of population dynamics and the ecological condition of the black sea bass.

During the fall of 2002, federal and state fishery employees began tagging and releasing black sea bass from Cape Cod, MA to Cape Henry, VA. Since that time the project has been dependent on commercial and recreational fishermen to report their encountered recaptures. This study requires a response on tag number, fish length, specific recapture location (Loran or lat/long preferred) and vessel information. Each tag holder is eligible to claim a reward after reporting the recaptured fish to the NOAA Fisheries office in Woods Hole, MA. Contact and report information: <http://www.cooperative-tagging.org> Phone and email: (508) 495-2246; Joshua.Moser@noaa.gov

### **Cooperative Monkfish Survey**

On or about 1 March, 2004 - 22 May, 2004 in the area of the mid-Atlantic continental shelf and slope from Cape Hatteras through Georges Bank and the Gulf of Maine in U.S. waters. Stations may be occupied between and 55-460 meters (30-250 fathoms). Objectives: To collect research survey data on the monkfish resource (distribution, abundance, biological characteristics) in U.S. waters north of Cape Hatteras.

Partners: NOAA Fisheries, F/V Mary K. Contact and report information: <http://www.nefsc.noaa.gov>

### **NMFS Cooperative Shark Tagging Program**

The National Marine Fisheries Service (NMFS) Cooperative Shark Tagging Program (CSTP) is part of continuing research directed to the study of the biology of large Atlantic sharks. The CSTP was initiated in 1962 with an initial group of less than 100 volunteers. The Program has expanded in subsequent years and currently includes over 6,500 volunteers distributed along the Atlantic and Gulf coasts of North America, and Europe. The tagging methods used in the CSTP have been essentially unchanged during the past 30 years. The two principal tags that are in use are a fin tag (Jumbo Rototag) and a dart tag ("M" tag). Rototag showing tag number and address. The rototag is a two piece,

plastic cattle ear type tag which is inserted through the first dorsal fin. These tags were primarily used by NMFS biologists on small sharks during the first few years of the CSTP. As the Program expanded to include thousands of volunteer fishermen, the dart tag "M" tag displaying tagging needle (top) and legend (bottom). was developed to be easily and safely applied to sharks in the water. The "M" tag is composed of a stainless steel dart head, monofilament line, and a plexiglas capsule containing a vinyl plastic legend with return instructions printed in English, Spanish, French, Japanese and Norwegian. These dart tags, in use since 1965, are implanted in the back musculature near the base of the first dorsal fin. More recently, a Hallprint tag has been used on a limited basis for use on small sharks in the nursery areas.

Numbered tags are sent to volunteer participants on self-addressed return post cards for recording tagging information (date, location, gear, size and sex of shark), along with a tagging needle, tagging instructions, an Anglers Guide to Sharks of the Northeastern United States, and a current Shark Tagger newsletter. This newsletter is an annual summary of the previous year's tag and recapture data and biological studies on sharks which is sent to all participants in the CSTP. Tagging studies have been mostly single release events in which recoveries are made opportunistically by recreational and commercial fishermen. When a previously tagged shark is re-caught, information similar to that obtained at tagging is requested from the recapturer. Initially, a five dollar reward was sent as an incentive for returning tags; since 1988, a hat with an embroidered logo has been used.

Between 1962 and 1995, more than 128,000 sharks of 40 species have been tagged and more than 6,000 sharks of 32 species have been recaptured, as a result of the CSTP. Eighty-six percent of the tags are represented by eight species: blue shark *Prionace glauca*, sandbar shark *Carcharhinus plumbeus*, dusky shark *C. obscurus*, tiger shark *Galeocerdo cuvier*, shortfin mako *Isurus oxyrinchus*, blacktip shark *C. limbatus*, scalloped hammerhead *Sphyrna lewini* and Atlantic sharpnose shark *Rhizoprionodon terraenovae*. The number of sharks tagged varies from two for the smalleye hammerhead *Sphyrna tudes* to 70,303 for the blue shark. Contact and report information: <http://na.nefsc.noaa.gov/sharks/intro.html>

## **FY 2003 Northeast Consortium Projects**

### **Developing an Alternative Bait for the American Lobster Fishery (\$132,997)**

Baits for crustaceans generally consist of fish or fish byproducts that act as attractants by the leaching from hydrolyzed protein/fluids. Currently the bait of choice is herring. However, the demand for fish for human consumption, the decrease of stocks, and the consequent fluctuation in the supply and price of fish bait are major concerns of lobstermen. Dr. Bayer of the Lobster Institute at the University of Maine has been experimenting with alternatives to fish bait since the 1970s. After extensive research on lobster attractants, studies focused on the use of soy-based alternative baits, using a combination of soybean meal, salted fish, fresh crabmeat, fish extracts, hydrolyzed fish, vegetable oils and soybean related products as ingredients. Recent results have shown certain test baits to fish at better than 200% as compared to the control (herring). The most effective bait obtained

catches up to 285% of the control. With an effective bait formula in place, refinement of the product is now needed to allow for combination with appropriate binders to manufacture the bait in pellet form. This will allow for ease of use by fishermen and both the proper leaching of attractants and viability of the bait. Various time-release binders will be incorporated with the bait formula. The range of products developed will provide for short-term (2-3 days) or long-term (7-21) dissolutions. These prototype bait pellets will be fished by licensed commercial fishermen at various locations throughout the Gulf of Maine to test their efficacy, ease of use, and soak time.

Partners: Robert Bayer (The Lobster Institute); Herbert Hodgkins (Lobster Products Inc.) For further information contact: rbayer@maine.edu

### **Mapping Mobility: The Movement of New England Multispecies Vessels and Crew in New England and Beyond from 1994 – 2004 (\$63,535)**

The mobility of vessels and crew in the New England multispecies fishery has gone relatively undocumented and unanalyzed by social scientific field research. Current requirements to analyze the impacts of multispecies regulations on geographically discrete fishing communities has obscured the extent to which vessels and the people who work them move from place to place and the extent to which fishing regulations drive this movement. We hypothesize that this movement is considerable and that it has dramatic effects on coastal communities. We propose to (1) document temporary and permanent shifts in vessels' principal ports over the past 10 years (1994-2004), (2) document permanent and temporary shifts in crew residence and occupational strategies over the same 1Q-year period, (3) map these movements of vessels and crew with GIS software; and (4) execute this research as a collaborative project of social scientists and fishing industry members. In the first stage of our project, we will examine the movements in and out of two key ports (Portland and Gloucester) in fine detail, using key informant interviews, mapping exercises, and tapping existing data sources. In the second stage we will conduct collaborative workshops in these and six additional New England ports to ascertain whether the mobility patterns apparent in our primary field sites reflect related movements in larger and smaller ports throughout the region.

Partners: David Bergeron (The Massachusetts Fishermen's Partnership); Gina LeDuc (F/V Resurrected); Christine Sherman (F/V Lady Jane). For further information contact: dbergeron@fishermentpartnership.org.

### **Yellowtail Flounder Tagging Study (\$200,000)**

New England fishermen and the Northeast Fisheries Science Center request a grant of \$200,000 from the Northeast Consortium to expand and improve an ongoing tagging study for yellowtail flounder in Northeast U.S. waters. The proposal is designed to charter commercial fishing vessels to tag yellowtail flounder with conventional disc tags and data-storage tags on Georges Bank and the Cape Cod-Gulf of Maine fishing grounds with the objective of estimating movement among stocks areas and mortality within stock areas as well as providing growth observations. Currently funded tagging efforts are planned to tag yellowtail from the Gulf of Maine to the Mid Atlantic. However, despite considerable uncertainties in the Cape Cod yellowtail and

Georges Bank yellowtail stock assessments, and the need for independent information on movement, mortality and growth, the current allocation of tagging efforts are disproportionately low for the Georges Bank and Cape Cod areas. Therefore, statistical estimation will be improved by increasing the number of tags released on Georges Bank and off Cape Cod. This proposal is designed to complement concurrent studies with a common tagging protocol, a single experimental and analytical design, the same tag return system as well as coordinated outreach efforts. Through the cooperation of industry leaders and fishery scientists, the proposal was designed to reduce uncertainty in yellowtail flounder stock assessments, thereby improving fishery management.

Partners: Steve Cadrin and Azure Westwood (Northeast Fisheries Science Center) Rodney Avila (F/V Travis & Natalie); David Goethel (F/V Ellen Diane). For further information contact: Steven.Cadrin@noaa.gov

### **An Evaluation of the Maine Sea Cucumber Resources and Impacts of Exploitation (\$165,647 over two years).**

Effective management of benthic invertebrate fisheries is a difficult undertaking. Pertinent data are frequently unavailable and are difficult and expensive to obtain. This is particularly true for new/developing fisheries because funds for fishery research and management tend to be unavailable. Paradoxically, this is also a time when a rational management plan is needed to prevent the over-exploitation that is often detected in benthic fisheries only after it is too late to prevent a collapse. A similar fate may await the sea cucumber fishery in Maine if actions are not taken soon. The sea cucumber is a relatively new, but rapidly expanding fishery in Maine. Like other new fisheries rapidly developed as a result of newly found markets, we have little knowledge about the status of the Maine sea cucumber resources and impacts of the fishery on the resources. Using the approaches developed with the support of the NEC Program development fund, we propose this cooperative research project to conduct cooperative research to (1) survey the sea cucumber resources in Maine; (2) collect biological information of the Maine sea cucumber population (e.g. size structure, size-specific maturation, size-specific fecundity, etc.); (3) collect ecological information of the Maine sea cucumber population (e.g. spatial and temporal variations in abundance and its associated key biotic and abiotic environmental variables characterizing the habitat; (4) evaluate the impacts of exploitation on the sea cucumber population by conducting a before- and after-fishing comparative study; (5) estimate current status of the resources; and (6) evaluate the effectiveness of the current management plan and propose an optimal management plan for the sea cucumber fishery. The results of this study will be given to the Maine Department of Marine Resources in developing an effective fishery management plan for the sea cucumber in Maine, thus leading to improvement in managing this important fisheries resource in Maine.

Partners: Yong Chen (University of Maine); Lawrence Ray; Drusilla Ray; Russell Leach; David Leach. For further information contact: ychen@maine.edu

### **Environmental Monitors on Lobster Traps Phase IV: Drifters (\$192,900)**

What are the physical processes governing the transport/fate of lob-

ster larvae and other planktonic particles along the coast of Maine, New Hampshire, and Massachusetts? Can we accurately simulate these processes with state-of-the-art numerical circulation models? We propose to address these questions with a truly collaborative effort that could potentially involve hundreds of fishermen along the entire western edge of the Gulf of Maine. By seeding the Maine Coastal Current with a few dozen low cost drifters at selected transects on a monthly basis during the summer of 2004 with the help of lobstermen to deploy and report these units, we propose to provide the first summer-long, coast-wide, description of the synoptic flow fields. These surface current velocity observations will be used to validate a set of numerical simulations conducted by a suite of local circulation models currently under development at various state, federal, and academic labs. In order to understand the inter-annual variability of stock recruitment processes, it is necessary to both monitor and model the underlying physical environment. Are there large changes in the conditions and pathways of drift during critical stages of larval development? The three most-important variables in describing the physical oceanography of the Gulf of Maine are temperature, salinity, and current velocity. Having setup an infrastructure for measurement and management of the first two data streams (temperature and salinity) in earlier phases of eMOLT, plans are now underway to obtain observations of the third (current velocity). While each of these variables are dependent on the other, all three are required in a complete description of the physical system. As in the case of atmospheric weather models, in order to generate realistic output for the entire three-dimensional field, it is necessary to repeatedly assimilate data at key locations throughout the geographic domain.

Partners: Patrice Farrey (Gulf of Maine Lobster Foundation and Maine Lobstermen's Association); James Manning (Northeast Fisheries Science Center); Charles Gregory (Southern Maine Community College); Jeremy Cates (Downeast Lobstermen's Association); Bonnie Spinazzola (Atlantic Offshore Lobstermen's Association); David Casoni (Massachusetts Lobstermen's Association) For further information contact: james.manning@noaa.gov

#### **Development of an Inclined Separation Panel to Reduce Bycatch and Discard in the Gulf of Maine Groundfisheries (\$225,501)**

Management and fisheries regulation can be problematic even in single species fisheries. However, these problems are exacerbated where fisheries are truly multispecies in nature. In circumstances where there is a need to reduce fishing pressure on one or more components of the multi-species complex (e.g. One species is overfished while stocks of other species are at high levels) the normal approach is to impose effort restrictions on all components of the assemblage. Given the recent imposition of rolling closures and the reduction in days at sea to protect single species within the Gulf of Maine multi-species complex, there is a clear and pressing need to develop effective strategies that allow fishing to continue on stocks that can support commercial exploitation while avoiding capture or discard of other species. Here we propose to build on preliminary research conducted in early 2003 to develop and conduct full scale seatrials of a bycatch reduction device (inclined separator panel) currently implemented in Irish Sea fisheries. The device consists of a simple sloping-panel of netting inserted into the extension of the net which guides cod and other roundfish towards the top of the net while directing flatfish downwards. The device was designed by Geartech (Ireland) to separate cod and other round fish from flatfish. Separation takes place in the extension of the net. In fleetwide trials it was shown to separate

cod and flatfish with 80 -85% success. Preliminary trials in the Gulf of Maine conducted by Manomet Center for Conservation Sciences and Capt. Terry Alexander (supported by a Northeast Consortium project development grant; see interim final report) demonstrated significant separation of cod from other species both in terms of weight and numbers of fish. Significant separation also occurred for monkfish with most individuals being retained in the upper codend. Any simple, cost effective bycatch reduction device that allows separation of cod from flatfish, and/or separation of monkfish from other species, could have significant and far-reaching implications for management of fisheries in New England.

