



Collaborations

A monthly update of cooperative research news

March 2002

W

elcome to the March issue of "Collaborations." In this month's newsletter, our newly hired collaborative research reporter, Randy Seaver, takes a closer look at many of

the 18 collaborative research projects that were funded in FY 2001 by the Northeast Consortium.

Last year, the consortium funded 18 collaborative research projects with a total of slightly more than \$2.5 million.

As you will see in the enclosed reports, many of the projects will be getting underway this spring, while others are continuing parts of ongoing research and development.

This newsletter will demonstrate that there are a number of interesting and dynamic things taking place between scientists and fishermen in the Gulf of Maine. Whether it's joining forces to provide updated quahog and scallop assessments, or working in concert to study the trends of offshore lobsters and cod, this year's collection of collaborative research projects runs the gamut from gear design

improvements and modifications to studying how particular types of bait are affecting individual fisheries.

In each case, scientists and fishermen are bridging gaps and learning new ways in which they can help one another to accomplish their common goals of ensuring a sustainable and healthy resource.

We would like to take this opportunity to thank all of those who took the time to talk with us and answer our questions about the various projects and their status.

We hope that you find these reports useful, and we invite your comments or questions about this month's issue. Please feel free to contact us at our Saco, Maine office if you have any ideas or suggestions about how we can improve this newsletter.

Thank you,

Northwest Atlantic Marine Alliance
200 Main Street; Suite A
Saco, Maine 04072

(207) 284-5374 (888) 320-4530

<http://www.namanet.org>

collaborations@namanet.org

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Understanding offshore lobsters

Watson, Win (UNH) and Bonnie Spinazola (Atlantic Offshore Lobstermen's Assoc.)

Project Title: [An Automated, Comprehensive Monitoring Program for the Atlantic Offshore Lobster Fishery](#) (\$75,000)

While information about inshore lobsters is readily accessible and being continually updated, not much is now known about the biological patterns of offshore lobsters.

Enter some volunteers from the Atlantic Offshore Lobstermen's Association (AOLA).

Along with scientists from the University of New Hampshire, more than 15 lobstering crews are now collecting critical data that may one day help properly manage the offshore species.

"This project is really an exciting proposition," said Dr. Windsor Watson of the University of New Hampshire. "What we're talking about here is akin to going into the rain forest in search of new species. There just isn't a lot of data available right now about offshore lobsters."

Funded last year by a \$75,000 grant from the Northeast Consortium, the project is formally titled "An automated, comprehensive monitoring program for the Atlantic offshore lobster fishery."

Essentially, lobstermen and scientists are hoping that this project is just the beginning of something that will eventually take on a life of its own. Once the one-year project is completed, its participants are hoping that the data they collect during the project will become part of a permanent database used to help monitor the trends of lobsters in offshore waters.

"There's just very little data available on the offshore (30-200 miles) lobster fishery," said Bonnie Spinazzola, executive director of the AOLA. "When you stop and think about it, there just aren't that many researchers who are willing to get out there for three or four days at a time."

Thus, Spinazzola said, this particular project is custom made for a collaborative effort with people who are already traveling offshore on a regular basis.

A learning curve

David Spencer (F/V Nathaniel Lee) and his Newport, R.I.-based crew is working to help make the lobster survey project a reality. "Lobsters are at the beginning stages of being managed," Spencer said. "Every fisherman complains that the scientists don't know what they are talking about. Well, I see this as a perfect opportunity for us to help ensure that the information is accurate and not just 'guesstimates.'"

Although Spencer says that it makes sense for offshore lobstermen to participate in the project, he also concedes that the research involves a learning curve -- requiring his crewmembers to learn about some new technology.

The offshore data will be collected using Thistle® electronic logbooks, along with GPS coordinates of the study site. Bottom temperature will also be continuously monitored at each study site. Upon returning to shore, the collected data will be automatically transferred to an updated database.

Learning to use the Thistle system and taking some extra study steps while handling the lobsters is being met with some slight resistance, Spencer said. "If you ask the guys, they would rather not do it, but I think it's just a learning curve. As we go along with the project, I think the kinks will work themselves out."

Overall, Spencer says the learning curve is well worth the effort, not just for him but all those who hold a stake in the offshore fisheries.

"I really want to know what shape the resource is in," he said. "I guess you could say that it made good sense for us to participate in this project."

Charting the unknown

Watson, Spinazzola and Spencer are all excited about the prospect of getting a better handle on what is happening with lobsters in the offshore fisheries. Especially important, they said, is their goal to learn at what age offshore female lobsters become sexually mature.

"We're actually getting excited about the things we're seeing," Spinazzola said. "It's such a diverse resource with so many variables -- tides, temperatures, bottom conditions . . . we're talking about a large area, stretching from Hudson Canyon to Georges Bank. We want to know how the lobsters in each region are the same and how they're different."

While studies have been done before to determine sexual maturity of the species, this project will be the first in which that data is compared against regional differences, broken down into three general geographic areas: northern, central and southern.

UNH graduate student Susan Little is assisting Watson on the project as part of her master's thesis. To date, Little has dissected 120 lobsters (roughly 20 percent of the project's survey goal).

"It's still early, but so far we've found a difference of roughly five to seven millimeters between samples from the northern and southern study areas," Little said. "So, if we know that lobsters in the northern area are taking longer to sexually mature, we also have to factor some other conditions into the survey in order to understand what is actually accountable for the differences that we find in each of the study areas."

One of those other factors, Little explained, is water temperature variation in the offshore fishery. To that end, Watson and Little are coordinating the project with James Manning of the Woods Hole Oceanographic Institute, using a temperature estimation program. By next fall, however, enough data should be collected in order to determine actual water temperature differences.

According to Watson, bottom temperature will be continuously monitored at each study site and then used to assess the size frequency composition of catch from offshore vessels, variances in specific shell diseases and the relationship between the distribution of lobsters and bottom temperature.

The project should be completed in October 2002, and Spinazzola said she anticipates putting in a planning letter for the project to continue next year.

A study of inshore herring

Perkins, Don (GoMARF), Mathew Cieri (Maine DMR), Cameron McLellan (F/V Adventurer), and Paul Palino (F/V Anna Lisa)

Project Title: [Fishing Vessel Survey of Coastal Herring Spawning Aggregations](#) (\$130,215)

The project is now in its fourth year, and its primary participants are expecting another successful season as they move forward with a study entitled *Fishing Vessel Survey of Coastal Herring Spawning Aggregations*. Although herring play a key role in Maine's economy, 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, according to both fishermen and scientists.

The project, funded this year by a \$130, 215 grant from the Northeast Consortium, involves the use of hydroacoustic techniques to survey pre-spawning herring aggregations in coastal Gulf of Maine waters with a pair of commercial vessels. But Shale Rosen, project coordinator at the Gulf of Maine Aquarium, is hoping that a third vessel can be added to the project this year.

Cameron McLellan (F/V Adventurer) has been using his 72-foot boat in the project because he wants to be "in the loop."

"I'm very interested in what science is doing. I always have been," McLellan said. "I'm a fifth-generation fishermen. I got my first boat when I was 18. I've never done anything else."

In fact, McLellan put in his own proposal to the National Marine Fisheries Service approximately 10 years ago. "I wanted to take scientists out on my boat and show them what I was seeing," he said. "It didn't work out. The project didn't get approved."

Now, however, McLellan says he is enjoying his work on a collaborative research project. "I got involved with this project two years ago," he said. "And I'm hoping that I can continue next year."

McLellan has been helping to collect data along easterly transects (ranging from three to seven miles) from West Quoddy Head to Cape Anne.

