

Developing a Cooperative Research Agenda for Maine's Commercial Fisheries

by Robin Alden

Linda Mercer



This past year the Department of Marine Resources sponsored a unique series of meetings involving fishermen, academic and government scientists, and fishery managers. The goal was to define a shared research agenda for Maine's marine fisheries. Robin Alden and Linda Mercer summarize the results of these meetings. In doing so they address the question: "What do we need to know to properly manage Maine's major marine resources?" Alden and Mercer also conclude that the collaborative process these meetings helped to establish is one of the keys to the successful management of Maine's marine resources. 🦞

What do we need to know to properly manage Maine's major marine resources? The Maine Department of Marine Resources (DMR) has set out to develop a research agenda to initiate and encourage new research by the scientific community and fishing industry to better manage Maine's valuable marine resources.

This spring, DMR sponsored an unusual series of collaborative meetings with fishermen and scientists to start to define a research agenda for Maine's marine fisheries. These meetings built on the Gulf of Maine Aquarium's groundbreaking work convening fishermen and scientists from the herring fishery and groundfish fishery to develop research priorities and collaborate on implementing research projects. What makes these meetings novel is surprisingly simple and yet unprecedented. The meetings were non-regulatory, neutral, and inclusive. They created a safe environment for curiosity and questioning. They brought together fishermen, academic scientists, government scientists, and fishery managers as equals to explore the questions that still need research for five of the state's major commercial fisheries: clams, lobster, scallops, shrimp, and urchins.

Seven daylong meetings were held from April 25 to May 17, 2000. Meetings were held in Rockland and Ellsworth on lobster; Boothbay Harbor on soft-shell clams and shrimp; Orland on sea urchins; and Machias on scallops and clams. The meetings were convened by Linda Mercer, director of the Bureau of Resource Management at the Maine Department of Marine Resources and planned and facilitated through a contract to the Gulf of Maine Aquarium (GMA) by GMA's Don Perkins and former DMR commissioner Robin Alden. The Maine Sea Grant Marine Extension Program joined DMR in planning and providing staffing assistance throughout. Funding for the meetings was provided by a planning grant from the Economic Development Administration (EDA), DMR, and the Maine Sea Grant Program.

Establishment of research priorities was identified as a key strategy to accomplish several of DMR's agency goals as well as the King Administration's 1996 *Jobs from the Sea Initiative*. The ultimate purpose of the research priority project is to ensure that fishery management decisions are based upon the best scientific and technical information so that Maine's marine

resources are sustainable and productive. However, the articulation of an agenda will accomplish several other goals. First, by establishing and communicating a shared vision of comprehensive research needs, it should create a market for research that serves the state's needs. DMR will be able to direct internal funding decisions appropriately and identify and involve potential research partners from the broader marine science community, including the fisheries and aquaculture industries. The agenda should enable the entire marine science community to develop quick responses to outside funding opportunities on topics that serve the state's needs.

The meetings covered only five major species. Separate ongoing priority-setting exercises in herring, groundfish, and finfish and shellfish aquaculture will also be integrated into the department's planning.

BACKGROUND

Marine resources have always been part of Maine's culture. From the plentiful fish that drew Europeans here, to the codfish trade of the 1800s, to modern day exploitation of new species such as urchins and sea cucumbers, many generations of Maine people have derived their income from the sea. An estimated seventy-three species of fish, twenty-six species of whales, porpoises and seals, and 1,600 different bottom-dwelling organisms reside in the Gulf of Maine.

The Gulf of Maine supports significant commercial and recreational fisheries. Maine's annual commercial catch was valued at \$323.8 million in 1999 and ranked first in value for northeast coastal states for the sixth year in a row. The top six species were American lobster (\$184.6 million), Atlantic salmon (\$58.2 million), green sea urchin (\$20.3 million), softshell clam (\$10.5 million), goosefish (monkfish) (\$5.2 million), and sea scallop (\$4.4 million). The groundfish complex, which includes cod, haddock, pollock, flounder, monkfish, and others, was valued at \$22.2 million. Atlantic herring is Maine's highest volume fishery at 111.4 million pounds, and with a value of \$7.7 million.