Partners: Chris Glass (Manomet Center for Conservation Sciences); James McDonnell (consultant); Vincent Balzano (F/V North Star). For further information contact: glasscw@manomet.org

#### **Development and Testing of a Novel "Rigid-Mesh" Bycatch Reducton Device for Gulf of Maine Groundfish Fisheries (\$186,723)**

With the current state of fisheries in the Gulf of Maine, it has become apparent that more robust information about the selectivity of trawl gears has become vital for both rebuilding fish stocks and maintaining the fisheries industry itself. It is also clear that many traditional approaches have failed to improve selectivity or reduce discard on a fleet-wide or region-wide basis. The fishing industry has changed dramatically over recent decades. Vessels are more powerful and have much improved fish finding capabilities but while nets are made from stronger and more abrasion resistant twines they remain essentially the same design and concept as nets in use 100 years ago. Nets are still constructed with flexible mesh netting and despite variation in mesh shape and rigging configuration, flexible meshes (whatever their shape) tend to close or distort when force is applied. Other industries have invested considerable resources into developing devices to grade fish by size. The aquaculture industry routinely utilizes "rigidmesh" panels to sift or size-grade fish in water. The meshes of this netting not only stay open even under tension but it also provides the opportunity for construction of asymmetrical meshes, for example, elongate mesh. Here we propose to build on preliminary research (supported by the Northeast Consortium, Project Development award) which demonstrated the feasibility of incorporating such a grading device into a conventional trawl net, and aim to assess the effectiveness of the device for reducing discard of undersized fish in Northeastern groundfish fisheries. It is expected that this program will produce high quality scientific information on the efficiency of novel codend mesh configurations in key fisheries in the Northeastern region. This will provide improved data available for management and clearly addresses an immediate management need. If successful this has clear implications for long-term rebuilding and sustaining stocks within the region.

Partners: Christopher Glass (Manomet Center for Conservation Sciences); Terry Alexander (F/V Jocka); Mark Freedman (F/V Miss Sarah). For further information contact: glasscw@manomet.org

#### **Use of Kites in Shrimp Codends to Reduce Small Shrimps and Bycatch Species. (\$162,553)**

Heavily loaded trawl codends stretch meshes in the codend and extension pieces, causing meshes to close. This restrains fish and shellfish escaping through the codend meshes and increases discards of small fish and shellfish. While the use of Nordmore Grid in shrimp trawls in the Gulf of Maine reduced large and medium sized finfish discards, small fish and small shrimps are often retained in shrimp

trawl codends. We propose to expand the meshes in a shrimp trawl codend with a series of kites to allow small fish and shrimps to escape or pass through expanded meshes, thereby reducing discards. Use of kites to expand meshes in a codend cover was funded by the Northeast Consortium in a development project and has been very successful. The kite-assisted codend cover is being used for codend mesh size selectivity studies. We plan to use two commercial shrimp trawl vessels in Maine to conduct parallel and alternating tows to compare bycatch reduction with the kite-assisted codend. Experienced in kite design and its application in trawls, we are confident that the technology can be utilized in shrimp trawl codends to reduce discards in Gulf of Maine shrimp fisheries.

Partners: Pingguo He (University of New Hampshire); Proctor Wells (F/V Tenacious); Vincent Balzano (F/V North Star); Daniel Schick (Maine Department of Marine Resources). For further information contact: pingguo.he@unh.edu

### **Iron Oxide Gillnets to Reduce Cetacean and Seabird Bycatch (\$103,875)**

We propose to perform a small-scale field test of gill nets in which the nylon monofilament contains 15% (by weight, 3% by volume) iron oxide, to determine if such nets can reduce harbor porpoise and seabird bycatch in the Gulf of Maine. Theory and limited sample testing indicates that gillnets with iron oxide filler should be significantly more acoustically reflective than nets filled with barium sulfate. Since nets filled with barium sulfate appear to reduce the bycatch of harbor porpoises and seabirds, the iron oxide nets, untested in the fishing waters of North America, in theory should be even better. We propose to manufacture sufficient nets to supply five boats, to fish a total of 80 days with equal numbers of conventional nets with pingers and the iron nets, and to provide each boat with 100% observer coverage. We propose to evaluate porpoise and seabird bycatch, as well as whether codfish catch rates are comparable to standard gillnets. This level of fishing will only allow for marginally statistically based conclusions, but it will provide indicators of performance for this new type of net. Net samples will be sent to the Whitlow Au at the University of Hawaii for acoustical measurements.

Partners: Scott Kraus (New England Aquarium); Norman Holy (Atlantic Gillnet Supply); Edward Trippe. For further information contact: skraus@neaq.org

### **Selective Gear Research and Development to Reduce Bycatch: Investigating the use of square mesh side panels and increased taper in a groundfish trawl (\$95,751)**

Selectivity of trawl gear is a critical issue in the northeastern US, where scrutiny of the fishery is intense, and reflected in regulation. Selection (specifically escapement) of finfish from the net occurs by mechanical sorting and/or behavioral processes. Both are important factors in designing selective trawls. The proposed project would make use of these factors, utilizing A) square mesh side panels in the belly section of a trawl, and B) a combination of square mesh side panels and increased belly taper, to assess the effects on escapement of undersized groundfish.

Partners: Dana Morse (Maine Sea Grant); Stanley Coffin (F/V Bad Penny). For further information contact: dana.morse@maine.edu

### **Field Trials of 4-inch Rings in the Inshore Scallop Fishery of the Gulf of Maine (\$92,932)**

Scallop drags are relatively unselective and inefficient as fishing gear, but remain little changed from the original designs of the 1940's. Their selective properties and bycatch rates are governed partly by the ring size and the size of inter-ring spaces in the drag. Given the fishing characteristics of scallop drags, and the rapid increases in meat sizes as young scallops grow, it is beneficial to avoid capturing scallops below the legal size, which is a 4-inch shell height in the state of Maine. This project will compare two scallop drags, one fitted with 4" rings vs. one fitted with the standard 3.5" rings, to assess the influence of ring size on capture of scallops, and retention of by catch and associated rubble.

Partners: Dana (Maine Sea Grant); Steve Patryn (F/V Northern Eagle); Robert Holland (F/V Double J). For further information contact: dana.morse@maine.edu

### **Survival of Sub-legal Atlantic Cod (*Gadus morhua*) in the Northwest Atlantic Longline Fishery (\$127,812)**

The Cape Cod Commercial Hook Fishermen's Association (CCCHA), National Marine Fisheries Service and New England Aquarium propose to quantify mortality of sub-legal sized cod on Georges Bank during various seasons and at various depths. Three to six vessels will utilize hook and line to catch and then "release" sub-legal sized cod into cages that will be monitored for 72 hours. Results will be used to develop policy to minimize the bycatch mortality rate of sub-legal sized cod caught by bottom set longline.

Partners: Pappalardo, John (Cape Cod Commercial Hook Fishermen's Association); Henry Milliken (Northeast Fisheries Science Center); Marianne Farrington (New England Aquarium). For further information contact: John Pappalardo, (508) 945-2432

### **Commercial Vessel Acoustic Survey of Coastal Herring Spawning Units (\$198,180)**

The Gulf of Maine Research Institute (formerly Gulf of Maine Aquarium) seeks funding to continue an annual acoustic survey of spawning and pre-spawning aggregations of Atlantic herring in the inshore section of the Gulf of Maine. The program's objectives are to conduct this survey using both groundfish and commercial herring vessels, to analyze acoustic and concurrently collected oceanographic data, and to make this information available to the stock assessment and management processes and industry. Information collected in past years was used by US and Canadian managers at the 2003 Transboundary Resource Assessment Committee meeting for Atlantic herring, and project results have been included in the Atlantic States Marine Fisheries Council's Stock Assessment and Fishery Evaluation (SAFE) report for Atlantic Herring. Funds are requested to cover vessel charter, equipment (including calibration of acoustic datalogging systems), and staff time for survey planning, execution, and data analysis.

Partners: Shale Rosen (Gulf of Maine Research Institute); Matthew Cieri (Maine Department of Marine Resources); Cameron McClellan (F/V Adventurer); Peter Mullen (F/V Western Wave and F/V Osprey); Frank O'Hara (F/V Starlight); Gerry O'Neill (F/V Mohawk); Walt Raber (F/V Providian); Dave Reingardt (F/V Thunder Bay). For more information contact: srosen@gma.org

### **Improving the Size Selectivity for Northern Shrimp Through Use of a Combination of a Modified Nordmore Grate and Square Mesh Cod End (\$250,721)**

The ability to reliably separate large, market shrimp from smaller, less desirable shrimp and fish using either a mesh size, or a Nordmore grate system has been elusive. The compound Nordmore grate we have tested seems to combine the proven ability of the double Nordmore grate system to release small shrimp with the ease of handling just one grate in the net. The compound grate, mounted upside down in the net, allows small shrimp to pass through small bar spacing and exit the net, then market shrimp pass through the larger bar spacing further along the grate and flow into the cod end. Larger organisms slide down the bars and out of the net at the other end of the grate. The upper edge of the cod end is attached to the grate at the juncture between the small bar spaces and the larger bar spaces. As the biomass of fish and shrimp in the Gulf of Maine continues to rebound the shrimp season will lengthen to a more historical norm. At this time interaction of shrimp fishermen and fish (especially juvenile whiting and redfish) will become a problem. Although the large fish will be released by the gate, many juvenile fish will be passed through to become bycatch on deck. By installing a compound Nordmore grate in knotless square mesh twine many of the smaller fish will be allowed to escape. When this is combined with a Nordmore grate with 3/4" bar spacing we will have a three tiered means offish escapement from the net. Fish too large to fit through the 3/4" bar spacing are excluded from the net, fish small enough to pass through the grate will exit the net either before the grate through the 7/8" square holes in the square mesh twine or through the shrimp separator portion of the compound grate along with the smaller shrimp.

Partners: Pinkham, Kelo (F/V Jeanne C.); Dan Schick, Margaret Hunter, Lessie White (Maine Department of Marine Resources); Laura Taylor Singer and Togue Brawn (Gulf of Maine Research Institute); Lewis Incze (University of Southern Maine); David Townsend (University of Maine); Vincent Balzano (F/V North Star); Stanley Coffin (F/V Bad Penny); Craig Pendleton and Mike Stinchfield (F/V Susan & Caitlyn); Kelo Pinkham (F/V Jeanne C.); Dale Page (F/V Aaron & Sarah). For further information contact: dan.schick@state.me.us

### **Developing Stock Assessment Methods for the New England Deep Sea Red Crab Fishery (\$274,132 over two years)**

Until 2002 the New England deep sea red crab, *Chaceon quique-dens*, was one of the last unmanaged fisheries in the Northeast United States. A Fishery Management Plan has recently been adopted, but with virtually no information on the biological status of red crab populations. The harvester-scientist partners submit this proposal for research contributing to the development of stock assessment methods for this species. This research constitutes the only fishery independent survey conducted on this valuable offshore resource in nearly three decades. Support for this research has been combined from three different agencies because of the expense of conducting research in very deep water off the continental shelf break some 100 miles offshore. In 2001 the Northeast Consortium agreed to support Year 1 of the three-year project, with the stipulation that future funding be contingent on the success of the first year. In this proposal with results from recent surveys we demonstrate that the work we proposed to do is both feasible and cost effective. With this proposal we request the balance of Northeast Consortium support originally requested for Years 2 and 3 of the project. Additional, complementary support for the project has

been secured from NOAA's Saltonstall-Kennedy Program and Maine Sea Grant. To discontinue the NEC support at this time would be to abandon a hard earned collaboration to overcome the logistical difficulties of doing surveys previously only done with scientific research vessels twice the size and without compromising fishing days. The objectives of the project are to: (1) Employ trawl- and camera-based sampling methodology established by early NMFS red crab surveys (Wigley et al. 1975) to determine whether abundance, size structure, and sex composition of the population has changed significantly at the same sites sampled in 1974, (2) Conduct sea sampling to characterize the commercial catch and better evaluate the spatial correlation between fishery-dependent data (catch per unit effort, catch per unit area) and fishery-independent estimates of abundance (trawl-camera data) for both harvestable and sub-harvestable crabs, (3) Conduct tagging to obtain much needed information on red crab growth rates and movement, and (4) Employ three stock assessment modeling approaches of different complexities (size-structured yield-per-recruit model, production model, and size-structured simulation model) to evaluate the dynamics of the red crab stock, estimate current status of the fishery, and evaluate alternative management strategies. Partners: Richard Wahle (Bigelow Laboratory); Jon Williams (New England Red Crab Harvesters Association); Yong Chen (University of Maine). For further information contact: rwahle@bigelow.org.