"The only trouble we're having is in areas where there is a lot of fixed gear," he said.

Results from the survey are being posted on the Gulf of Maine Aquarium's herring website, Rosen said.

"We're working closely with the [Department of Marine Resources]," Rosen said. "Basically, what we want is to develop a better picture of the health of coastal Maine's herring stock."

According to the DMR's Matthew Cieri, this project is focusing upon inshore stocks while a similar project, funded by NMFS, is looking at the offshore stocks.

Hydro-acoustic survey techniques, which are widely employed in other countries, present the best option for developing an accurate survey, Cieri said.

Fishing vessels have proven to be cost-effective survey platforms that are superior to traditional research vessels for shallow-water, nearshore operations.

F/V Adventurer will be equipped to sample via multiple methods, Cieri said, 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.

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 a regular monitoring effort, with greater industry involvement, and incorporate the results into future stock assessment procedures) should extend well beyond the project year.

"I'm hoping that we might be able to get Congressional funding at some point for this project," Cieri said. "But for now, it's a great project that brings scientists like me and fishermen together."

Collecting samples has caused some challenges, but Cieri said the project is in a "fine-tuning" process. "In general, we're seeing a pretty stable population," he said. "Herring have a very punctuated spawning season, but we need to get a coast-wide look at the populations year after year so that we can use the survey as a relative index."

Between the end of August and the beginning of October, McLellan and Peter Mullen (F/V Western Wave) will work from one end of the coast to the other.

By working directly with guys in the industry, we are able to keep the project's expenses low, and you can rely on fishermen for knowing where the fish are. They really are project partners and they're just as interested as we are in the data."

Getting back to basics

Carr, Arne and Michael Pol (Mass. DMF), Russell Sherman, Trevor Daley, William Amaru, and others

Project Title: [Fishermen Assisting Gear Technologists and Scientists](#) (\$90,368)

It's one thing when marine scientists or government officials test their experiments and theories on dry land. But when those same people have an opportunity to partner with experienced commercial fishermen on the water - - the resulting research is bound to be much more dynamic and comprehensive.

At least that's the theory behind a project now being coordinated by Arnold Carr, senior marine fisheries biologist of the Massachusetts

Division of Marine Fisheries (MaDMF).

According to Carr, if commercial fishermen can learn new ways in which to modify their nets and other equipment, the results should prove beneficial to the entire Gulf of Maine -- in terms of maintaining sustainable fisheries and reducing bycatch.

Joseph Scola, for one, thinks it's a good idea and something that should have happened a long time ago.

Scola, a commercial fisherman, based in Gloucester, Mass., has been fishing in the Massachusetts Bay area for more than 25 years, yet this is his first collaborative project. By working directly with the MaDMF, Scola (F/V Dolores Louise) is hoping that he can finally get his message out; a message he says that has yet to be heard by non-fishermen.

"We know what we're doing out there," Scola said. "I'm not out here selling used cars, you know. I hope that I can show them what I know. I've been at this a long time. Everybody says they want to reach common ground, but most of them don't listen to me when I have attended a few meetings around here."

Basically, Carr's project is designed to employ fishermen who will work with gear technologists and scientists to explore gear modifications in commercial fishing operations. Conservation engineering has been most successful when fishermen and scientists have worked together to address problems, Carr said.

Carr's project is being funded by a \$90,368 grant from the Northeast Consortium, and it is one of 18 cooperative projects the consortium funded with a total of slightly more than \$2.5 million in FY 2001.

According to Carr, the (MaDMF) and the Manomet Center for Conservation Services (MCCS) has several examples of previous success with this type of collaborative "teaming."

The project will enlist the help of fishermen in order to provide needed manpower and tested experience that will supplement ongoing conservation engineering programs.

"The overall project is coming along quite well," Carr said. "Actually, we're now in the process of developing several subprojects."

In addition to working with Scola, Carr is relying upon a number of other fishermen from throughout the New England area to help with the project. Along with the MCCS and officials from the Massachusetts Institute of Technology, the first part of Carr's project centers upon gaining a better understanding of fish behavior in relation to fishing gear. Data obtained through this research, Carr hopes, will be used to reduce bycatch and limit adverse impacts on non-target species.

As part of that effort, Scola and other fishermen, including Luis Ribas (F/V Blues Skies), recently attended a week-long workshop at Memorial University in St. John's, Newfoundland. While there, the fishermen were able to use the Marine Institute's large test tank to see how well their nets worked underwater, as opposed to losing the view once the nets are cast into the ocean.

"It was pretty interesting," Scola said. "You really get to see how your gear is working. It's like we're all learning together. They're learning something, and I'm learning something. I found out about all sorts of stuff, and the modifications I made on my gear were really small things. Actually, I could have used another week up there."

Ribas, whose boat is a 62-foot trawler, agreed with Scola, saying that a few minor modifications to his nets have already shown desired results.

"If we can reduce bycatch than we may be able to go fishing more," Ribas said, reporting that he has already seen a significant increase (between 65 and 85 percent) in the effectiveness of the nets during the early stages of the project.

Although the project is still in its early stages, Carr said he is pleased with how well the project is shaping up.

"For the past 16 days or so, we've been working with Luis on a cod reductions program, but we're also testing fish pots in Maine to see if potting of cod can be done."

According to Carr, many of the gear modifications are fairly simple, such as dropping the vertical profiles and head ropes of the nets. Other modifications, such as an extension piece with a raked opening will be tested later in the spring.

Underwater videotaping will play a major role in the research, Carr wrote in his project's summary report. Both the MaDMF and the 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 materials and provide new observations that may further assist in bycatch reduction, fish behavior and gear interaction with marine animals and habitat, according to the report.

That, Scola said, should help him prove his points: fishermen can be effective partners with both scientists and government officials, and furthermore, fishermen are concerned with protecting the viability of the resource. All the fishermen need, Scola said is a chance to be heard and an opportunity to fully participate in the process.

"Like I said, everybody talks about reaching a common ground," Scola said. "Well. I want that, too. And I just want to be able to work . . . and who's to say I can't go after my flounder if I can prove that I can do these other things they want and let them see it on paper?"

By August of this year, Carr is expecting to have the results of his research published as an article on the MaDMF's website at:

http://www.state.ma.us/dfwele/dmf/dmf_toc.htm

It's the same with cod: You are what you eat

Ligenza Theodore (F/V Riena Marie) and Frank Almeida and Jason Link (Northeast Fisheries Science Center)

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

Most likely, it will be dirty and tedious work. And perhaps that's the reason Ted Ligenza had such a hard time finding a scientist who would help him with a project designed to examine cod stomachs.

Similar to the popular phrase, "You are what you eat," Ligenza (F/V Riena Marie) is hoping his project will give fishermen and scientists a better understanding of the species by determining how its diet relates to spawning, prey abundance, water temperature and major weather events.

"We are forever being told that fishermen have only anecdotal data," Ligenza said. "I believe that if you have issues and concerns, then you have to be able to quantify your data in order to convince others of your position."

The study, focused on small-scale cod, will involve collecting roughly 1,200 stomach samples over a one-year period throughout the inshore waters, east of Chatham, Massachusetts.

The project, funded by a \$125,475 grant from the Northeast Consortium, got underway in October of 2001, and approximately 200 stomach samples have been collected so far.

Ligenza, who studied biology at Lebanon College in Annville, Pa., said it makes sense to carefully study what a particular species is eating. The hard part, he said, was finding a scientist to help with the project.

"I must have made nearly 50 calls, and no one wanted to get on board," Ligenza said. "Finally, I talked with Frank Almeida (Northeast Fisheries Science Center), and he didn't hesitate to take on the project."