Because fishermen are self-employed and often work at a number of different trades during the year, there are no clear data on employment. However,

Economic Impacts of Maine Fish Harvesting and Processing Sectors

*Prepared by Sue Inches, Director of Industry Development,
Department of Marine Resources, October 2000*

Fishing Totals:

Total number of fish harvesting licenses: 18,000
Estimated full-time harvesters: 6,000
Estimated part-time harvesters: 4,300

Seafood Processing:

Total number of wholesale dealer/processor licenses, 1999: 575
Seafood processing employment: 2,400

Overall Impact Estimates:

Direct employment, harvesting and processing: 10,550
Indirect employment: 15,450
Total employment: 26,000
Total landed value of all species, 1999: \$323.8 million
Total economic impact on state economy: \$777 million per year

Maine is first among eastern states in landed value of seafood.

Top Eight Species with Highest Commercial Value

Lobsters:

Total number of commercial lobster/crab licenses: 5,930
Estimated full-time employment in lobster fishing: 3,457
Estimated part-time employment in lobster fishing: 2,000
Estimated crew: 3,400
Value of lobster catch, 1999: \$184.6 million (all-time record)
Estimated economic impact on state economy: \$500 million

Salmon Aquaculture:

Estimated employment including processing: 1,000
Value of harvest, 1999: \$58.2 million
Estimated Economic Impact: \$116.4 million

Groundfish (cod, haddock, hake, monkfish, pollock, etc):

Total number of Maine boats reporting groundfish landings, 1998: 179
Number of Maine boats landing more than 10,000 pounds, 1998: 131
Total number of pounds harvested, 1999: 17.5 million
Total value of catch, 1999: \$22.2 million
Estimated Economic Impact: \$49 million

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recent studies conducted by the University of Maine and DMR estimate that there are 6,000 full-time harvesters and 4,300 part time harvesters out of a total of 18,000 commercial fishing licenses. Overall employment (direct and indirect) in the business is estimated at 26,000, with a total economic impact on the state of \$777 million per year.

DMR bears the statutory responsibility to conduct and sponsor scientific research in order to conserve and develop the marine and estuarine resources of the state. In the last fifteen years the agency has faced an explosive demand for its services. Three factors have contributed to this explosion:

- New fisheries such as sea urchin and sea cucumber developed in response to the global market;
- A huge expansion of federal and interstate management—now involving more than thirty-six Maine species; and,
- The growth of the aquaculture industry.

These developments have placed unprecedented demands on the scientific side of DMR.

There is also a change going on in the nature of the demand for marine science. Traditional fishery management is based on a single species approach. It assumes that controlling the catch level is the most important variable. Thus, fishery science has consisted of models that allow estimation of the biomass of individual fish species, which result in prescriptions for the appropriate level of removals. The principal role of science in agencies such as DMR has been to provide the monitoring information that allows those models to work (e.g., annual data concerning landings, size and age at capture; harvesting effort; and, in some cases, fishery-independent data on abundance as gathered through surveys).

Fishermen have never been comfortable with the traditional assessment approach to understanding what is needed for a sustainable fishery; their on-the-water observations involve many variables besides overall stock level. The current overfished status of many of the world's fisheries has led to a growing interest in new approaches to fishery management, such as ecosys-

tem-based approaches and local management, including the co-management in Maine's lobster and sea urchin fisheries. These approaches will require more involvement of the harvesters and a broader knowledge of species interactions and their environment. These include a species' dynamics at all life stages (larval as well as adult), its behavior and ecological interactions. This requires a research effort that goes far beyond the scientific capabilities and funding of any state or federal fishery agency.

METHOD

The research priority meetings were modeled on previous efforts by the GMA to establish research agendas for herring and groundfish. Drawing on the GMA's experience, the meetings were designed to be non-regulatory, neutral, and inclusive. They created a safe environment for curiosity and questioning. They brought together fishermen, academic scientists, government scientists, and fishery managers as equals. Seven meetings were held on five fisheries to achieve broad input along the coast. Four topics were chosen for each species, and scientists were invited to make a short presentation on each of the topics. In addition each was asked to write a short analysis on some aspect of the topic, or on his or her research questions for the final report.

Publicity for the meetings was customized for each fishery. Depending on the fishery, methods included direct mail to license holders, personal contact with association leaders, and posters distributed to sites in each town. All of the meetings were covered in press releases to local and statewide papers.