### **Workshop on Trawl Selectivity and Conservation (\$139,076 over three years)**

This proposal seeks supports to organize three five-day trawl gear workshops over the next three years at a specialized fishing gear testing facility at the Memorial University of Newfoundland in St. John's, Newfoundland. The workshops will be primarily for trawl fishermen in Massachusetts, New Hampshire and Maine, with invited participants from Sea Grant, federal, state and fisheries management council member/staff. With significant positive feedbacks from participants of previous two workshops supported by the Northeast Consortium, it is proposed that the workshop be offered annually for the next three years to build up a momentum of success and to provide benefits for the fishing industry in the Gulf of Maine. The workshops will be part of the outreach effort of the UNH Institute for the Study of Earth, Oceans and Space, UNH Cooperative Extension, NH Sea Grant Extension and the Northeast Consortium as part of overall university strategy of engaged institution. Each workshop will be attended by 15 participants from the area, primarily fishermen. The workshop intends to increase knowledge and awareness of conservation-oriented fishing gears and operations and to empower the industry in conservation engineering, responsible fishing, sustainable fisheries, and responsible fisheries management. The workshop will also serve as an arena where conservation engineering, bycatch reduction and seabed friendly fishing gears will be discussed among fishermen, Sea Grant extension specialists and educators, and fisheries managers. The project also serves to stimulate the industry to generate innovative project ideas for cooperative research programs supported by the Northeast Consortium and National Marine Fisheries Services and as a vehicle to attract more widespread participation of cooperative research by the fishing industry.

Primary Investigator: Pingguo He (University of New Hampshire)  
For more information contact: pingguo.he@unh.edu.

### **Intensive Study of the Western Gulf of Maine Closure Area (\$195,516)**

By examining a combination of ecosystem factors including primary production, bottom habitat heterogeneity and temporal dynamics, and potential human impacts to the seafloor, this project seeks to initiate an ecosystem-level assessment of the effectiveness of the Western Gulf of Maine Closure Area. In addition, it will provide an opportunity to develop new approaches to habitat mapping that may have important ramifications for fisheries management. We propose to use satellite remote sensing of primary production, multibeam acoustic mapping of the seafloor, videographic mapping of the seafloor, and grab sampling of sediments and benthos to produce detailed maps of primary production and bottom habitat characteristics for a portion of the closed area and adjacent areas. The new maps and other information will be combined with existing data from the study area to assess the potential effects of the closure on groundfish populations and overall habitat quality.

Partners: Raymond Grizzle (University of New Hampshire); Mark Dowell, Michael Lesser, Larry Mayer, Andy Rosenberg, and Larry Ward (University of New Hampshire); David Goethel (F/V Ellen Diane); Jayson Driscoll (F/V Karen Lynn); Pete Kendall (F/V Miss Alicia); Craig Mavrikis (F/V Marion Mae); Bob Hannah. For more information contact: ray.grizzle@unh.edu.

### **PULSE: A Cooperative Partnership for Coastal Ocean Ecosystem Monitoring in the Gulf of Maine (\$240,033)**

This proposal puts forward a plan for a university-fishing industry collaboration to monitor the pelagic ecosystem of the Gulf of Maine. This initial phase calls for a two-year, weekly sampling program in partnership with the Portsmouth Fisherman's Cooperative. The program involves collection of plankton samples and basic hydrographic information at two fixed stations located within a day's round-trip steam of the coast. The samples would be analyzed for phytoplankton and zooplankton biomass and species composition. This two-year data set is valuable in its own right, but the goal is to develop a long-time series of data that will show trends in the structure of the planktonic community and in the timing of biological events that influence the recruitment and distribution of fish in the Gulf of Maine. To this end, other strategically located fixed stations in the Gulf of Maine would be proposed in later phases, depending on the success of this initial program. The need for a long-term biological data collection program in the Gulf of Maine becomes critical in light of increasing evidence for change in New England's climate. It becomes increasingly important for the fishing industry as decisions about fishery management shift from a single or multi-species to an ecosystem-based approach. By incorporating the expertise and resources of local fishermen, we hope to learn more about the natural and manmade variability of the Gulf of Maine marine ecosystem. With long time series of zooplankton data, we would have a better indication whether dramatic changes in fish stocks were being forced by environmental conditions and bottom-up processes or by overfishing. The Northeast Consortium has funded the pilot phase for an industry-based, long-term ecosystem monitoring program in the Gulf of Maine. During the pilot phase (in 2002), coordination with an industry partner and establishment of sampling and sample analysis protocols will be the focus. We are informed of and will seek to compliment other data acquisition programs in the Gulf of Maine. With the help of a seven-member monitoring advisory panel (MAP), a plan has been put forth for the selection of industry partners, design of a sampling scheme, analysis of samples, and integration with

other monitoring efforts. Sample analysis will be in part contracted out and in part analyzed in-house. The possibility of engaging a local community volunteer organization in sample analysis, with oversight from core NEC staff, will also be explored. Data reporting is a key issue for the long-term initiative. While a website clearinghouse of data and interpretative articles will be necessary, it is also important to give immediate feedback to the fishermen through workshops and at-sea discussions and posted results on the coop bulletin boards.

Partners: Jeffrey Runge and Rebecca Jones (University of New Hampshire); George Littlefield (F/V Lady Regena); Jeremy Davis (F/V Chutzpah); Craig Mavrikis (F/V Marion Mae); Lee Stevens (F/V Lynn Allison); Bud Fernandes. For more information contact: jrunge@cisunix.unh.edu.

### **An Automated, Comprehensive Monitoring Program for the Atlantic Offshore Lobster Fishery (\$134,452)**

The effective long-term management of the lobster fishery requires a thorough understanding of the resource and the impact the fishery has on that resource. It is generally accepted that cooperative efforts involving members of the industry, biologists and managers are likely to have the most success both collecting the appropriate data and developing management strategies that are acceptable to all parties concerned. The overall goal of this project is to develop a monitoring program for the offshore lobster fishery so that data are collected that will assist the development of management practices appropriate to that fishery. Most data will be collected directly by members of the industry, from experimental traps integrated into strings of commercial traps. Data from lobsters will be entered directly into electronic log-books, along with the GPS coordinates of the study site. Bottom temperature data will be recorded with tidbit temperature dataloggers attached to one of the experimental traps. These data will be transferred to a website upon return to shore and then used to assess the: 1) size frequency composition of catch from offshore vessels; 2) temporal and spatial patterns of abundance of all lobsters, especially berried females; 3) temporal and spatial patterns of shell disease; and 4) the relationship between the distribution of lobsters and bottom temperature. In addition, a range of sizes of female lobsters will be examined from three different areas of the fishery to determine the size when 50% of them reach sexual maturity and if this is correlated with water temperature. All these data will be used to improve our current management practices and thus ensure maintenance of a sustainable offshore lobster fishery for years to come.

Partners: Win Watson (University of New Hampshire); Bonnie Spinazzola (Atlantic Offshore Lobstermen Association). For more information contact: whw@cisunix.unh.edu.

### **Marine Resource Education Project (\$142,714)**

Partners: Mimi Becker and Andy Rosenberg (University of New Hampshire); John Williamson (consultant). For more information contact: jwilliamson@fishadvocate.com

## FY 2003 NOAA Fisheries Northeast Regional Office Cooperative Research Partners Initiative Projects

### **Video examination of the continuing change in habitats within the closed areas of Georges Bank**

Examine scallop size, abundance and spatial distribution and associated macroinvertebrate community by conducting video tows similar to previous work and further analysis of current data.

Principal Investigator: Kevin Stokesbury, Ph.D. (UMASS-Dartmouth SMAST)

Project Period: June 2004-May 2005. For more information contact: [kstokesbury@umassd.edu](mailto:kstokesbury@umassd.edu)

### **Habitat-Dependent Catch Composition and Food Web Dynamics with Respect to Long-Term and Rolling Closures on Stellwagen Bank**

Conduct trawls and jigging in and out of closed areas to compare catch rates. Also small-scale pilot studying age and growth samples using stable isotope analysis for trophic dynamic studies.

Partners: David Bergeron (Massachusetts Fishermen's Partnership); Les Kaufman (Boston University)

Project Period: May 2004 - May 2006. For more information contact: [lesk@bu.edu](mailto:lesk@bu.edu)

### **An Industry-Based Characterization of Essential Fish Habitat in the Western Gulf of Maine**

Two Essential Fish Habitat locations (one in permanent closure area, one outside) will be selected after a review of scientific literature, group meetings and fishermen interviews. These two sites will then be evaluated using remote sensing, benthic sampling and water sampling to identify what characteristics make them essential fish habitat.

Principal Investigator: Allan Michael (Cape Ann Fisheries Institute).

Project Period: Spring or Fall 2004-December 2004. For more information contact: <http://www.cafi.info>

### **Reproductive Life History and Essential Fish Habitat Mapping of Western Georges Bank Cod: GIS mapping of eggs, larvae and juvenile cod**

Train fishermen to conduct field and lab work. Use bongo nets to track cod progeny, evaluate effectiveness of genetics for tracking progeny, and use GIS mapping to describe geographic locations used for spawning, egg, larvae and juvenile life history stages of W. Georges Bank cod. Relate this information to Essential Fish Habitat.

Partners: Paul Parker (Cape Cod Commercial Hook Fishermen's Assoc.); Marine Biologic Laboratory; UMass Boston,

Project Period: June 2004 - June 2005

For more information contact: Paul Parker: (508) 945-2432

### **A Proposal to Define Monkfish Trawl Exemption Areas and Monkfish Trawl Gear that will Reduce Groundfish Bycatch and the Frequency of Deployment on Groundfish Habitat**

Use commercial draggers to test new NEFMC Monkfish trawl net. Film performance for net evaluation and to provide NEFMC with nec-

essary data on deepwater EFHs.

Partners: Christopher Glass (Manomet Center for Conservation Sciences); The Groundfish Group of Associated Fisheries of Maine.  
Project Period: 10 months. For further information contact: [glass-cw@manomet.org](mailto:glass-cw@manomet.org).

### **Identification of Juvenile Groundfish Habitat within Nearshore Waters of the Gulf of Maine**

Identify juvenile cod usage of habitat by type and depth to ascertain links. Sites will be sampled with small-mesh trawls comparable to DMR methods and data. Baited fish traps will also be used at each of ten depths in 4 benthic types. Links between habitat and delineated health indices will be determined.

Partners: Jonathan H. Grabowski (Gulf of Maine Research Institute) Univ. of Maine; F/V De Dee Mae II; F/V Tenacious  
Project Period: July 2004 - Spring 2005. For more information contact: [Jhg2729@email.unc.edu](mailto:Jhg2729@email.unc.edu).

### **An Assessment of Benthic community recovery in the Western gulf of Maine Closed Area**

Use of sidescan sonar, ROV videography and quantitative sediment sampling to assess benthic habitat recovery in the W. GOM closed area.

Partners: Laura Singer (Gulf of Maine Research Institute); F/V Adventurer; University of Maine.

Project Period: May 2004 - July 2005. For more information contact: [laura@gma.org](mailto:laura@gma.org).

### **A Quantitative Assessment of Substrate Changes Due to Scallop Dredging in the New York Bight and Associated Recovery Rates**

Two transects will be selected and monitored using video equipment. One transect will serve as a control and will not be manipulated while the other will be subjected to scallop dredging. Will examine the two sites to determine effect of dredging. Use information to build consensus between stakeholders in the future.

Partners: William C. Phoel (Phoel Associates, Inc.); Arthur Ochse; Kenneth Ochse

Project Period: April 2004-July 2005. For further information contact.

### **Identifying Habitat Associations of Early-Juvenile Cod in Nearshore Gulf of Maine Waters**

Unmanned submersible and rebreather SCUBA divers will video document, and characterize habitat. Includes buying the rebreather equipment and training the researchers in how to use it.

Partners: Slade Moore (Maine DMR); U Maine; (F/V Tenacious); F/V North Star.

Project Period: January 2004-June 2005

For further information contact: [slade.moore@state.me.us](mailto:slade.moore@state.me.us).

### **Development of Species-Specific Essential Fish Habitat Indices using Biological and Habitat Data Collected Using Remote Sensing**

Video bottom mapping, sediment profiling and concurrent commercial trawling to develop quantitative indices leading to detailed mapping of species-specific Essential Fish Habitat.

Principal Investigator: Jon Volstad (Versar, Inc)

Project Period: November 2003 - April 2005. For further information contact: <http://www.versar.com>

## Study Fleet Project

The Study Fleet Project will be assessing the utility of the various electronic reporting devices on vessels with a variety of wheelhouse characteristics through the use of three separate New England fleets: Gulf of Maine mid-sized vessels; Southern New England large, off-shore vessels; and smaller Cape Cod hook vessels. The Gulf of Maine Research Institute, the Manomet Center for Conservation Sciences, and the Cape Cod Commercial Hook Fishermen's Association are partners in the project. The Study Fleet Project is a pilot project that partners commercial fishermen with NOAA Fisheries personnel to develop and implement state-of-the-art electronic data reporting devices and software for use aboard groundfish fishing vessels in the Northeast. Fishermen are assisting in the design of these data collection systems. These collaborative efforts will result in information that will be utilized by both fishermen and managers.

Partners: Manomet Center for Conservation Sciences with the cooperation of Zane Gogola (F/V Mora K; Bob Khole (F/V Glenna); Jacob Phil Ruhle Jr. (F/V Sea Breeze); Tony Santos (F/V T. Luis); Scott Wescott (F/V Mary Elena). For further information contact: glass-cw@manomet.org

Cape Cod Commercial Hook Fishermen's Assoc with the cooperation of Jamie Eldredge (F/V Yellow Bird); Bruce Kaminski (F/V Never Enough); Tom Luce (F/V Sea Win); Mike Russo (F/V Susan Lee); Peter Taylor (F/V Sea Hound).