Almeida, along with Jason Link, will study the stomach sample data once it has been processed by an independent subcontractor hired for the project.

Marine Research Incorporated will perform the subcontract work for \$18,000.

"The project makes sense to me," Almeida said. "We're hoping to get a pretty wide range of samples; and the protocols we have established call for going out once every 10 days, roughly 3 times each month."

For his part, Ligenza describes himself as a simple jigger (hand-liner), but he talks much more like a scientist when describing the project and its goals.

"Honestly, I could have done this myself, but it would have taken too much time," he said. "Initially, I got pretty discouraged when I was having a hard time finding someone to work with me, but Frank has been great, and he was very receptive to what I was proposing."

According to Ligenza, collecting the data for this project will hopefully fill in the informational "gap" between broad-scale studies and laboratory research.

While the diet of Atlantic cod (*Gadus morhua*) has been well studied. Ligenza and Almeida are hoping that they can infer rates, processes, and relationships about cod, cod prey, and oceanographic conditions from those other research projects. Only a few studies have been conducted at small temporal (months) and spatial (approximately 300 mi² or 777 km²) scales, according to the project summary Ligenza submitted to the Northeast Consortium.

Furthermore, Ligenza said, the information collected on monthly and local scale cod feeding could have broad implications for fisheries management. As an 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, such as growth, fecundity, maturity, spawning and recruitment.

"Ideally, I would like this project to continue for two years," Ligenza said. "I don't think that one year is going to be enough. It's kind of a tough duty because you have to go out every 10 days."

Almeida said keeping the sample dates consistent would be an important component of the research so that the study will be better able to track specific patterns.

So far, Ligenza has made 12 trips, averaging 2.4 trips per month. Samples will be collected from five class sizes: less than 40cm; 40-60 cm; 60-80 cm; 80-100 cm and 100-120 cm, he said, adding that the larger samples have been harder to find.

Some fishermen, Ligenza said, have noted that cod change their behavior (schooling, distribution, migration, etc.) in the winter and are no longer found in shoal waters (16-20 fathoms), where they were once common at this time of year, but rather in deeper waters (30-50 fathoms).

Fishermen speculate that these differences are due to a change in temperature, the loss of population genetic memory as a result of many of the fish simply being caught, removal of key seasonal prey (e.g. brittle stars) by storm events, or other declines in the availability of prey which form a large part of the cod diet. For example, fishermen note that herring and mackerel are a large part of the diet of cod right before and during the spawning season.

This study will document and validate (or invalidate) these observations, Ligenza said.

"If you want to study a fish's habits, you have to know what it eats," he said. "Personally, I find this type of stuff very interesting. Let's face it. The regulations are going to be coming down on me. Therefore, I want to have the data so that I can make my case and so that my statements will be validated."

Looking at the bottom

Dionne, Michele (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)

Project Title: [*Relationship between Substrate, Humans, and Ecology of Juvenile Fish in the Bigelow Bight and Estuaries*](#) (\$262,542)

The planning is nearly finished, and the project's participants are raring to go. Drs. Michele Dionne and Richard MacKenzie of the Wells National Estuarine Research Reserve are now putting the final touches on the planning portion of their study to survey juvenile groundfish distribution and abundance along transects from estuarine through inner shelf areas of the Bigelow Bight.

The project, one of 18 collaborative research projects funded by the Northeast Consortium in FY 2001, received \$262,542 in funding.

The study is expected to simultaneously use three commercial fishing vessels, and it's expected to get underway in March. Two other 10-day sampling dates are scheduled to take place in the summer and fall.

Working in collaboration makes sense for Dionne.

"This is a project that has huge potential to be beneficial on both sides," she said. "Both disciplines have a lot to offer each other – in terms of equipment, methodology or how we look at the project and its results."

Vincent Balzano (F/V North Star) couldn't agree more. Balzano has participated in a number of other collaborative projects, but says this particular project held a special interest for him.

"If you look at the geographic study area, that's where I spend most of my time fishing," Balzano said. "I have an interest in what the bottom actually looks like. We have an idea of what we think it looks like, but now we'll have some evidence to back up those ideas.

Balzano is referring to one of the project's critical elements: the use of a sediment profile imager (known as a SPI camera), a device that takes photos of substrates and associated organisms both from a surface and a profile view to depths of up to 1 foot.

The SPI camera, weighing more than 750 pounds, will be housed in an aluminum casing and rigged to the F/V Full Circle One (Capt. Jeff Reid).

According to Dionne, the project will characterize associated substrate and prey availability in order to determine fisheries habitat resources with the region. To that end, two other vessels will use a combination of modified traps and gill nets and a beam trawl.

"There will be some places where we will use all the gear in order to get the most complete picture possible," Dionne said during a Feb. 4 meeting of the project's primary participants.

The deepest sampling station is expected to be 300 feet, but sampling along the estuaries of coastal Maine and New Hampshire could take place in much more shallow waters, to a minimum of four feet.

David Gallager, formerly a commercial fisherman, now owns a consulting business that is assisting Dionne and MacKenzie with their project. "This project has many benefits for commercial fishermen," Gallager said. "The camera will allow us to see how gear is damaged near the bottom and give us a different perspective. I'm hoping that we can form a cooperative that will eventually own this piece of equipment, including groups like the Maine Groundfish Association and the Associated Fisheries of Maine."

Dionne hopes to have each sampling set completed within a two-week period without significant lag time between collection dates. "We'll be looking for juvenile bottom fish, from age 1 up," she said.

Reid and others at the meeting raised concerns about sampling near Jeffreys Ledge, expressing questions about time durations in using nets to avoid unnecessary capture of dogfish and other species. Participants also said their project can take place during the lobstering season without disruption to area traps or other types of commercial fishing activity.

The data will be collected by combining traditional research sampling methods for fish and the project 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).

Results of the study will provide much needed data to determine estuarine and inner-shelf fish habitat, the food resource value of these habitats, and their response to current and previous human alterations, Dionne said.

Balzano is hoping he will be able to use the collected information to make better use of his limited time within the resource.

"I plan to use the information so that I can better target particular species," he said. "Overall, I'm hoping to make myself more efficient, but I also think this will be a good way for us to reduce bycatch."

Fishing, for the most part, is a process of elimination, Balzano said. By having more detailed information, he and other fishermen will be able to make better judgments regarding where they spend time while fishing.

"They say knowledge is power," Balzano said, "And I think we'll be able to put a scientific twist on things we already know instinctively. It makes for a good cross-reference."

While Balzano admits that collaborative research has its downsides, such as scheduling problems and time commitments, he also says that you get out of it only what you put into it.

"The way I look at it this," he said. "You have to give something in order to get something. You never really know what you're going to get when you go fishing. At least this way you know exactly what you'll be doing on the boat.

"I think this collaborative research thing is fabulous," he added. "I've heard it described as a new fishery, and I think it is."

The effects of herring on lobsters

Grabowski, Jon and Erika Clesceri (GoMARF), Phil Yund (UM), 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

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

It's estimated that more than 73,000 metric tons of herring are dumped each year along the coast of Maine for lobster bait, but how does the use of herring bait affect the lobsters that are being harvested in the Gulf of Maine?

That is the question Dr. Phil Yund and other scientists are hoping to answer this year as part of their collaborative research project entitled "Are we using herring to farm lobsters?: Effect of herring bait on lobster growth, and fate of discarded bait in benthic communities."

The project was funded last year by a \$111,972 grant from the Northeast Consortium, and its objectives are simple and straightforward.

Yund, along with Jon Grabowski and Erika Clesceri of the Gulf of Maine Aquarium, will use their research to determine the proportion of lobster diet and tissue derived from bait; assess the impact of a bait-augmented diet on lobster growth and population density; quantify the initial fate of discarded herring bait in the benthic community, and conduct an economic assessment of lobster production versus herring cost.

The project is scheduled to get underway in May and it should be finished in November, according to Yund.

The study will focus on two specific areas, comparing data collected from the area surrounding Monehegan Island in Maine and the waters near Grand Manan Island in New Brunswick.

"Basically, we want to find out what's really happening with all of the herring we dump as bait," Yund said. "For instance, what other species are eating it, besides the lobsters?"

According to Yund, approximately 25,000 metric tons of lobster is harvested each year. The scientists are now wondering whether those lobsters are being affected, in terms of size and location, by the use of herring bait.

"What [lobsters] feed on during the summer is what makes them grow," Yund said, explaining why the project will be conducted during the summer months.

In order to make their project work, the scientists needed the help of some lobstermen who know the geographic study area.

Carl Wilson of the Maine Department of Marine Resources served as a liaison for the project and enlisted the help of some local lobstermen, including Matt Webber (F/V Griffin) from Monehegan Island.

A need to participate

Webber, 25, is relatively young, but says he has a lot invested in the lobstering industry. Thus, he says, it made sense to participate in a collaborative research project that could have long-term impacts upon his livelihood.

"I work in a six-month fishery (Dec.- May)," Webber said. "Because of the closures, I end up with a lot of time on my hands. At least this way, I'm able to be out on my boat, but I'll also get to be a part of the process and I think that's a good thing."

Although Webber said he is interested in the research aspect of the project, he also expressed concerns about increased regulations, including trap limits and net change requirements.

"I think the more you know about a species, the better you can actually forecast what may take place in the future," he said. "I'm young, and I want to be doing this for the rest of my life."

Like many other fishermen who participate in collaborative research projects, Webber said he is expecting to face some challenges and minor difficulties by agreeing to work on the project.

"Sure, I'll incur some costs. . . like increasing my insurance and picking up some extra survival gear, but I would still say it's worth it," he said. "This is my life and I want to be a part of it."

The project's goals

According to the project's summary, 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.

Three complementary methods will be used to assess the relative contribution of herring to lobster diet and growth in areas with and without bait.

Lobster gut contents will be examined to assess dietary impact. Secondly, nitrogen stable isotope ratios will be used to compare longer-term effects of herring bait on lobster biomass production.

Finally, single-season growth rates will be compared to determine whether the presence of herring bait increases short-term growth. By addressing these issues, this project will begin to assess how different fisheries are interconnected by fishing practices of lobster production versus herring cost.

Can cod bycatch be reduced with a

'double grid' device on trawlers?

He, Pingguo (UNH) and Bart McNeel (F/V Aaron and Melissa II)

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

On the one hand, Bart McNeel (F/V Aaron and Melissa II) has a business to run, and he doesn't have a lot of time to spare. On the other hand, McNeel has serious concerns about what is happening in the Gulf of Maine regarding codfish limits and closures. That's why, he says, it made sense for him to partner in a collaborative research project.

McNeel is joining with Dr. Pingguo He from the University of New Hampshire in a collaborative project that will explore the benefits of a "double-grid" device intended to hopefully reduce cod bycatch during flatfish trawls.

According to He, the project will involve conceptual design, flume tank model tests and at-sea trials. The design is aimed to reduce catch of cod, especially small cod, as well as undersized flatfish. The double grid device is designed to capitalize upon the differences in the behavior of flatfish and cod inside fishing gears.

The two-year project is being funded by a \$356,866 grant from the Northeast Consortium, and the first trials took place in October 2001.

Now, Dr. He and McNeel say they are taking a closer look at how the device worked during the first trial.

"Right now we are doing some more design and testing," He said. "I think we noticed a lot of potential improvements that we can make. For instance, we found that monkfish and skates were sticking on the grid and masking any possibility of selectivity.

"What we are looking at now is how we can modify the gear in order to be more responsive."

According to He, one potential improvement may be found in modifying the grid angle or changing the grid spacing.

Overall, the project will take place in four trial segments, each lasting between seven and eight days. The next trial is scheduled for this spring. Additional trials will be conducted in the fall and again in the spring of 2003.

This project represents McNeel's first foray into collaborative research, and he says the project seems to be going well.

"The whole thing is an upside," McNeel said when asked about the project's progress. "When you're doing this type of stuff, you meet some really interesting and intelligent people."

As a businessman, however, McNeel says there can be some challenges found in working with members of the academic community.

For instance, payments for the use of his vessel take longer than he initially expected. And scientists sometimes have a hard time understanding what is involved in preparing to head out for offshore waters.

"Hopefully, we can modify this project so that we can take longer trips," he said. "I really can't afford to do this a day here and a day there."

According to McNeel, it takes nearly 24 hours for his boat to reach the southeast quadrant of the Georges Bank after leaving the harbor in Portland, Maine.

When asked about how the trawling device was working, McNeel said it would take time to "tweak" the system.

"From my point of view, I think it allows too many ground fish to escape," he said. "It's only supposed to allow large cod out. I think we're going to try a steeper angle. We noticed that the more gradual the angle, the more fish went out to the escape."

Dr. He is hoping the manufacturers (IMP of Canada) will be able to design a lever that can adjust the angle of the grid.

"I think we have a good handle on it," He said, when asked about the design's potential. "It will be interesting to see how it performs in the next trial."

For his part, McNeel, who has been in the fishing business since 1978, is looking forward to the next trial.

"I like working with him (Dr. He)," McNeel said. "He's shown me some interesting stuff, and I've learned a lot from him. I think this will be good for both of us."

Project remains in design stage

He, Pingguo (UNH) and Bart McNeel (F/V Aaron and Melissa II)

Project Title: [*Impact of Trawling on the Seabed in the Gulf of Maine*](#) (\$50,000)

A project designed to assess the effects of lighter footgear for trawling on the seabed has yet to be fully developed, thus it received only a fraction of the funding its sponsors were hoping for last year.

Dr. Pingguo He and Bart McNeel (F/V Aaron and Melissa II) were hoping to conduct some sea trials this year for their *Impact of Trawling on the seabed in the Gulf of Maine* project, but will instead be restricted to design work since they received only \$50,000 in funding from the Northeast Consortium for FY 2001.

"I had some ideas about essential fish habitats," McNeel said. "But we really didn't have time to get the entire proposal written."

Instead, McNeel opted to assist Dr. He with another project that was funded by the consortium this year (Design of a Double Grid Device to Reduce Cod Bycatch in Flatfish Trawls).

According to McNeel, bottom trawling alters the physical and biological structure of the seabed. While the effects of alteration on benthic

ecosystems and fish population has yet to be clarified, reducing alteration would be viewed positively by all concerned with the marine environment and fishery, he wrote in his proposal to the consortium.

The project would have involved design, model tests and sea trials of trawl footgears, which have less contact with the seabed, yet would be commercially viable for the groundfish and shrimp operations.

The current funding level only allows for designing and model testing of some lighter footgears for groundfish and shrimp trawls, McNeel said.

Where are the lobsters coming from?

Incze, Lewis (Bigelow Labs), Proctor Wells (Maine Fishermen's Cooperative Assoc.), and Mathew Thomson

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

What is affecting the travel of larval lobsters in eastern Maine? That is the question Dr. Lewis Incze of the Bigelow Laboratory in Boothbay Harbor, Maine is hoping to answer – at least, in part – from data he will be collecting in a two-year collaborative research project.