Gulf of Maine Research Institute with the cooperation of Lendall Alexander (F/V Julie D.); David Goethel (F/V Ellen Diane); Bill Lee (F/V Ocean Reporter); Cameron McLellan (F/V Adventurer); Paul Vitale (F/V Angela & Rose). For more information contact: Paul Parker: (508) 945-2432

## Industry-Based Surveys

The sampling designs used for cooperative resource surveys may range from traditional stratified random sampling similar to resource surveys conducted on research vessels to sentinel surveys where fisherman recommend sampling stations based on their empirical knowledge. It is important that the partners in the program understand that there are many variations in survey design, many different designs have merit, and all designs have limitations. The Industry-Based Survey is a partnership between four New England states (Maine, New Hampshire, Massachusetts, and Rhode Island); NOAA Fisheries; and the fishing industry to collect data pertinent to Gulf of Maine cod and Southern New England yellowtail flounder stocks. The purpose of this program is for the fishing industry to assist in providing higher-resolution data in near-shore areas. The focus of the Gulf of Maine Cod Assessment is to survey aggregations of cod in time and space, describe cod distributions by stock demographic characteristic (age structure, spawning, and variance), and develop a species aggregation map. These surveys of cod distribution are needed to monitor inshore stocks, assess the importance of these areas as nursery and spawning grounds, and may provide greater detailed information for management purposes. This program will be operational in late 2003. The focus of the Southern New England Yellowtail Flounder Project is to derive precise estimates of the abundance of Southern New England yellowtail flounder at age using intense sampling with industry designed "flatfish" trawls. Work on this project is currently underway.

Partners: Maine Department of Marine Resources:

[www.state.me.us/dmr/](http://www.state.me.us/dmr/)

New Hampshire Fish and Game Department:

<http://wildlife.state.nh.us/>

Massachusetts Division of Marine Fisheries:

<http://www.state.ma.us/dfwele/dmf/index.html>

Rhode Island Department of Environmental Management:

<http://www.state.ri.us/dem/>

Reports: Documents and reports may be viewed at <http://coopresearch.nero.noaa.gov/surveydoc.htm>

## Northeast Regional Cod Tagging Program

Stock identification is an important foundation for stock assessments. In the Northeast, it is also a controversial foundation for several species, most notably cod and yellowtail flounder. The fishing industry strongly advocates tagging to test existing stock boundaries. The purpose of the Northeast Regional Cod Tagging Program is to monitor movements and identify distributions of cod in inshore and offshore waters of the Gulf of Maine and Georges Bank. CRPI has formed a partnership among Island Institute, Maine Department of Marine Resources (DMR), Manomet Center for Conservation Sciences, University of Massachusetts Dartmouth's School for Marine Science and Technology (SMAST), and the Cape Cod Commercial Hook Fishermen's Association (CCCHFA). These groups have been awarded contracts to coordinate regional tagging operations with the local fishing industries; manage and present tagging information on a web-based Geographic Information System (GIS), and provide outreach to the fishing community to encourage the return of tags from captured fish. The Gulf of Maine Research Institute (GMRI) is serving as the central coordinating organization for the five local cod tagging projects and will provide program consistency, maximize the return tags, and compile and make data readily available.

More information is available on the Northeast Regional Cod Tagging Program website: [www.codresearch.org](http://www.codresearch.org)

Contact: Dr. Shelly Tallack, Northeast Regional Cod Tagging Program, Gulf of Maine Research Institute Tel: (207) 772-2321; Email: [stallack@gma.org](mailto:stallack@gma.org)

## FY2002 Northeast Consortium Cooperative Research Projects

### Mapping Spawning and Hatching Grounds of the American Lobster (\$260,000)

The proposed field studies will investigate where and at what temperatures female lobsters spawn (egg out), overwinter (brood), and hatch their eggs in Muscongus Bay, Maine. Fishing vessels will be equipped as research platforms to follow the movements of egg-bearing females using mark/recapture and sonar tracking techniques. In some locations within the Gulf of Maine, females concentrate in large groups to spawn (Campbell 1990, 1992, Campbell and Duggan 1980). We propose to tag females near shore in the fall shortly after they have spawned. Sonar tagged lobsters will also be equipped with temperature data loggers to record daily temperature throughout egg development.

Partners: Diane Cowan (The Lobster Conservancy); Andy Solow (WHOI), Win Watson (UNH). June 2003 report available at [www.northeastconsortium.org](http://www.northeastconsortium.org). For further information contact Diane Cowan, [dcowan@lobsters.org](mailto:dcowan@lobsters.org)

### **Environmental Monitors on Lobster Traps: Phase III (\$116,000)**

Having completed the distribution of temperature probes in phase I and salinity in phase II, the eMOLT project is now fully operational with nearly one hundred monitoring sites throughout the Gulf of Maine. The objective now is to simply maintain these long-term sites and fine-tune our record keeping procedures. We strive to minimize the effort required by lobstermen in accurately, systematically, and efficiently documenting deployments. So that data can be collected, processed, and archived for many years to come, we now propose "Phase III: Date Management". The goal will be to set up small computer stations at several locations along the coast where eMOLT participants can get help in downloading, documenting, and viewing their data. Industry representatives will be trained in all aspects of the eMOLT operations including hardware and software. They will train participants (i.e. lobstermen) to document data in paperless media (i.e. with electronic logging devices and web-based forms). With a minimal amount of equipment (laptops connected to the internet), the industry representatives will ensure that all deployments are formally documented in a standardized way so that all environmental records are properly stored in the publicly available eMOLT database. These industry representatives will report on a quarterly basis to their respective lobster association representatives (MaLA, MeLA, DELA, or AOLA) on the status of the local eMOLT records. As in the previous two phases, the Gulf of Maine Lobster Foundation will act to distribute the funds and equipment to the associations. While most of the funding will go to the industry representatives and individuals to train those representatives, administrative support will also be provided at the association and foundation levels. Travel money is requested for all "representatives" to attend quarterly meetings.

Partners: Patrice Farrey (Maine Lobstermen's Assoc.); Manning, James (NMFS), David Casoni (Mass. Lobstermen's Assoc.), Bernard Feeny (Ocean Gold Seafood, Inc.), Clare Grindal (Downeast Lobstermen's Assoc.), David Sleeper (Spruce Head Fishermen's Coop), Bonnie Spinazzola (Atlantic Offshore Lobstermen's Assoc.) June 2003 report available at [www.northeastconsortium.org](http://www.northeastconsortium.org). For further information contact Jim Manning, [jmanning@whsun1.wh.who.edu](mailto:jmanning@whsun1.wh.who.edu).

### **Reduction of Bycatch and Discard in the Gulf of Maine Groundfish Fisheries: The effect of composite mesh codends (\$197,085)**

Here we propose to investigate the effectiveness of two novel, composite mesh codends (constructed with the proposed increased minimum mesh sizes, 6 1/2" and 7" diamond and 7" square mesh netting), in reducing bycatch and discard in Gulf of Maine Groundfish fisheries. We will compare their selective efficiency with codends constructed with current minimum mesh sizes (6" diamond and 6 1/2" square) and projected minimum mesh sizes (6 1/2" diamond and 7" square). Four fishing vessels from Maine and Massachusetts will conduct sea trials at three different times of year, on commercial fishing grounds in the Gulf of Maine. Covered codend techniques will be employed to generate absolute selectivity estimates for each codend, area and season. We also propose to quantify the behavioral responses of fish to the different meshes of the codend. These data will help our understanding of observed differences in selectivity parameters and may help in design of more species and size selective codends. It is expected that this program will produce high quality scientific information on the selective efficiency of novel codend mesh configurations in key fisheries in the Northeastern region. This will provide improved data available for management and clearly addresses an

immediate management need. We also expect to demonstrate effective bycatch reduction strategies within key species and this has clear implications for long-term rebuilding and sustaining stocks within the region.

Partners: Christopher Glass (Manomet Center for Conservation Sciences); Arne Carr, Vincent Balzano (F/V North Star), Russell Sherman (F/V Lady Jane), Proctor Wells (F/V Tenacious). June 2003 report available at [www.northeastconsortium.org](http://www.northeastconsortium.org). For more information contact Christopher Glass, [glasscw@manomet.org](mailto:glasscw@manomet.org)

### **The Identification of Cod and Haddock Spawning Habitat Using Passive Acoustics (\$183,600)**

Atlantic cod (*Gadus morhua*) and haddock (*Melanogrammus aeglefinus*) are important species in the multispecies complex of the northwest Atlantic, especially Georges Bank and the Gulf of Maine. There is a critical lack of information on the spawning habitat requirements of both species. In addition, there is a lack of information on how fishing activity affects spawning activity and specifically how closed area management approaches may enhance stock production by protecting spawning habitats or providing a refuge during spawning activities. We plan 120 days of fieldwork aboard two commercial fishing vessels in areas both open and closed to fishing in the Gulf of Maine. Seabed-mounted recording units will be placed with a high-flyer. Cooperating fishermen will place the units in designated areas retrieving mass storage media and changing batteries as the units are moved to the next site. To accompany the acoustic data, fishermen will take bottom grab samples and gather information on location, environmental conditions, and any nearby fishing activity. We will also use a video camera to aid in identifying the species being monitored and, to some extent, the behavior associated with the sounds. Post processing software will be used to quantify the daily pattern of each sound type (time of day, number of calls, time between calls, etc.), as well as summarize statistical properties of each type of call (call duration, frequency, pulse rate, pulse width, number of pulses, etc.). The number of calls and call rate can be used as an index of abundance/activity. This index of abundance can then be used for comparison among each monitored location and habitat type to determine their use as spawning habitats.

Partners: Cliff Goudey (MIT); David Marciano, Rodney Rountree (UMass-Dartmouth), Proctor Wells (F/V Tenacious). June 2003 report available at [www.northeastconsortium.org](http://www.northeastconsortium.org). For further information please contact Clifford Goudey, [cgoudey@mit.edu](mailto:cgoudey@mit.edu).

### **Intensive Study of the Western Gulf of Maine Closure Area (\$204,340)**

By examining a combination of ecosystem factors including primary production, bottom habitat heterogeneity and temporal dynamics, and potential human impacts to the seafloor, this project seeks to initiate an ecosystem-level assessment of the effectiveness of the Western Gulf of Maine Closure Area. In addition, it will provide an opportunity to develop new approaches to habitat mapping that may have important ramifications for fisheries management. We propose to use satellite remote sensing of primary production, multibeam acoustic mapping of the seafloor, videographic mapping of the seafloor, and grab sampling of sediments and benthos to produce detailed maps of primary production and bottom habitat characteristics for a portion of the closed area and adjacent areas. The new maps and other information will be combined with existing data from the study area to assess the

potential effects of the closure on groundfish populations and overall habitat quality.

Partners: Raymond Grizzle (UNH); Mark Dowell (UNH), Michael Lesser (UNH), Larry Mayer (UNH), Andy Rosenberg (UNH), Larry Ward (UNH); David Goethel, Pete Kendall; Craig Mavrikis; and Bob Hannah. June 2003 report available at: [www.northeastconsortium.org](http://www.northeastconsortium.org). For further information contact Ray Grizzle, [ray.grizzle@unh.edu](mailto:ray.grizzle@unh.edu).

#### **Reducing Seabed Contact of Trawling: A Semi-Pelagic Trawl for the Gulf of Maine Shrimp Fishery (\$107,234)**

This proposal seeks funding to conduct a cooperative research to reduce bottom impact of shrimp trawling in the Gulf of Maine. The project will test a semi-pelagic shrimp trawl for harvesting the pink shrimp (*Pandalus borealis*) instead of traditional bottom shrimp trawls. The proposed semi-pelagic trawl will use a pair of pelagic trawl doors with high spreading force flying off bottom while maintaining trawl groundgear on the seabed. Off-bottom trawl doors will result in reduced seabed contacts as well as saving energy costs due to reduced drag. Sea trials will be conducted on board a 55' shrimp trawler owned and operated by the industry partner. Catch rates and catch composition will be compared with another commercial shrimp trawler fishing side by side. We will analyze if a semi-pelagic shrimp trawl can be economically viable considering catch rates, bycatch, fuel costs and initial investment of a new set of trawl doors and modification to the gear.

Partners: Pingguo He (UNH); George Littlefield (F/V Lady Regena). June 2003 report available at [www.northeastconsortium.org](http://www.northeastconsortium.org). For further information contact Pingguo He, [pingguo.he@unh.edu](mailto:pingguo.he@unh.edu)

#### **Reducing Cod Bycatch in Flounder Nets in the Gulf of Maine by Using Shallower Gillnets (\$103,934)**

This proposal seeks funding to conduct a cooperative research to reduce cod bycatch in flatfish gillnets in the Gulf of Maine (GOM). The project will involve testing two designs of shallower gillnets with fewer number of meshes in the depth onboard a commercial fishing vessel owned and operated by the industry partner. The proposed net will be 12 meshes deep (MD) and 8 MD, compared with regular roundfish nets (stand-up net, 25 MD) and flatfish nets (tie-down nets and foam-core nets, both 25 MD). The design utilizes differences in behavior and closeness to the seabed between flatfish and cod. It is envisaged that shallower nets will have better species and size selectivity than either regular roundfish gillnets, or tie-down and foam-core flatfish gillnets, thereby reducing discards of GOM cod and allowing fishermen to continue to fish for flatfish under a limited GOM cod quota. Nets with a lower vertical profile may also reduce probability of entanglement of porpoise and other marine mammals in gillnets.