Incze says he has always been fascinated by how ocean forces affect various species and their population distribution. This project, funded by a \$142,453 grant from the Northeast Consortium, will focus solely upon lobster larvae.

"Basically, what I want to [identify] are the things that drive the abundance of lobsters," Incze said.

Lobsterman Proctor Wells has been fishing in and around Maine's mid-coast area for more than 30 years, and he is one of the fishermen assisting Incze with the project.

"I had an interest," Wells said. "The more you can learn from the science aspect, the better fisherman you become."

After working out the details of the project last year, Incze and Wells set up sampling stations along eight, 40-mile transects from the state's mid-coast area up to Cutler. The location for the project, Incze said, was critical.

"We chose this area because we are studying the influences of eastern Maine's coastal current system," Incze said. "For practical reasons, we had to limit our research area in order to limit the number of variables."

In August of 2001 (the time when lobster eggs are released), Wells and Incze conducted two weeks' worth of tows with a plankton net. "We were wondering if the cold water currents coming down from Canada could be carrying the lobster larvae into inshore areas," Wells said. "Are the lobsters coming from Canada or from coastal stacks?"

According to Incze, the data received from that series of tows showed at least one interesting fact; a majority of the post-larvae was found in the inshore bays along the mid-coast.

That discovery coincides with the hypothesis Incze offered in his project proposal. ". . . 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," Incze wrote.

Incze said larval supply and settlement are limited when compared against 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 re-circulation to the north seem plausible.

The project's goal is to understand how egg production in various regions of the nearshore and coastal shelf (offshore to about 40 nautical miles) interacts with the current system to affect lobster recruitment.

Incze said he wants to use the project's data to supplement other studies that have been done about lobster larvae.

"It's just unrealistic to expect that our data will be all inclusive," he said. "Two years is simply not enough time for such an undertaking."

For example, if lobsters are recruited in Jonesport, Incze hopes to determine where those eggs were actually hatched.

"After a lobster drops its eggs they go to the surface for about two or three weeks," Wells explained. "What happens to those eggs once they are hatched is what we're trying to understand."

The project's long-term goal, however, is to derive a model of spatial and temporal lobster recruitment dynamics, an effort that Incze says will be coordinated with Canadian and other U.S. scientists.

Both Incze and Wells reported that they were able to develop a good working partnership.

"I took some time talking with Proctor before I submitted the proposal," Incze said. "If you're going to spend two weeks on someone's boat, you want to make sure that you can basically get along."

Wells agreed, saying he has a vested interest in the project.

"I've been fishing ever since I was 15," he said. "Fishing is all I have ever done. I wanted to make sure that I was involved in the project. I wanted to prove that scientists and fishermen can work together. Fishermen offer a barometer of what's actually happening in the ocean."

But not all projects are alike, Wells said. And, sometimes, even the best project creates some hardships, including difficulty in coordinating time at sea.

"Collaborative research is something you really have to commit to," Wells said. "You get out of it, only what you put into it. It's important work, and it needs to be done, even though a lot of critics said it would never work."

The second phase of the project will begin in August 2002. By April, however, Inzce is hoping to have some of his preliminary data posted on his website at <http://www.bigelow.org>.

A return of the scallops?

Schick, Dan (Maine DMR), Dana Morse (Maine Sea Grant), and Marsden Brewer

Project Title: [*Maine Scallop Fishery Monitoring and Enhancement*](#) (\$207,411 for 2 years)

George Freeman stands on the pier at Camp Ellis, Maine -- watching the sunrise and the early tide roll back into Saco Bay. In the back of his pickup truck are several diving tanks. He's a professional diver, and he's preparing to -- once again -- dive for scallops.

At one time, Saco Bay was replete with scallops. In the last 10 years, however, the stocks have steadily declined because of over harvesting and -- quite possibly -- pollution issues.

Freeman, 42, has been a professional diver for more than 20 years. A resident of Scarborough, he knows the local waters like the backs of hands.

"It's not that it really got bad," he says of the local scallop stocks. "It's just that some big boats came in during the mid-'80s and cleaned them [scallops] right out. What would have lasted small boats for more than a year, those big boats cleaned out in about 10 days. Now, if you want to dive for scallops, you have to go someplace else."

Members of the Saco Bay Alliance, a non-profit collaborative of fishermen and others, who hold a stake in ensuring sound management of the area's marine resources, are hoping to change that. Saco Bay is just one of four regions in the state that is benefiting from a two-year collaborative research project that was funded last year with a \$207,411 grant by the Northeast Consortium.

The project was born four years ago from concerns that have been raised about the possibility of excessive harvests and a decline in landings since 1993, said Dan Schick of the Maine Department of Marine Resources. In fact, those same concerns have prompted renewed discussion on management options for the Maine scallop fishery.

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 No. 2 behind lobsters, Schick said. The fishery has the potential to offset potential economic hardship in the event of a decline in other stocks.

Marsden Brewer (F/V Lindsey Marie) has been working with roughly 35 other area fishermen on the scallop enhancement project in the Stonington Area, coordinating spat collection and setting out settlement bags of juvenile scallops below Isle au Haut, in Blue Hill, Jericho and Penobscot Bay.

The project has been ongoing for four years now, but Brewer says it could be a while before area fishermen know whether scallop stocks can be successfully recruited with settlement bags.

"We set the first bags in 1999," Brewer said. "We now have about 2,500 bags in the water but we probably won't have [recruitment] numbers until April. We still don't know in what areas the young will take. What may work in one area won't necessarily work in another. This is more of a long-term project. We are looking down the road -- 25 to 50 years -- wondering whether we can successfully harvest scallops."

The Wild Scallop Stock Enhancement Project is an attempt to bolster local stocks by giving scallops a "biological" helping-hand, of sorts.

Each of the specially designed scallop bags (resembling a large onion bag) contains roughly 1,500 scallops. The newly hatched scallops are caught when the microscopic eggs float upon the water's surface for 30 to 45 days. As the eggs mature, they form an appendage that seeks to anchor the growing scallop to something along the ocean floor.

Other than landings data, little information has been collected on Maine's inshore scallop populations since a sampling program in the late 1980s.

According to Schick, 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, Schick said.

Divers say that scallops prefer a muddy area, near gravel along the ocean floor. "They like to be near the current," Freeman said. "Once they find a place they like, they sit right there."

Why the experiment?

Scallops are harvested in the inshore waters with drags, dredges and diving. For most fishermen, scalloping is a “fall back fishery,” not their primary source of revenue. Entry into the Maine inshore scallop fishery is open to anyone who wants to participate. But because scallops are found in patches, by their very nature, they can be quickly over harvested.

Using their own lines and buoys, fishermen like Brewer set the scallop bags in the bay, at various depths, at a time when the species are expected to release their spat into the water column.

The fishermen then record relevant data like depth, location, water temperature, date and time and pass that information back to local project coordinators and the DMR.

The bags remain in these locations until mid-winter when some are shifted out of shrimping grounds and areas subject to storm danger to more protective areas.

Brewer says he set about 900 bags on his own. Overall, approximately 2,500 bags have been set in Stonington Bay.

Researchers will document the on-going experiment using underwater cameras supplied by DMR. Within 48 hours after release of the scallops, they will film the experimental plots to check the density and distribution of the scallops.

Restoring Maine’s inshore scallop fishery will do more than provide lobstermen a winter diversion. In 2000, scallops were ninth in commercial value in the state’s seafood industry, down from fourth place in 1990.

The harvest value in 2000 was \$3.9 million as compared to \$6 million in 1990. According to the DMR, there were 888 boats and 390 divers involved in Maine’s scallop fishery during the last year, representing an increase in both categories. These numbers don’t reflect the additional workers involved in processing.

Many of those involved in the project say that it is far too early to use the data collected as part of a statewide fishery management program because of the unique environment of each test site.

"Again, what will work in one area, may not work in another," Brewer said. "The more I get into this, the more I’d say that it would be premature to think about crafting regulations at this point."

Brewer says that it wasn’t difficult to enlist the help of local fishermen.

"A bunch of these guys are interested in the project," he said. "This is a way to look at small-scale aquaculture projects in a different way – rotational management on a local level. But it’s still real important for the state to be involved."

The state’s perspective

Four years ago, a delegation from Maine traveled to Japan to see how that country has replenished its scallop stocks. Today, Schick says the scallop enhancement project is providing the DMR with an opportunity to refine its research protocols.

"We are looking and focusing on survivability after release," he said. "The project is spread out so that we can get a better picture of what’s happening with scallops all along the coast."

One drawback to the project, Schick explains, is the fishermen’s propensity to be proprietary. "It’s not our purpose to broadcast what specific areas are working best," he said. "I don’t blame people for not wanting to give detailed locations, but we do need the best data possible."

For Schick, the project has raised an interesting question: Should the scallops be released after one year, when they still measure less than one inch? Or do you invest in holding the bags for another year, until the scallops measure between 1-1/2 to 2 inches?

"Scallops are an inshore resource, even though they can be found on Georges Bank," Schick said. "This species varies in abundance on their own. So, the question becomes can we fiddle with Mother Nature to keep recruitment high?"

Another benefit to replenishing scallop stocks, Schick says, is their tendency to sequester shellfish diseases.

Dana Morse, an extension associate at the University of Maine’s Sea Grant program, says the project is an excellent example of how the state and local fishermen can work together.

"At this point, it seems well-proven that we can collect the scallop spat," Morse said. "If we can’t collect scallops in a couple of years, however, we have missed our mark. It’s looking positive, but we’re not home free yet."

Are skate species being over-fished?

Jurek Joe (F/V *Mystique Lady*) and Paul Tsang, James Sulikowski, and Patrick Danley (UNH)

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

Capt. Joe Jurek (F/V *Mystic Lady*) doesn’t mince words when talking about collaborative research projects. Although Jurek has found collaborative research to be very beneficial, he also says, “It’s not for everyone.”

Jurek, a commercial fishermen based in Seabrook, N.H., is now working with James Sulikowski of the University of New Hampshire in order to study two over-fished skate species in the Gulf of Maine.

Jurek and Sulikowski have been collecting the species (*Amblyraja radiata* and *Malacoraja senta*) in order to determine the

species' breeding patterns, how many genetically distinct populations exist for each species within the Gulf of Maine and both species' growth rates, correlating size and weight to specific age classes.

The project, one of 18 cooperative research projects funded by the Northeast Consortium in FY 2001 (slightly more than \$2.5 million), received \$200,000 in funding for the next two years.

"Teaming up with James just sort of happened naturally," Jurek explained while talking about how he became involved in his first collaborative project. "I had helped him collect some samples before, but I was basically just doing it for the money then . . . but now it's different."

Jurek said working with Sulikowski has expanded his geographical knowledge about the Gulf of Maine, thus providing him with new information for future days at sea.

"Being on this project allows me to learn about a new bottom," Jurek said. "Previously, I had no reason to go into these areas, but since we're looking for a specific species, we had to go looking in places where I wouldn't have gone before."

Additionally, Jurek said he has enjoyed having some company on his boat, but he also says that some fishermen prefer to work independently.

"I've found that there's a certain amount of give and take, which has to take place in these situations," he said. "Personally, I think James has gotten a lot out of this. For instance, he's learning more about what happens on our end and about the challenges that fishermen face, such as weather or how the fishery works on an economic level. You can't really appreciate those things until you get out on a boat.

"I've always had an interest in biology, and the research seemed interesting. I think this is a good way to share information."

According to Sulikowski, the project began by collecting samples approximately 16 miles off the New Hampshire coast last summer. The data now being collected will be analyzed in Year Two of the project, beginning in the fall.

"These two species of skates, so far, don't have a designated reproductive season," he said. "Therefore, it's important for us to go out at different times throughout the year in order to gather the most comprehensive information."

Asked about what it was like to work in a partnership with a non-scientist, Sulikowski didn't hesitate with his response: "Quite simply, we couldn't have asked for a better working relationship," he said. "It truly has been a great collaboration."

Paul Tsang and Patrick Danley, both from the University of New Hampshire, are also working on the project.

Is pollution affecting cod stocks?

Monosson, Emily (Mount Holyoke College) and the Gloucester Fishermen's Wives Assoc.

Project Title: [*Comparison of Environmental Contaminants on Georges Bank and Stellwagen Bank*](#) (\$129,130)

During the mid 1970s, marine scientists discovered unusually high levels of PCBs and other contaminants in cod fish from the Georges Bank. Now, nearly three decades later, a group of fishermen working in collaboration with scientists, are planning to study contaminant levels in the same area.

The project, sponsored by the Gloucester Fishermen's Wives Association (GFWA), is being funded by a \$129,130 grant from the Northeast Consortium, and it will compare data collected from both the Georges Bank and Stellwagen Bank.

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 between April and June of this year.

According to David Lincoln of GFWA, a kickoff for cod sample collection will take place on March 4. He expects most of the sampling to be completed by the end of April, using roughly five vessels.

"We want to know how the contaminants are affecting recruitment," Lincoln explained. "And I think it's important to sample from both the offshore and inshore fishery."

Monosson agrees, saying fishermen have been raising concerns about possible contaminants in the fisheries for many years.

"The contaminants could be coming from any number of different sources," she said. "Whether it's a result of shipping traffic or airborne contaminants, we just don't know at this time."

"Not everything can be blamed on overfishing," Lincoln added. "Fishermen, for a very long time, have been saying pollution may be a factor in declining fish stocks."

According to the project's summary report, hundreds of studies conducted worldwide during the last five 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.

Monosson and Lincoln are hoping that the data collected during this study will provide valuable baseline information together with an overview of historical trends based upon 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.

Establishing a quahog baseline

Schick, Dan (Maine DMR) and Kristan Porter (F/V Whitney and Ashley)

Project Title: [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, according to the summary report for a project that seeks to update the state's quahog assessments.

While the Maine fishery initially occurred in the territorial waters, it began to exploit the quahog resource in federal waters in the 1980s, due in part to paralytic shellfish poisoning (PSP) closures of several areas in state waters, said Dan Schick of the Maine Department of Marine Resources.

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.

And Schick says it is now imperative to conduct a stock survey and assessment to determine if the resource is being harvested at a sustainable rate.

A 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. The collaborative project was one of 18 such projects funded last year by a \$23,326 grant from the Northeast Consortium.

The one-month project is expected to get underway in April, Schick said.

Kristan Porter (F/V Whitney and Ashley) says the assessment survey is something the industry has needed for quite a while.

"We need a stock assessment to base our future quotas on," he said. "As I understand it, the first year is kind of a pilot study – something we use to develop a baseline."

Porter said he is participating in the project so that he can have a better chance of ensuring the industry gets its quota each year. "We want to make sure that we're not overfishing or underfishing," he said. "We don't have any hard numbers on our fishery at all."

According to Porter, there are roughly 40 Maine fishermen licensed to catch quahogs, and many of those permits are inactive.

"My expectation of this project is to get a grip on the fishery," he said. "How long a tow do we make? What size mesh should we be using? At what speed should we tow? I want to give the [DMR] a good, solid place to start – or at least some parameters on what to do. I mean, we could be doing a survey every year and be doing it the wrong way."