Partners: Pingguo He (UNH); Mark Gauron (F/V Captain A1). June 2003 report available at [www.northeastconsortium.org](http://www.northeastconsortium.org). For further information contact Pingguo He, [pingguo.he@unh.edu](mailto:pingguo.he@unh.edu).

#### **Determining Groundfish Movement Patterns In and Around the Western Gulf of Maine Area Closure (\$134,243)**

Area closures and marine protected areas are becoming increasingly popular as fisheries management tools. Theoretical benefits include: 1) providing a refuge from harvesters and a consequent reduction in fishing mortality; 2) serving as a source of eggs and larvae that can rebuild populations outside of the closed area; and 3) simplified enforcement. While it is clear that they can be effective if the closed area encompasses a large part of the available habitat and the species

are largely immobile, their utility for highly mobile, migratory species is less certain. This study seeks to study the movement patterns of groundfish in and around the Western Gulf of Maine Area Closure using mark and recapture techniques. Results of the study will provide fisheries scientists and managers with detailed information about the temporal and spatial distribution of several groundfish species, which will thus contribute towards our understanding of this closed area's effectiveness.

Partners: Hunt Howell (UNH); David Goethel (F/V Ellen Diane). June 2003 report available at [www.northeastconsortium.org](http://www.northeastconsortium.org). For further information contact Hunt Howell, [whh@cisunix.unh.edu](mailto:whh@cisunix.unh.edu)

#### **The Trophic Ecology of Atlantic Cod: Insights from Tri-Monthly, Localized Scales of Sampling (\$123,350)**

We propose to continue a study funded by the Northeast Consortium in 2001 to examine the small-scale variation of Atlantic cod feeding based upon tri-monthly stomach sample collections from the near-shore region of Georges Bank. Our primary objective is to relate any detectable changes in cod diet and amount of food eaten with changes in temperature, spawning, prey abundance, and major weather events. Collecting this information will fill in the informational "gap" between broad-scale studies and in vivo laboratory studies. We anticipate that the information collected could have implications for fisheries management. For example, these data could highlight the importance of particular prey during certain seasons, oceanographic conditions, or important biological events (e.g. spawning) at specific locations. The value of the proposed research extends beyond the scientific merits of the collaboration and includes an attempt to transform information previously considered "anecdotal" into quantitative data valuable for fisheries science and management.

Partners: Ligenza, Ted (F/V Riena Marie), Frank Almeida (NEFSC), Jason Link (NEFSC). June 2003 report available at [www.northeastconsortium.org](http://www.northeastconsortium.org). For further information contact Ted Ligenza, [tligenza@attbi.com](mailto:tligenza@attbi.com)

#### **An Assessment of Bottom Habitat Community Recovery in the Western Gulf of Maine Closed Area (\$168,896)**

There has been a great deal of controversy over the last decade about the impact of mobile fishing gear on bottom habitat communities. While some issues have apparently been settled, others are still awaiting the benefits of further research. One issue, however, that has not been addressed in any significant way, is one that deals with changes in the bottom when mobile gear are excluded from an area. The Western Gulf of Maine Closed Area, while still allowing some dragging from shrimp and clams, has for the most part been free of mobile fishing gear disturbance. It is the purpose of this project to take advantage of this hiatus in disturbance to find out how the bottom community has changed. We will use side scan sonar and a remotely operated vehicle video to quantify the degree of disturbance features remaining and the diversity and abundance of the benthic fauna in the Closed Area. Sites of similar habitat characteristics will be examined inside and outside the Closed Area using the fishing vessel F/V Adventurer.

Partners: M. Cameron McLellan (F/V Adventurer); Joseph Kelley (UMaine), Laura Taylor Singer (GMRI), Les Watling (UMaine). June 2003 report available at [www.northeastconsortium.org](http://www.northeastconsortium.org). For further information please contact Cameron McLellan, [mcfish@lincoln.mid-coast.com](mailto:mcfish@lincoln.mid-coast.com)

### **Fishing Vessel Survey and Migration Study of Coastal Herring Spawning Aggregations in the Gulf of Maine (\$205,985)**

The Gulf of Maine Aquarium, F/V Adventurer, F/V Western Wave, F/V Ocean Venture, and Maine Department of Marine Resources request funding (\$239,685) to support a fishing vessel survey and migration study of coastal herring spawning aggregations in the Gulf of Maine. Atlantic herring management strategies are currently limited by incomplete information on the inshore stock complex and the rate of mixing between herring stock units. There are three elements to this project proposal. First, we will continue an inshore coastal survey of Atlantic herring spawning grounds using acoustic methods to assess the status of coastal spawning stock and produce a biomass estimate. Second, we will collect oceanographic data for an ongoing investigation relating herring distribution and oceanographic variables. Third, we will expand a new herring tagging initiative designed to provide information on migration and spawning site fidelity. Combined, these three elements will provide information critical to the management of Atlantic herring in the Gulf of Maine. This project is the result of merging two related projects that received planning letter approvals: Atlantic Herring Stock Discreteness and Migration: A Tagging Project in the Gulf of Maine and Commercial Vessel Acoustic Survey of Coastal Herring Spawning Units. Merging the projects has reduced the total request to the Northeast Consortium by \$19,000.

Partners: Donald Perkins (GMRI); Matthew Cieri (ME-DMR), J. Kohl Kanwit (ME-DMR), Barry Matthews (F/V Ocean Venture), M. Cameron McLellan (F/V Adventurer), Peter Mullen (F/V Western Wave), Shale Rosen (GoMA). June 2003 report available at [www.northeastconsortium.org](http://www.northeastconsortium.org). For further information contact Don Perkins, [don@gma.org](mailto:don@gma.org)

### **A Cooperative Partnership for Pelagic Ocean Ecosystem Monitoring in the Gulf of Maine (\$198,531)**

This proposal puts forward a plan for a university-fishing industry collaboration to monitor the pelagic ecosystem of the Gulf of Maine. This initial phase calls for a two-year, weekly sampling program in partnership with the Portsmouth Fisherman's Cooperative. The program involves collection of plankton samples and basic hydrographic information at two fixed stations located within a day's round-trip steam of the coast. The samples would be analyzed for phytoplankton and zooplankton biomass and species composition. This two-year data set is valuable in its own right, but the goal is to develop a long-time series of data that will show trends in the structure of the planktonic community and in the timing of biological events that influence the recruitment and distribution of fish in the Gulf of Maine. To this end, other strategically located fixed stations in the Gulf of Maine would be proposed in later phases, depending on the success of this initial program. The need for a long-term biological data collection program in the Gulf of Maine becomes critical in light of increasing evidence for change in New England's climate. It becomes increasingly important for the fishing industry as decisions about fishery management shift from a single or multi-species to an ecosystem-based approach. By incorporating the expertise and resources of local fishermen, we hope to learn more about the natural and manmade variability of the Gulf of Maine marine ecosystem. With long time series of zooplankton data, we would have a better indication whether dramatic changes in fish stocks were being forced by environmental conditions and bottom-up processes or by overfishing. The Northeast Consortium has funded the pilot phase for an industry-based, long-term ecosystem monitoring program in the Gulf of Maine. During the pilot phase (in 2002), coordi-

ination with an industry partner and establishment of sampling and sample analysis protocols will be the focus. We are informed of and will seek to compliment other data acquisition programs in the Gulf of Maine. With the help of a seven-member monitoring advisory panel (MAP), a plan has been put forth for the selection of industry partners, design of a sampling scheme, analysis of samples, and integration with other monitoring efforts. Sample analysis will be in part contracted out and in part analyzed in-house. The possibility of engaging a local community volunteer organization in sample analysis, with oversight from core NEC staff, will also be explored. Data reporting is a key issue for the long-term initiative. While a website clearinghouse of data and interpretative articles will be necessary, it is also important to give immediate feedback to the fishermen through workshops and at-sea discussions and posted results on the coop bulletin boards. Partners: Jeffrey Runge (UNH); Portsmouth Fishermen's Cooperative (four Coop fishermen TBN). June 2003 report available at [www.northeastconsortium.org](http://www.northeastconsortium.org). For further informat contact Jeff Runge, [jrunge@cisunix.unh.edu](mailto:jrunge@cisunix.unh.edu)

### **Abundance, Migration and Recruitment of Northern Shrimp in the Gulf of Maine: An Industry-Initiated Verification Survey and Environmental Monitoring Pilot Project (\$319,999)**

The Northern Shrimp Technical Committee for the Atlantic States Marine Fishery Commission's Northern Shrimp Section assesses the status of the northern shrimp (*Pandalus borealis*) stock in the Gulf of Maine each year. This analysis is used by the Northern Shrimp Section to determine annual management measures for the fishery. Information for the assessment comes primarily from port sampling (catch, effort and catch at size) and a cooperative, fishery-independent survey conducted offshore during the summer by the National Marine Fisheries Service (NMFS) and the state of Maine, Massachusetts and New Hampshire. These data sets cover over 30 years and provide a foundation from which to model the population and the effects of the fishery. However, there is sometimes strong disagreement between the assessed status of the stock in summer and the commercial catch the following winter. At present, we do not know if this results from problems with the assessment of subsequent processes affecting the distribution and abundance of shrimp during the fishing season. This proposal seeks to gain critical information about the abundance, migration and recruitment of northern shrimp through two industry-initiated projects. First, we will conduct an almost two-week intensive, cooperative survey alongside the current survey. The main objective will be to statistically re-assess the sample density. Second, we will pilot a seven-month, almost biweekly monitoring program to document the environmental parameters that may affect the inshore migration of female shrimp, timing of egg release, and larval survival. These data will provide additional information for the stock assessment, contribute to an improved prediction of year-class strength of the shrimp resource, and permit more effective application of shrimp fishery seasons.

Partners: Dan Schick (ME-DMR), Hunter, Margaret (ME-DMR); Vincent Balzano (F/V North Star), Yong Chen (UMaine), Stanley Coffin (F/V Bad Penny), Lew Incze (Bigelow Lab), Dale Page (F/V Aaron & Sarah), Craig Pendleton (F/V Susan & Caitlyn), Kelo Pinkham (F/V Jeanne C.), Laura Taylor Singer (GMRI), David Townsend (UMaine), Lessie White (ME-DMR). June 2003 report available at [www.northeastconsortium.org](http://www.northeastconsortium.org). For further information please contact Daniel Schick, [dan.schick@state.me.us](mailto:dan.schick@state.me.us)

### **Improving the Size Selectivity for Northern Shrimp Through Use of a Modified Nordmore Grate (\$107,994)**

The ability to reliably separate large, market shrimp from smaller, less desirable shrimp using either a mesh size, or a Nordmore grate system has been elusive. The compound Nordmore grate system to release small shrimp with the ease of handling just one grate in the net. In theory, the compound grate, mounted upside down in the net, will allow small shrimp to pass through small bar spacing and exit the net, then market shrimp will pass through the larger bar spacing further along the grate at the juncture between the small bar spaces and the larger bar spaces. A series of tows with a trouser trawl, pairing the compound grate with a variety of controls will be done to test the degree to which the grate separates and releases small shrimp and retains larger shrimp. Two different sized panels of small bar spacing will be tested to see which releases more small shrimp while retaining the larger shrimp.

Partners: Dan Schick (ME-DMR); Kelo Pinkham (F/V Jeanne C.), Lessie White (ME-DMR). June 2003 report available at [www.northeastconsortium.org](http://www.northeastconsortium.org). For further information please contact Daniel Schick, [dan.schick@state.me.us](mailto:dan.schick@state.me.us)

### **Maine-NH In Shore Trawl Survey (\$299,815)**

This project continues a fishery independent multi-species stock assessment along the Maine and New Hampshire coasts that was originally funded by the Northeast Consortium in 2000. Support for this work is especially important given the current debate over implementation of the Sustainable Fisheries Act, especially Amendment 9 that defines overfishing based on stock biomass. It fills an obvious information gap on the status and trends of groundfish and other species in the inshore Gulf of Maine region for which assessment data are absent. The survey consists of two stratified random surveys, one in fall and the other in spring. Each survey covers approximately 100 stations from New Hampshire to Canada. The project is a close partnership with commercial fishermen, the Gulf of Maine Aquarium and the two state agencies charged with managing the inshore state waters. Note that this request is to fund the survey from 2003 to 2004.

Partners: John Sowles (ME-DMR); Douglas Grout (NH Fish & Game), Don Perkins (GMRI), Sally Sherman (ME-DMR), Robert Tetrault (F/V Tara Lynn). June 2003 report available at [www.northeastconsortium.org](http://www.northeastconsortium.org). For further information contact John Sowles, [john.sowles@state.me.us](mailto:john.sowles@state.me.us)

### **Implementation of a Monitoring Program for the Atlantic Offshore Lobster Fishery (\$129,934)**

The effective long-term management of the lobster fishery requires a thorough understanding of the resource and the impact the fishery has on that resource. It is generally accepted that cooperative efforts involving members of the industry, biologists and managers are likely to have the most success both collecting the appropriate data and developing management strategies that are acceptable to all parties concerned. The overall goal of this project is to develop a monitoring program for the offshore lobster fishery so that data are collected that will assist the development of management practices appropriate to that fishery. Most data will be collected directly by members of the industry, from experimental traps integrated into strings of commercial traps. Data from lobsters will be entered directly into electronic logbooks, along with the GPS coordinates of the study site. Bottom temperature data will be recorded with tidbit temperature dataloggers attached to one of the experimental traps. These data will be trans-

ferred to a website upon return to shore and then used to assess the: 1) size frequency composition of catch from offshore vessels; 2) temporal and spatial patterns of abundance of all lobsters, especially berried females; 3) temporal and spatial patterns of shell disease; and 4) the relationship between the distribution of lobsters and bottom temperature. In addition, a range of sizes of female lobsters will be examined from three different areas of the fishery to determine the size when 50% of them reach sexual maturity and if this is correlated with water temperature. All these data will be used to improve our current management practices and thus ensure maintenance of a sustainable offshore lobster fishery for years to come.

Partners: Win Watson (UNH); Bonnie Spinazzola (Atlantic Offshore Lobstermen's Assoc.). June 2003 report available at [www.northeastconsortium.org](http://www.northeastconsortium.org). For further information contact Win Watson, [whw@cisunix.unh.edu](mailto:whw@cisunix.unh.edu)

### **Distribution and Abundance of Jonah Crabs, *Cancer borealis*, in the Near-Shore Gulf of Maine (\$128,371)**

The Jonah crab, *Cancer borealis*, is a traditional bycatch of the Maine lobster fishery but is currently unregulated in Federal waters. In recent years a perceived increase in abundance and an increase in value has led to a growing interest in targeting Jonah crabs. Little is known about Jonah crab biology and ecology in the Gulf of Maine. We propose to design and test a benthic video sled as a quantitative assessment tool for Jonah crabs and then to conduct a stratified fishery-independent assessment of the distribution and abundance of Jonah crabs along the Coast of Maine. The proposed assessment survey is ideally timed with the anticipated issuance of an Experimental Fisheries Permit (EFP) to the Maine Department of Marine Resources (DMR), which will allow 100 fishermen to develop an exempted trap to target Jonah crabs in Federal Lobster Management Area 1. Jonah crabs may represent the largest unregulated harvest in the Gulf of Maine; there is an immediate need to collect basic information on the distribution and abundance of this crab to insure well-informed recommendations on the sustainability of a targeted Jonah crab trap and/or fishery.

Partners: Carl Wilson (ME-DMR); Larry Knapp (F/V Lady Esther); Oscar Look III (F/V Mary Lou & Kendra); Brian McLain (F/V Silver Bullet); Brent Oliver (F/V Jarsulan III), Robert Russell (ME-DMR); Stanley Sargent (F/V Gale Warnings); Art Vuilleumier (F/V KEEP-AH). June 2003 report available at [www.northeastconsortium.org](http://www.northeastconsortium.org). For further information contact Carl Wilson, [carl.wilson@state.me.us](mailto:carl.wilson@state.me.us)

### **Workshop on Trawl Selectivity and Conservation (\$63,803)**

This project seeks funding to organize a five-day trawl gear workshop for trawl fishermen; Sea Grant staff; and federal, state and council managers in Massachusetts, New Hampshire and Maine at a specialized fishing gear test flume tank at the Memorial University of Newfoundland in St. John's, Newfoundland. A total of 15 participants will have the opportunity to attend a five-day training workshop where innovative fishing gears will be displayed, demonstrated and discussed. The workshop intends to increase knowledge and awareness of conservation-oriented fishing gears and operations. The workshop will also serve as an arena where conservation engineering, bycatch reduction and seabed-friendly fishing gears will be discussed among fishermen and between fishermen and Sea Grant extension specialists and educators, and fisheries managers. The project also serves to stimulate the industry to generate innovative project ideas for cooperative

research programs supported by the Northeast Consortium and National Marine Fisheries Services. For further information please contact Pingguo He, pingguo.he@unh.edu.

**Socioeconomic Impact Assessment Enhancement Project: Analysis of Impacts from Fishing Capacity Reduction. (\$43,500)**

Partners: Robert Robertson and Bruce Lindsay (UNH). For further information please contact Rob Robertson, robert.robertson@unh.edu

**Marine Resource Education Project (\$232,092)**

Partners: Mimi Becker and Andy Rosenberg (UNH) and John Williamson. For further information please contact John Williams, jwilliamson@fishadvocate.com

**Adopt-a-Boat: Commercial Fishing Vessels in K-12 Education (\$262,360)**

Partners: Clifford Goudey (MIT Sea Grant), Dean Goodwin (Kimbel Union Academy), Craig Pendleton (NAMA), Bob Kohl (F/V Glenna & Jacob), and Cameron McLellan (F/V Adventurer). For further information visit the project's website: <http://web.mit.edu/seagrant/adopt-boat/index.html>

**FY 2002 Northeast Consortium Project Development Grants**

**Development of an Off-bottom Scallop Drag (\$12,200)**

Contact: David Autio, Tel: (207) 529-5354

**A Preliminary Study of the Maine Sea Cucumber Fishery (\$25,000)**

Contact: Yong Chen, Tel: (207) 581-4381; email: ychen@maine.edu

**Testing of an Inclined Separation Panel to Reduce Bycatch and Discard in Gulf of Maine Groundfish Fisheries (\$24,801)**

Contact: Christopher Glass, glasscw@manomet.org

**Development and Testing of a Novel "Rigid-Mesh" Bycatch Reduction Device for Gulf of Maine Groundfish Fisheries (\$24,685)**

Contact: Christopher Glass, glasscw@manomet.org

**Understanding the Habitat Consequences of Area Closures (\$25,000)**

Partners: Clifford Goudey and Justin Manley. For further information contact Cliff Goudey, cgoudey@mit.edu

**Harvesting of Groundfish Using Baited Pots to Reduce Bycatch and Seabed Impact (\$24,992)**

Contact: Pingguo He, Tel: 603-862-3154; email: pingguo.he@unh.edu

**Use of 8" Square Mesh Throughout a Trawl to Target Flatfish in the Western Gulf of Maine (\$24,900)**

Contact: Dale Moore, Tel: (207) 677-2929

**Saco Bay Scallop Stock Enhancement (\$25,000)**

Partners: Craig Pendleton (craig@namanet.org) and Stephan Zeeman.

**Feasibility Study for Knotless Cod Ends (\$10,000)**

Contact: Kelo Pinkham, gpinkham@zwi.net.

**Evaluating Beam-Trawls in Stock Assessment Surveys of New England Deep Sea Red Crab (\$24,928).**

Richard Wahle, rwahle@bigelow.org

**A cooperative investigation towards an exempted trap to exclusively target Cancer Borealis in Lobster Management Area I (\$25,000).**

Contact: Carl Wilson, carl.wilson@state.me.us

**FY 2002 Cooperative Research Partners Initiative (CRPI) Projects**

**Codend mesh selectivity in the Gulf of Maine multispecies trawl fishery (\$102,640)**

The project has two purposes: 1) To develop a fishermen-designed electronic logbook system for the northeast multispecies fishery 2) To develop a soft species separation system for the New England multispecies fishery.

Partners: Dr. Pingguo He (UNH). Reports and current status available at <http://coopresearch.nero.noaa.gov/grant.htm>. For further information contact Pingguo He, pingguo.he@unh.edu

**Improving the Selective Efficiency of Trawl Gear with Escape Windows and Visual Stimuli (\$174,956)**

To improve the selective efficiency of trawl gear with escape windows and visual stimuli.

Partners: Chris Glass (the Manomet Center for Conservation Sciences); Vincent Balzano (F/V North Star); Frank Mirarchi (F/V Lady Jane); Russel Sherman (F/V Christopher Andrew). Reports and current status available at <http://coopresearch.nero.noaa.gov/grant.htm>. For further information contact: Chris Glass, glasscw@manomet.org.

**Gloucester, Massachusetts Trawl Selection Study (\$135,027)**

Partners: Joseph Novello (F/V Vincie N) and Allen Michael & Associates were contracted to conduct a trawl selection study out of Gloucester. Reports and current status available at <http://coopresearch.nero.noaa.gov/grant.htm>. For further information contact: <http://www.cafi.info/>.

**A Collaborative Program to Test the Use of a Cod/Haddock Separator Panel in Trawl Nets (\$110,144)**

John Raymond and Chris Glass (the Manomet Center for Conservation Sciences) were contracted to develop a collaborative program to test the use of a cod/haddock separator panel in trawl nets. Reports and current status available at <http://coopresearch.nero.noaa.gov/grant.htm>. For further information contact: Chris Glass, glasscw@manomet.org.

**Assessing the By-Catch of Groundfish in the Monkfishery (\$147,920)**

Partners: Chris Glass (The Manomet Center for Conservation Sciences) and Laura Singer (Gulf of Maine Research Institute) were contracted to assess the bycatch of groundfish in the monkfish fishery. Reports and current status available at <http://coopresearch.nero.noaa.gov/grant.htm>. For further information contact: Laura Singer, [laura@gma.org](mailto:laura@gma.org).

#### **Characterization of Bycatch Reduction from Codend Mesh Size Increases in the Directed Scup Bottom Trawl Fishery (\$48,898)**

Partners: David Beutel (The University of Rhode Island); Chris Brown (F/V Grandville Davis); and David Borden (RIDEM) were contracted to characterize the bycatch reduction from cod end mesh size increases in the directed scup bottom trawl fishery. Reports and current status available at <http://coopresearch.nero.noaa.gov/grant.htm>. For further information contact David Beutel, [dbeutel@uriacc.uri.edu](mailto:dbeutel@uriacc.uri.edu)

#### **Development of Video techniques for Bycatch reduction Studies (\$67,060)**

Partners: Bill Lee (F/V Ocean Reporter) and Allen Michael & Associates were contracted to develop video techniques for bycatch reduction studies. Reports and current status available at <http://coopresearch.nero.noaa.gov/grant.htm>. For further information contact: <http://www.cafi.info/>

### **FY2001 Northeast Consortium Research Projects**

#### **Fishermen Assisting Gear Technologists and Scientists (\$90,368)**

This project provides a mechanism to employ fishermen to work with gear technologists and scientists to explore gear modifications in commercial fishing operations - from mobile gear to fixed gear. Conservation engineering has been most successful when fishermen and scientists have worked together to address problems. The Massachusetts Division of Marine Fisheries (MaDMF) and the Manomet Center for Conservation Services (MCCS) have successful examples of this teaming and intend to further improve activity. These fishermen would provide needed manpower and tested experience to supplement present conservation engineering programs. Several areas of specific interest are 1) increasing the understanding of fish behavior in relation to fishing gear so as to reduce bycatch and impact on non-target species; and 2) investigating certain selective qualities and modifications to current commercial fishing gear. MaDMF and MCCS have underwater camera systems that have collected observations of fishing gear and the behavior of fish associated with that gear during the fish capture process. Some of this video has been used at fish forums, workshops, as well as by Public Television, museums and aquariums. Fishermen in these positions would assist in acquiring more video of these processes to further compliment existing material and provide new observations that may further assist in bycatch reduction, fish behavior and gear interaction with marine animals and habitat.

Partners: Arne Carr and Michael Pol (Mass. DMF), Russell Sherman, Trevor Daley, William Amaru, and others. Final report available at <http://www.northeastconsortium.org/Search?do=Search&keywords=206&year=2001>. For further information visit the Mass. Department of marine Fisheries website: <http://www.state.ma.us/dfwele/dmf/index.html>.

#### **Relationship between Substrate, Humans, and Ecology of Juvenile Fish in the Bigelow Bight and Estuaries (\$262,542).**

This study represents a collaboration effort between researchers and members of the Gulf of Maine fishing industry to survey juvenile groundfish distribution and abundance along transects from estuarine through inner shelf areas of the Bigelow Bight. The project will characterize associated substrate and prey availability in order to determine fisheries habitat resources with the region. The project will feature the use of a sediment profile imager (known as a SPI camera), a device which takes photos of substrates and associated organisms both from a surface and from a profile view to depths up to 1 ft. This technique will be combined with traditional research sampling methods for fish (small mesh trap nets, beam trawls, and variable mesh gill nets) and benthos (Ponar grab sampler). The survey design will compare fish, benthos and substrates between estuarine, nearshore and offshore areas, including sites within these zones that have been altered by human activities (i.e. dumping of dredge material, outfall of treated sewage, and bottom trawling). Traditional cod spawning and feeding grounds and a closed area (Jeffrey's Ledge) are included in the survey. Results of the study will provide much needed data to determine estuarine and inner shelf fish habitat associations, the food resource value of these habitats, and their response to current and previous human alterations.

Partners: Michele Dionne (Wells National Estuarine Research Reserve), Jeff Reed (F/V Full Circle One), Vincent Balzano (F/V North Star), and Kenneth Young, Jr. (F/V Judy Marie). Final report available at <http://www.northeastconsortium.org>

#### **Are We Using Herring to Farm Lobsters?: Effect of Herring Bait on Lobster Growth, and Fate of Discarded Bait in Benthic Communities (\$111,972).**

We will evaluate whether herring bait contributes to the production of lobster biomass, and will assess the initial fate of discarded bait in the benthic community. Recent lobster landings have been higher than traditionally thought to be sustainable. The thousands of tons of herring that are dumped into coastal waters each year are believed to be contributing to this production, and likely are having additional consequences for the nearshore benthic environment. We will use three complementary methods to assess the relative contribution of herring to lobster diet and growth in areas with and without bait. First, we will directly compare lobster gut contents to assess dietary impact. Second, we will use nitrogen stable isotope ratios to compare longer-term effects of herring bait on lobster biomass production. Third, we will compare single-season growth rates to determine whether the presence of herring bait increases short-term growth. We also will address whether or not active lobster fishing influences lobster density, fecundity, and growth, and determine the initial fate of discarded bait. By addressing these issues, this project will begin to assess how different fisheries are interconnected by fishing practices.