Porter said the project is now in its planning stages, and he's evaluating what equipment he'll need. "It's really hard to know exactly what we'll need until we get out on the water," he said.

E-MOLT project moves to second phase

Manning, James (Northeast Fisheries Science Center), Bonnie Spinazola (Atlantic Offshore Lobstermen's Assoc.), and David McCarron (Gulf of Maine Lobster Foundation)

Project Title: [Environmental Monitors on Lobster Traps Phase II: Salinity](#) (\$82,000)

The second phase of a project designed to place environmental monitors on lobster traps is moving forward as expected, reports James Manning of the Northeast Fisheries Science Center.

The project's second phase involves testing for salinity, and it was funded by an \$82,000 grant from the Northeast Consortium.

The first phase of the eMOLT program centered upon collecting temperature readings throughout the Northeast Continental Shelf.

As of December 1, 2001, 77 temperature probes have been distributed in various depths, ranging from 20 to 200 fathoms throughout the Northeast Continental Shelf including the Gulf of Maine, Manning reported in his regular update on the eMOLT web page (<http://www.nefsc.nmfs.gov/~jmanning/emolt.html>)

Approximately half of these probes have already returned data, Manning said. These hourly records from fixed locations are typically several months long.

The objective, he said, is to occupy the same sites in subsequent years in order to investigate the inter-annual variability. Participants are learning how to carefully document each deployment so that they may return to these fixed locations.

Much of this first year of operation entailed working out the logistics, Manning said. The distribution of equipment and information down through the levels of lobster foundations and associations required considerable time and effort. The resources and outreach activity was limited especially in the state of Maine where the participants are so widely distributed geographically.

Manning said that Patrice Farrey, as the interim Gulf of Maine Lobster Foundation coordinator, is in the process of wrapping-up tasks associated with the first phase of eMOLT. She has been accounting both supplies and support money associated with eMOLT I and disbursing the balance to the associations.

Association representatives are asked to be patient as this transition takes place, Manning said.

"Hopefully, in the next few months, we will turn our attention to the work proposed in the second phase of eMOLT," Manning said. "Most of the salinity probes have been delivered and at least one unit has been tested in the field (thanks to Marc Palombo).

When contacted in early February, Manning said several lobstermen have expressed interest in deploying salinity probes.

"We have thus far conducted tests on the salinity probe of choice (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.

In gathering the data, Manning is being assisted by the Atlantic Offshore Lobstermen's Association (AOLA).

"There's just very little data available on the offshore (30-200 miles) lobster fishery," said Bonnie Spinazzola, executive director of the AOLA. "When you stop and think about it, there just aren't that many researchers who are willing to get out there for three or four days at a time."

Thus, Spinazzola said, this particular project is custom made for a collaborative effort with people who are already traveling offshore on a regular basis.

The details of the project are regularly posted on the project website <http://www.nefsc.nmfs.gov/~jmanning/emolt.html>.

All the data is stored in a ORACLE database. All the temperature time series data and plots are accessible on the Internet.

Where the scallops are

Howland, Jonathan (WHOI) and Richard Taylor (Sea Scallop Recruitment Group)

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

A group of scientists at the Woods Hole Oceanographic Institute are about to begin collecting data in a collaborative research project that will develop and test a non-invasive, "real-time" imaging system in order to assess juvenile and adult sea scallop abundance.

According to Jonathan Howland, an engineer at Woods Hole, researchers are expecting to receive a CCD camera within the next few days, and they are now building a tow sled for that camera.

"What we're hoping is that we can assess the scallop stocks without dredging them up and destroying them," Howland said.

The project will focus upon Georges Bank, where Howland and others are expecting to conduct tows of between four and five knots.

"It's really going to be a learn-as-you-go project," he said.

The study is being funded by a \$200,000 grant from the Northeast Consortium, and, according to Howland, the one-year project is now in its "evaluation mode."

"We're hoping that we will be able to continue this project into next year," he said. "As an engineer, I'm particularly interested in the design and feasibility of using an autonomous vehicle versus the traditional tethered system in collecting our data."

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, according to the participants' summary report.

From there, scallop size and abundance will be recorded and displayed, along with sampling statistics, as the vessel steams in a defined grid pattern.

The project group is hoping that the real time data will be used in an adaptive sampling scheme for routine scallop surveys and closed area rotational management.

Richard Taylor of the Sea Scallop Recruitment Group is assisting the research team with the project.

Talking with Taylor

In November, Rebecca Clauss of the Northeast Consortium conducted a series of e-mail interviews with Taylor about the project's status

and goals. The following is a portion of those interview transcripts:

Why are the three areas, closed area I (GSChannel), HAPC - closed area II (NE edge of Georges Bank), and closed area II (southeastern part of Georges Bank) of particular interest for this study? Are these areas linked in terms of developmental phases of the scallop?

"There is a general inflow of water into the Gulf of Maine through the Northeast Channel, between the eastern end of Georges and Browns Bank, because of the southwesterly counter-flow (to the Gulf Stream) of the Labrador Coastal current, resulting in the counterclockwise flow overall, southwesterly along the Maine coast and southerly along the New Hampshire and [Massachusetts] coasts.

"The sill structure between the Nantucket Shoals and the western end of Georges acts as a spillover release area for the incoming waters. Generally, the Gulf of Maine waters get stratified in the summer (so that there is a pycnocline and thermocline) while the waters on Georges and in the Great South Channel sill area are turbulent and well mixed. Larvae from the GoM back up against the GSC front, are concentrated, and brought to the bottom by the mixing action. Also the finer sediments are washed away there, giving good settlement substrate."

When spat aggregate at frontal boundaries, do they concentrate on the warmer side of the front? What is the cause of these thermal frontal boundaries (tidal, seasonal warming, etc?). Are the greatest spat concentrations (generally) found at the pycnocline?

"The exact location(s) of greatest concentration(s) is not really going to be addressed by this phase of the project, but is of great interest and (it) is planned for a follow-up effort.

"Spat collection gear has a higher likelihood of survival in areas that are off limits to mobile gear. The three collector site locations that are inside are historically areas of repeated recolonization of scallops. If you think about it in a larger sense, all small creatures are carried along by the powerful forces of these currents and so will be subject to these same 'physical forcing factors.'"

At what age do adults settle? What conditions are idyllic for adult scallops when settling?

"Larval scallop go through several metamorphic changes while in their pelagic stage and by about 40-50 days from fertilization are large enough (~230-250um, about the size of a grain of pollen), perhaps more importantly heavy enough or have enough mass to sink through the pycnocline (if there is one), and most importantly have the capability of byssal attachment by having developed a 'foot', the organ used to attach the byssal thread. By then, their shells are forming and their specific gravity is more than that of sea water. Without attaching they would be swept along in the tide and current like dust in a hurricane.

"Previous to that time they seem not be able to penetrate the cooler denser (saltier) water below the pycnocline (again if there is one) somewhat like how it is difficult for us to sink in the Great Salt Lake with its high salt content given our body density or specific gravity. For substrate, they seem to have better survival success on larger grain sands, gravels, shells, and small rocks. The exact nature is 'poorly understood', we have little mostly dredge survey and fisherman's accounts about substrate to go on.

How will [this project] help fisheries management decisions?

"[The] primary reason is to determine time of spawning as an indicator for when to set out spat collectors. The GSI increases over time as the gametes mature before spawning, then subsides as they are released. Generally, it is thought that spawning is a fall activity, however; there is evidence that there is a primary spring spawning in the mid-Atlantic. From our first results in spat collection there is possibly a spring spawning on Georges, as well.

"All this is basic science, there have been variable results from many studies, and it is entirely possible that inter-annual differences are major.

"The second important rationale for the GSI is to set the timing of scallop fishing. To date, the timing of access to areas where scallop populations have rebuilt [Southeast Part Closed Area II (1999), Middle section of CLAI(2000), NE corner NLSCA(2000), Hudson Canyon and Va. Beach(2001)] have been based on avoiding bycatch of other species.

One result of this (NLSCA) was opening the area directly before spawning time, thereby foregoing the reproductive potential of the removed (and potentially the other locally disturbed) animals.

"For example, if the amount removed was a million pounds and they were 10 meats per pound, that would imply 10 million animals were taken. If half [of those] were females, and we use the 200 million eggs per female discussed in the literature, then we have just reduced the number of larvae by: five million times 200 million or 1,000,000,000,000,000 potential animals.

"By way of comparison, this year's record landings will approach 50 million pounds, and assuming a meat count of 30 implies 1500 million animals, a very small fraction of the larvae released from just the animals caught in that one small area, 5+ orders of magnitude less in fact. Now, of course, the survival ratio is of great impact to this lopsided comparison, but you can see the potential effects of harvesting at the inappropriate time.

"The larger question is the balance between the amount and location of the spawning biomass necessary in each an every area to increase the stock in all areas, and the amount and location of removals in order to maximize landings of the fishery."

Do you think these findings will help rotational management decisions in the future? If so, how?

"It's being used right now in development of Amendment 10 to the Scallop FMP."

What (in your view) has been the best outcome of the project?

"It's still underway, but I see the best outcome as having individuals from both industry, fisheries science (NEFSC, NMFS) and 'pure' science work together on a common problem as being the major accomplishment.

"Establishing these continuing relationships is the key to more rapidly getting where we need to go."

What were the most difficult [aspects of the project]?

"There are two problems that are difficult to overcome. First is the inertia, the major shift in focus that has had to happen to change how we move forward, how we involve, connect and communicate the issues, knowledge base, and findings from basic and new science, to all concerned parties who bring differing terms of reference, and how we integrate this information into the regulatory process, one that seems Byzantine at best to those previously not exposed to the charms of its form and method.

"These are new approaches that are developing, we do not already know how to best to accomplish these goals.

"The other aspect is that the spatial range of the species is large, from Carolina to Newfoundland, and to my mind the science needs to be all inclusive. Within the US segment, from Carolina to Georges, distances are large for collecting processing GSI samples from vessels.

"We need to integrate this collection process on the industry side, make it a routine part of the fishery, streamline the logistics, and looking ahead develop longer-term funding for the science."

What are your recommendations for future studies?

"We are well on the way to showing we can produce more scallop by orders of magnitude. In my view, as we move from a wild fishery, regulated by the politics of scarcity, toward marine farm production where volume is not a limiting factor, major focus needs to be made on control of markets, predator control, bycatch (really the interaction with other species), and the specific habitats needed to increase production of other species."

How has the collaboration worked between the different partners?

"Again in my view, it's been a good start. All parties are interested and positive. Our collaborations are still new and we are geographically spread out, without all parties having access to the net, so that quick and easy contact is not simple, familiar or routine.

And all individuals are multitasking, fishermen with their normal routines, scientists with their normal projects. Collaboration is a new concept. This aspect will take time to develop into routine communication and feedback."

Updating red crab assessments

Wahle, Richard (Bigelow Labs) and Jon Williams (New England Red Crab Harvesters Assoc.)

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

When the supply of the Alaskan king crab species became rare, large processing vessels turned their attention to the Gulf of Maine in pursuit of the New England Deep Sea Crab.

Recognizing the problem, regional harvesters turned to the New England Fishery Management Council, which implemented emergency regulations to address the situation and the danger of over harvesting the species in May 2001.

Additionally, a proposed three-year collaborative project between Dr. Richard Wahle of Bigelow Laboratory and Jon Williams, president of the New England Red Crab Harvesters Association, was started in order to do a stock assessment of the species.

"The full FMP has gone to Washington, and we're expecting it to be implemented June 8," said Williams. "We're now using the 1972 assessments, and it's time for some new information."

According to Wahle, the project is focused upon the fringe of the Continental Shelf from the Hague Line to the Hudson Canyon. Four or five vessels will be used to collect the data, and a shakedown cruise is expected to take place in April.

Wahle hopes to have his initial reports published in May, but he also says the project will likely need another two years of funding in order to be comprehensive enough.

The project received \$94,857 in funding from Saltonstall-Kennedy and a \$9,000 grant from the University of Maine Cooperative Extension/Sea Grant, Wahle said.

The emergency regulations have proven to be somewhat effective, Wahle said, serving as what he described as a "de-facto curtailing" of the large factory ships.

"The trip limits have precluded the big ships from coming in because it's no longer profitable for them to do so," he said.

According to Wahle, the New England deep sea red crab, *Chaceon quiquedens*, is one of the last unmanaged fisheries in the Northeast.

Williams' own vessel (F/V Hannah Bowden) will be used in the project as researchers use trawl and camera-based sampling methodology to determine whether abundance, size structure and sex composition of the population has changed significantly at the same sites sampled in 1974.

Williams began harvesting crabs in the Gulf of Maine in 1995, following many years of fishing in the Pacific Northwest.

"When we started the price was terrible," he said. "I hope to have something here that we can fish on for a long time to come versus just coming in to make some quick money."

According to Williams, fishermen were catching between five and seven million pounds of red crabs each year since 1995. He is expecting

the new fishery limit to be six million pounds.

During the 10 to 12-day cruises, researchers will 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, and conduct tagging to obtain much needed information on red crab growth rates and movement, and use 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, Wahle said.

The participants, including Dr. Yong Chen of the University of Maine, are hoping to work closely with NMFS fishery managers to integrate this research with the development of a fishery management plan mandated by the Sustainable Fisheries Act.

"Rick has been great to work with," Williams reported.

And Wahle said the project is receiving strong support from the industry.

"I don't see a lot of downsides to collaborative research," he said. "It's really a matter of you scratch my back and I'll scratch your back."

Experiments continue without inventor

Pol, Michael (Massachusetts DMF) and Robert MacKinnon (Mass. Bay Inshore Commercial Gear Fishermen's Assoc.

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

Although he designed them, Robert MacKinnon is no longer taking part in a collaborative research project that will continue field-testing two of his experimental gillnets.

The first phase of the project was funded by the Northeast Consortium in 2000, and the project received \$71,710 in funding this year.

MacKinnon, however, says he is now out of the business.

"I came up with all of the ideas and now I'm out of the box," MacKinnon said, citing increasing regulations as one of the reasons he gave up commercial fishing as part of the Massachusetts Bay Inshore Commercial Gear Fishermen's Association.

Paul Cohan of Gloucester, Mass., has agreed to help with the project in MacKinnon's absence, but he was unavailable for comment at publication time.

According to Michael Pol of the Massachusetts Division of Marine Fisheries, one of the experimental designs adds lead weight to an otherwise ordinary floatline; the second experimental design replaces the floatline of the gillnet with another leadline.

Both designs, Pol said, 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, Pol wrote in his summary report.

Pol said he was able to get an experimental permit to go into Block 124 (Stellwagen), but was denied access to closed areas during the first phase of the project

"For consistency and simplicity, we're limiting all of the sets to 24 hours," he said.

Pol said uncooperative weather has slowed the project, but 10 sets were completed in May 2001 and another 10 sets should be completed soon.

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, Pol said.