Partners: Jon Grabowski and Erika Clesceri (GoMARF); Phil Yund (Univ. of Maine); Carl Wilson (Maine DMR); Matt Webber (F/V Griffin); Mike Cushman (F/V Mistress); Phillip Poland (F/V Magan-Dawn); Sherman Kinghorne (Grand Manan Fishermen's Assoc.); and Jeremy Cates. He, Pingguo (UNH) and BartMcNeel (F/V Aaron and Melissa II). Final report available at <http://www.northeastconsortium.org>

### **Design and Test of a Double Grid Device to Reduce Cod Bycatch in Flatfish Trawls (\$356,866 for 2 years)**

Excessive catch of cod in flatfish trawls increases cod discard mortality and impedes recovery of cod stocks in Gulf of Maine and Georges Bank. Successful separation of cod from flatfishes during capture processes will therefore reduce discards of cod, thereby reducing unnecessary mortality. Species separation trawls will also allow fishermen to continue to fish for flatfish under limited daily cod bycatch quotas. This two-year project involves design, flume tank testing, and sea trials of grid devices. Modifications were made on the course of flume tank testing and sea trials. The project is still in progress. We describe the methodologies and progress made during the first year of the project, and experience in working with the fishing industry in achieving conservation and sustainable utilization of fisheries resources.

Partners: Pingguo He (UNH); Bart McNeel (F/V Aaron and Melissa II). Annual report available at <http://www.northeastconsortium.org/Search?do=Search&key-words=206&year=2001>.

### **Impact of Trawling on the Seabed in the Gulf of Maine (\$50,000)**

Bottom trawling alters physical and biological structure of the seabed. While effect of alteration on benthic ecosystem and fish population has yet to be clarified, reducing alteration would be viewed positively by all concerned with the marine environment and fishery. The project would have involved design, model tests and sea trials of trawl footgears which have less contacts with the seabed, yet commercially viable for the groundfish and shrimp operations. The current funding level (reduced funding level) allows designing and model testing of some lighter footgears for groundfish and shrimp trawls.

Partners: Pingguo He (UNH); Bart McNeel (F/V Aaron and Melissa II). Final report available: <http://www.northeastconsortium.org>

### **Non-Invasive, Real Time Assessment of Sea Scallop Abundance and Habitat (\$200,000)**

We have been funded to develop and test a non-invasive, real time imaging system for 1) Assessing juvenile and adult sea scallop abundance and size distribution and, 2) Characterizing habitat and resources shared between scallops and other ground fish. The prototype instrument, essentially a camera sled, will be towed from a commercial scallop vessel and be flown within a few meters of the bottom. A color camera synchronized with a strobe will be triggered at up to 10 times per second. The images will be sent directly to the surface on a fiber optic tow cable where a high-speed frame grabber and associated software will capture the images and analyze them for the presence of scallops. Scallop size and abundance will be recorded and displayed, along with sampling statistics, as the vessel steams in a defined grid pattern. We envision that the real time data will be used in an adaptive sampling scheme for routine scallop surveys and closed area rotational management. Our current plans will utilize a fiber-optic based telemetry system and a Firewire-based camera, along with an obstacle avoidance sonar on a fairly simple tow sled. Future enhancements could include provision of a doppler sonar to allow speed-adaptive sampling.

Partners: Jonathan Howland (WHOI); Richard Taylor (Sea Scallop Recruitment Group). Incze, Lewis (Bigelow Labs), Proctor Wells (Maine Fishermen's Cooperative Assoc.), and Mathew Thomson. Final report available at <http://www.northeastconsortium.org>

### **Inshore/Offshore Patterns of Lobster larvae and Postlarvae Spatial Relationships (\$142,453 for 2 years)**

This two-year project (2001-02) will investigate the pathways of transport and delivery of larval lobsters in the Eastern Maine Coastal Current (EMCC) system. The goal is to understand how egg production in various regions of the nearshore and coastal shelf (offshore to about 40 nm) interacts with the current system to affect settlement patterns (recruitment). Our hypothesis is that recruitment along the eastern coast (outer coast of Washington County) is confined mostly to coastal embayments where water temperature is elevated and residence times increased over those on the neighboring shelf. Larval supply and settlement are limited compared with regions to the west. Outside the coastal headlands, transport in the rapid and cold westward flow brings larvae toward the central coast before they develop to postlarvae and settle. As the coastal current diverges from the coast, an enlarged region of comparatively warm water creates a large potential settlement region along the central coast and shelf. Larvae from Canadian waters may travel in the coastal current (thus potentially contributing to settlement in the mid coast) and along its warm, outside edge. From the latter location, offshore transport and possible recirculation to the north seem plausible. This project will sample the distribution and abundance of planktonic stages (primarily the first stage larvae and the neustonic postlarvae) and hydrography (CTD) along the entire coastal current system (Boothbay to the Hague Line) during a two-week cruise in early to middle August each year. In the first year, there also will be a series of weekly cruises (1-2 d/week) along the central shelf at the terminus of the EMCC. Data will be analyzed using computer models of the flow field (collaborations with Drs. Huijie Xue, University of Maine and Christopher Naimie, Dartmouth College) and will be combined with a number of other, ongoing studies of postlarval abundance and settlement. Our long-term goal is to derive a mechanistic model of spatial and temporal lobster recruitment dynamics, an effort that ultimately will be coordinated with Canadian and other U.S. colleagues.

Partners: Lewis Incze (Bigelow Labs), Proctor Wells (Maine Fishermen's Cooperative Assoc.), and Mathew Thomson. Annual report available at <http://www.northeastconsortium.org>

### **Life History Parameters for Two Exploited Skate Species (*Amblyraja radiata* and *Malacoraja senta*) in the Gulf of Maine (\$200,000 for 2 years)**

Partners: Joe Jurek (F/V Mystique Lady); Paul Tsang; James Sulikowski; and Patrick Danley (UNH). Annual report available at <http://www.northeastconsortium.org>

### **Trophic Ecology of Atlantic Cod: Insights From Tri-monthly, Localized Scales of Sampling (\$125,475)**

This study will examine small scale variation of Atlantic cod feeding based upon tri-monthly stomach sample collections from the nearshore region of Georges Bank. Our primary objective is to relate any detectable changes in cod diet and amount of food eaten with changes in temperature, spawning, prey abundance, and major weather events. Collecting this information will fill in the informational "gap" between broad scale studies and in vivo laboratory studies. The diet of Atlantic cod (*Gadus morhua*) has been well studied. There have been several broad scale studies of cod feeding ecology in the U.S. Atlantic and other ecosystems and numerous laboratory based studies of cod feeding. From these studies we can infer rates, processes, and rela-

tionships about cod, cod prey, and oceanographic conditions. However, there are only a few studies that have been conducted at small temporal (months) and spatial (approximately 300 mi<sup>2</sup> or 777 km<sup>2</sup>) scales. In a sense, there is a gap between the small scale laboratory experiments and the broad scale studies done. Data acquired from this project will help to fill the gap. It will provide a new perspective on cod feeding habits with respect to short-term and seasonal temperature changes, pre-spawning, spawning, and post spawning events, migration of key prey, cod migration, and episodic weather events. It has been hypothesized, but is still unclear, that cod feeding (i.e. diet composition, amount of food eaten, consumption rates, etc.) can alter in response to these factors. The information collected on monthly and local scale cod feeding can have broad implications for fisheries management. It may be that forage fish are most important during the pre-spawning/spawning period and should not be over-exploited in general nor removed at that time to preserve cod spawning. As another example, it may be that cod aggregate to feed on a temperature induced "explosion" of benthic invertebrate populations, implying that the habitat where this phenomenon occurs is critical during that time. Similar examples could provide insight into numerous issues surrounding cod stock dynamics (e.g. growth, fecundity, maturity, spawning, recruitment, etc.) that may be overlooked at broader scales.

Partners: Theodore Ligenza (F/V Riena Marie); Frank Almeida and Jason Link (Northeast Fisheries Science Center). Final report available at <http://www.northeastconsortium.org>

#### **Environmental Monitors on Lobster Traps Phase II: Salinity (\$82,000)**

Using 58 individuals with probes in 47 distinct geographic locations around the Gulf of Maine who have thus far contributed a total of 458,296 temperature observations to the eMOLT database. Thanks to cooperation of 4 lobster associations (Atlantic Offshore, Massachusetts, Maine, and Downeast) lobstermen are deploying instruments all along the coast from the deep canyons south of Nantucket to the mouth of the St. John. An effort is now underway to ensure that all deployments are properly documented (lat,lon,catch,etc) on either a standardized mooring log, web-served forms, or the Thistle HMS-410 electronic data logger. Association representatives are attending near-monthly meetings to download data and assist participants in record keeping procedures. The second phase involved tests using a salinity probe (Seabird Microcat) both in the Woods Hole Aquarium and off the dock. At least one probe has been secured to a trap and recovered from the deep water on the southern side of Georges Bank to demonstrate the logistics of the operation. These units are state-of-the-art instruments recording salinity with at least 0.1 PSU accuracy but require regular cleaning to maintain quality data. For this reason, the participating lobstermen are scheduled for a day-long training sessions in Woods Hole to become familiar with the instrumentation and the process of taking regular water samples for calibration purposes.

Partners: James Manning (Northeast Fisheries Science Center); Bonnie Spinazola (Atlantic Offshore Lobstermen's Assoc.); and David McCarron (Gulf of Maine Lobster Foundation). More details are posted on the project website: Annual report available at [www.northeastconsortium.org](http://www.northeastconsortium.org)

#### **Comparison of Environmental Contaminants on Georges Bank and Stellwagen Bank (\$129,130)**

The Gloucester Fishermen's Wives Association is proposing this project to analyze and compare the concentrations of pollutants in cod-fish livers, eggs and sediments on some of the most important fishing grounds off New England. Dr. Emily Monosson will head a team looking for anomalously high levels of toxics such as PCBs and PAHs (hydrocarbons) as well as certain heavy metals which have been indicated to have possible adverse effects on the reproductive health and survivability of some marine fish species. Levels of contaminants will be contrasted between the inshore and offshore areas and compared to contaminant concentrations in cod fish livers reported in other regions. A total of six sites will be sampled. We will be collecting some baseline samples this fall for analysis this year. The remainder of the cod samples will be taken during the spawning period next Spring. Hundreds of studies conducted worldwide during the last 5 years have established that organic contaminants and endocrine-disrupting substances are disturbing sexual function in wildlife. This is possible even when the concentrations are far below levels that pose any threat to human health. Nevertheless, such contaminants are known to be present in some marine environments and evidence is mounting that these chemicals are impacting fish reproduction, which could impact recovery of some fish stocks. The data collected during this study will provide valuable baseline information (at this point in time) together with an overview of historical trends based on previous work. It will alert fisheries managers to any potentially damaging levels of toxics accumulating in cod in critical habitat areas and provide a standard of comparison for future pollution studies.

Partners: Emily Monosson (Mount Holyoke College); David Lincoln (Gloucester Fishermen's Wives Assoc.) Report available at <http://www.northeastconsortium.org>

#### **Fishing Vessel Survey of Coastal Herring Spawning Aggregations (\$130,215)**

Fishing Vessel Survey of Coastal Herring Spawning Aggregations involves the use of hydroacoustic techniques to survey pre-spawning herring aggregations in coastal Gulf of Maine waters with a pair of commercial vessels. Herring play a key role in Maine's economy, but the coastal spawning stock is thought to be in danger of depletion. Efforts to manage the coastal stock are hindered by the absence of fishery-independent data on abundance. Hydroacoustic survey techniques, which are widely employed in other countries, present a viable solution to this problem. Over the last three years, the Gulf of Maine Aquarium has developed an innovative, industry-based acoustic survey approach. Industry vessels have proven to be cost-effective survey platforms that are superior to traditional research vessels for shallow-water, nearshore operations. The acoustic survey techniques per se have now been fully developed for coastal waters. However, we have not completely resolved problems associated with collecting appropriate biological samples of surveyed aggregations. These samples are vital to 1) confirm species composition of aggregations, 2) document herring spawning status, and 3) increase the accuracy of biomass conversions from acoustic signals. Our sampling problem is caused by the need to sample in shallow coastal waters in which substantial fixed gear is present. Last year, we followed the lead of a NMFS acoustic survey performed annually on Georges Bank, and relied mainly on a mid-water trawl for sampling. That approach proved difficult to implement in most of our survey areas. We now propose to explore a variety of different sampling options. First, we

will perform a sub-set of the survey and sampling work with a purse-seiner that routinely fishes for herring in coastal waters dominated by fixed gear. However, seasonal market pressures that peak during the survey and sampling constraints at extremely shallow sites preclude using this approach throughout the season. Consequently, we will perform the remainder of the surveys with a displaced ground-fish vessel (F/V Adventurer, owned and captained by Cameron McLellan). The F/V Adventurer will be equipped to sample via multiple methods, including a small-mesh bottom trawl, a range of different-sized gill nets, underwater photographic equipment, hand jigs, and surface illumination combined with a cast net. Our goal is to complete the development of a cost-effective means of assessing and monitoring coastal spawning stocks of herring, building on our three years of successful pilot work with commercial fishing vessels. The immediate measurable outcomes from this project will include: 1) the production of a biomass estimate for the coastal spawning stock and 2) the development of a standardized survey protocol for future years. The longer-term goal of this program (to continue this program as a regular monitoring effort, with greater industry involvement, and incorporate the results into future stock assessment procedures) extend well beyond the project year.

Partners: Don Perkins (GMRI); Mathew Cieri (Maine DMR); Cameron McLellan (F/V Adventurer); and Paul Palino (F/V Anna Lisa). Final report available at [www.northeastconsortium.org](http://www.northeastconsortium.org)

#### **Phase II: Testing of Low-Profile Low Cod-Bycatch Gillnets (\$71,710)**

The first phase of this project was funded by the Northeast Consortium in 2000. In the second phase, we will continue field testing of two experimental gillnets designed by Robert MacKinnon. One experimental design adds lead weight to an otherwise ordinary floatline; the second experimental design replaces the floatline of the gillnet with another leadline. Both designs attempt to reduce the vertical profile of the nets and take advantage of a behavioral difference between cod and flatfish. Fishing experience and video observation suggest that cod do not often hang out on the very bottom of the ocean, and flatfish do not often rise more than one foot above the bottom. The potential use of the experimental nets, if proven, is to either allow fishing for flatfish in areas closed for cod, or to reduce the bycatch of cod in open areas. Fifteen overnight sets of all four nets have been completed; data are currently being analyzed. Field testing was designed to allow comparisons of catch rates of cod and commercially valuable flatfish between experimental nets and standard nets. Results so far indicate that the designs are working; the net with added lead catches less cod than the standard cod and flatfish nets; the mean catch rate of the dual leadline net is lower than the standard nets, but not significantly so. Not enough flatfish were captured in the nets to allow comparisons of flatfish catch rates. The lack of flatfish is probably a result of testing in not-the-best places and times. The time and place of these fifteen sets was limited by area closures and severe weather. This second phase of funding will allow further testing in February and March 2002 in Area 125. Area 125 is closed to commercial fishing during this time because of high concentrations of cod. This time and place are our best chance to test these nets where sufficient densities of cod and flatfish are present to allow valid comparisons. Entering the closed area to perform this experiment will require an Experimental Fishing Permit (EFP) from the National Marine Fisheries Service (NMFS).

Partners: Michael Pol (Massachusetts Division of Marine Fisheries); Bob MacKinnon (Massachusetts Bay Inshore Commercial Gear Fishermen's Association). Collaborations article available at <http://www.northeastconsortium.org>

#### **Gulf of Maine Ocean Quahog Assessment (\$23,326)**

The ocean quahog (*Arctica islandica*), also called the mahogany quahog in Maine, is found in temperate and boreal waters on both sides of the North Atlantic. In the Gulf of Maine region, ocean quahogs are distributed in relatively nearshore waters, with fishable concentrations 3 to 7 miles from shore. The Maine fishery initially occurred in the territorial waters but began to exploit the quahog resource in federal waters in the 1980's, due in part to paralytic shellfish poisoning (PSP) closures of several areas in state waters. The Maine fishery came under federal management with the development of the ITQ system in 1990. Since little was known about the Maine resource, an experimental fishery was established that allowed Maine boats to fish outside of the ITQ. The experimental status for the fishery ended in September 1997 when a separate 100,000-bushel quota was established for the Maine fishery. It is now imperative to conduct a stock survey and assessment to determine if the resource is being harvested at a sustainable rate. An industry-cooperative pilot survey of the ocean quahog resource from the east side of Mount Desert Island to Petit Manan in eastern Maine will be conducted to determine the abundance, distribution, and size composition of the ocean quahog resource and to develop an assessment methodology for this resource.

Partners: Dan Schick (Maine DMR); Kristan Porter (F/V Whitney and Ashley). Report available at <http://www.northeastconsortium.org>. For more information on this project, contact Dan Schick at 207-633-9528

#### **Maine Scallop Fishery Monitoring and Enhancement (\$207,411 for 2 years)**

Concerns over excessive harvest capability and a decline in landings since 1993 have prompted renewed discussion on management options for the Maine scallop fishery. Additionally, industry efforts in developing an enhancement program for this fishery may point to the need for more cooperative and area-based management strategies. Maine's coastal population of sea scallops has historically been an important but variable source of income to fishermen - always falling within the top 10 most valued species, and in some years as high as number two behind lobsters. The fishery has the potential to offset potential economic hardship in the event of a decline in other stocks. Other than landings data, little information has been collected on Maine's inshore scallop populations since a sampling program in the late 1980's. There are five primary objectives associated with this project: 1) To establish a program of port and sea sampling to collect catch, effort, age/size, and bycatch information. 2) To conduct a fishery-independent survey using industry scallop vessels. 3) To attempt to correlate age structure and area population densities and recruitment patterns with physical data. 4) To characterize productive scallop beds with ROXANN - a bottom profiler that can be ground-truthed to known habitat types and used to generate three-dimensional maps color coded by habitat type. 5) To support industry efforts to develop a community-based enhancement program for the scallop fishery. Characterization of the scallop population, its fishery and preferred environment will provide a biological basis to inform management decisions, serve as a footing on which to base future monitoring efforts, and be an aid in developing the ability to enhance recruitment to the stock.

Partners: Dan Schick (Maine DMR); Dana Morse (Maine Sea Grant); and Marsden Brewer. Report available at <http://www.northeastconsortium.org/Search?do=Search&keywords=206&year=2001> For more information on this project, contact Dan Schick at 207-633-9528.

### **An Atlas-Based Audit of Fishing Territories, Local Knowledge, and Community Participation in Fisheries Science and Management (\$168,953 for 2 years)**

The "Atlas" project is moving along well after a delayed start. The work is progressing through five phases of activity. The first two phases involve analysis of NMFS data and the production of maps representing the fishing territories of different communities (or groups of communities) in the Northeast. These first two phases are ongoing and, we now believe, will remain ongoing for most of the project since they will continue to complement the community-based research of later phases. The third phase has begun and is moving the project out into fishing communities by working with fishermen's organizations and other fishing community advocacy groups in several regions of the Northeast. This phase began when we attended the latest Maine Fishermen's Forum. At the forum we distributed flyers discussing our project and made important connections with community representatives. Follow-up on those initial discussions and networking in an attempt to produce community workshops has been on going since that time. We are also sharing our efforts to initiate community workshops with another NEC funded project that has set up "community panels" for social/community impact assessment of fisheries regulations. These two projects overlap insofar as they both rely upon a gathering of community representatives (in either a "workshop" or "panel" setting). Convening such gatherings for both projects together seems to make sense where the region and communities of interest overlap. We hope our cooperation will reduce the considerable labor involved in setting up such meetings. The focus for our community research is currently in the regions surrounding the following ports: Jonesport, ME; Vinalhaven, ME; Portland, ME; Gloucester, MA; Siquate, MA; and New Bedford, MA. We have made contact with different groups and community representatives in each location (through either the "Atlas" or the "Community Panels" projects) and plan to host workshops in all locations in the near future. The workshops will lead to the identification of community researchers who will interview fishermen from the surrounding regions. To conceptualize and support the "fieldwork" aspect of this third phase, we have completed an extensive literature review on participatory research. This review has shaped the development of protocols for hosting workshops and our ideas for interacting with community members. It has also suggested several locations where we might contribute our eventual results and insights on participatory research in fishing communities.

Partners: Kevin St. Martin (Rutgers University); Madeleine Hall-Arber (MIT Sea Grant). Report available at <http://www.northeastconsortium.org>. Contact phone: (617) 253-9308

### **Developing Stock Assessment Methods for the N.E. Deep Sea Red Crab Fishery (\$113,000)**

The New England deep sea red crab, *Chaceon quiquedens*, is one of the last unmanaged fisheries in the Northeast. Recently this species has drawn the interest of harvesters from as far away as Alaska, and in turn fishing pressure on the red crab has expanded dramatically. In response to concerns raised by harvesters, the New England Fishery Management Council has implemented emergency regulations to address over-fishing of this species. The harvester-scientist partners

submit this proposal for research contributing to red crab stock assessment. Additional support for this research is being requested of Maine Sea Grant and Saltonstall-Kennedy. The objectives of this three-year project beginning in spring 2002 are to: (1) Employ trawl- and camera-based sampling methodology established by early NMFS red crab surveys to determine whether abundance, size structure, and sex composition of the population has changed significantly at the same sites sampled in 1974, (2) Conduct sea sampling to better evaluate the spatial correlation between fishery-dependent data (catch per unit effort, catch per unit area) and fishery-independent estimates of abundance (trawl - camera data) for both harvestable and sub-harvestable crabs, (3) Conduct tagging to obtain much needed information on red crab growth rates and movement, and (4) Employ three stock assessment modeling approaches of different complexities (size-structured yield-per-recruit model, production model, and size-structured simulation model) to evaluate the dynamics of the red crab stock, estimate current status of the fishery, and evaluate alternative management strategies. This combination of fishery-dependent and -independent information with a three-part modeling approach will provide a robust evaluation of stock status and sustainable levels of harvest. Our intent is to work with NMFS fishery managers to integrate this research with the development of a fishery management plan mandated by the Sustainable Fisheries Act.

Partners: Richard Wahle (Bigelow Labs); Jon Williams (New England Red Crab Harvesters Assoc.). Report and Collaborations article available at [www.northeastconsortium.org](http://www.northeastconsortium.org). For further information contact Yong Chen (207-581-4303)

### **An Automated, Comprehensive Monitoring Program for the Atlantic Offshore Lobster Fishery (\$75,000)**

The overall goal of this project is to develop a monitoring program for the offshore lobster fishery so that data are collected that will assist the development of management practices appropriate to that fishery. Most data will be collected directly by members of the industry, from experimental traps integrated into strings of commercial traps. Data from lobsters will be entered directly into Thistle electronic logbooks, along with GPS coordinates of the study site. Bottom temperature will also be continuously monitored at each study site. Data will be automatically transferred to a database upon return to shore and used to assess the: 1) size frequency composition of catch from offshore vessels; 2) temporal and spatial patterns of abundance of all lobsters, especially berried females; 3) temporal and spatial patterns of shell disease and; 4) the relationship between the distribution of lobsters and bottom temperature. In addition, a range of sizes of female lobsters will be examined to determine the size when 50% of them reach sexual maturity. All these data will be used to improve our current management practices and thus ensure the maintenance of a sustainable offshore lobster fishery for years to come.

Partners: Win Watson (UNH); Bonnie Spinazola (Atlantic Offshore Lobstermen's Assoc.). Report available at <http://www.northeastconsortium.org/Search?do=Search&keywords=206&year=2001> For further information contact Win Watson (603-862-1629).

## FY 2001 Cooperative Research Partners Initiative (CRPI) Projects

### **Development of a Fishermen-Designed Electronic Logbook System for the Northeast Multispecies Fishery (\$67,658)**

Partners: Dr. Andrew Rosenberg (University of New Hampshire).

### **Expanding the Use of the Sweepless Raised Footrope Trawl in Small-Mesh Whiting Fisheries ( \$60,113)**

Partners: Michael Pol (Mass DMF)

### **Soft Species Separation System for the New England Multispecies Fishery (\$297,874)**

Partners: Dr. Pingguo He (University of New Hampshire)

### **Monkfish Cooperative Research Project: Gillnet Survey & "Study Fleet" (\$290,445)**

Partners: Dr. David Pierce (Mass DMF)

### **On-Going Study Expansion - Smooth Bottom Net Trawl Fishing Gear Effect on the Seabed: Investigation of Temporal and Cumulative Effects (\$212,785)**

Partners: Francis Mirarchi (F/V Kathleen A Mirarchi)

### **A collaborative Program to Assess Possible Temporal Access to Closed Area II: Targeting Yellowtail Flounder Without Significant Bycatch of Cod and Haddock (\$500,000)**

Partners: Chris Glass (Manomet Center for Conservation Science)

### **Gulf of Maine Inshore Trawl Survey (\$332,455)**

Partners: John Sowles (Maine DMR)

## FY 2001 Northeast Consortium Project Development Awards (awards of up to \$25,00 to help develop solid research concepts into full proposals)

### **Field Testing of Improved Pingers in the Sink Gillnet Fishery (\$25,000)**

Contact: Erik Anderson, Tel: 603-431-1779; email:  
andy42152@aol.com

### **Developing a Computer Simulation Framework for Identifying an Optimal Fishery-Independent Survey Program for the ME Sea Urchin Population (\$23,920)**

Contact: Yong Chen, Tel:207-581-4381; email: ychen@maine.edu.

### **Preliminary Evaluation of Stretch-Mesh Catch Controls (\$25,000)**

Contact: Cliff Goudey, Tel: 617-253-7079; email: cgoudey@mit.edu

### **Development of a Hydrodynamic Cover for Conducting Experiments on Selectivity of Trawl Codend Onboard Fishing Vessels (\$24,570)**

Contact: Pingguo He, Tel: 603-862-3154; email: pingguo.he@unh.edu

### **Industrial Training Workshop on Selectivity and Conservation during Trawling (\$24,885)**

Contact: Pingguo He, Tel: 603-862-3154; email: pingguo.he@unh.edu

### **Atlantic Herring Stock Discreteness and Migration: A Coded Microwire Tagging Pilot Project in the Gulf of Maine (\$24,926)**

Contact: Kohl Kanwit, Tel: 207-633-9535; email:

kohl.kanwit@state.me.us

### **A Test of Baited Underwater Video as a Fisheries Assessment Tool (\$25,000)**

Contact: Allen Michael, Tel: 978-525-2195; email:michael@cove.com