Meetings ran from 9 a.m. to 5 p.m., with breaks and lunch provided. Each day was divided into four sessions, each on a specific topic pertinent to the species. Each of the four sessions had the same format. First, the group spent ten to fifteen minutes brainstorming the questions they had about the resource. Then, the invited presenter gave a short presentation on some aspect of the question and on his or her major research questions about the species. After that, the group discussed the topic and the presentation, generating a list of questions that were summarized by one of the facilitators for later ranking.

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Urchins:

Total number of harvesting licenses: 954
Value of urchin harvest, 1999: \$20.3 million
Landed pounds (whole animal): 15.4 million

Softshell Clams:

Total number of commercial clam licenses: 2,100
Value of clam harvest, 1999: \$10.5 million
Estimated Economic Impact: \$21 million
Landed pounds (whole clams): 2.28 million

Herring:

Value of herring harvest: \$7.7 million
Total number of pounds harvested, 1999: 111.4 million
Estimated percentage of catch used for bait: 60%
Estimated percentage of catch used for human consumption: 40%

Scallops:

Number of commercial scallop boats: 780
Number of commercial scallop divers: 387
Value of scallop harvest, 1999: \$4.4 million
Landed pounds (whole scallops): 2.6 million

Shrimp:

Number of shrimp licenses: 570
Value of shrimp harvest, 1999: \$3.16 million

Data sources:

Licensing database, Maine Department of Marine Resources
Economic impacts: Wilson, James; Economic Impact Study, 2000
Lobster employment: Acheson, James;
Lobster Zone Questionnaire Project, 1998
Landings: National Marine Fisheries Service
Seafood processing employment: Maine Department of Labor
Portland Fish Exchange, Price and Landings Report, 1998-99

Note:

Since fishermen are self-employed and often work at a number of different trades throughout the year, there are no clear data on employment. The estimates made here use a combination of sources, such as license data and surveys to give an estimate of employment activity.

At the end of the day, one half hour was spent in an informal ranking process where everyone was given ten sticky notes to stick by the topics of their choice. The day wrapped with an oral evaluation and discussion of follow-up and ways to improve the process.

In November, the final report will be presented by the consultants to DMR. Subsequent to that, plans are under way to put the agenda on the Web and make it interactive so that the agenda will not be a static document.

PRELIMINARY RESULTS

The meetings were well-attended and enthusiastically received by those who participated. A total of 248 people attended the seven meetings, an average of thirty-five with as few as twenty at one meeting, and forty-nine at the best-attended meeting. Most attendees stayed the full eight hours. The quality of the discussion was determined by the mix of fishermen with years of experience observing their fisheries, academic and public sector scientists, and managers who came to listen and contribute their own questions.

The meetings appeared to tap a hunger for substantive, respectful exchange and questioning on these species, something emphatically expressed by both fishing industry and academic participants. The most obvious take-home message from the meetings was the fact that they were long overdue and that it is symptomatic of the problems in fisheries that this type of exchange is not an everyday event. During the evaluation session comments included, "Best meeting in 25 years"; "Why haven't you done this before?"; "This is the best fishing meeting I've ever been to"; "How will we continue this?"

The report from the meeting will not be final until September. Nevertheless, preliminary results are instructive. Two common research foci emerged from every meeting:

1. **Nearshore Oceanography.** We need to develop a better understanding of nearshore oceanographic processes. The fundamental question for fisheries is how to ensure that there continues to be a supply of young

that successfully grow up to fuel the fishery. Nonetheless, for all of the species discussed, science cannot yet fully describe the process that starts with reproduction and results in an adult fish showing up in a particular location. The species' larval stage is pelagic and subject to ocean currents and other environmental factors. If a clam, lobster, or urchin spawns in one place, it is not known where (or if) those larvae will settle successfully to create adults. Though recent advances in offshore oceanography have improved our understanding of how the Gulf of Maine functions, we need to make complementary nearshore advances in physical (currents), chemical (water quality) and biological (life stage, behavior) oceanography to understand coastal ecosystem dynamics. For fisheries where enhancement is a factor—such as clams, scallops, and to some extent lobster—these questions are even more compelling.

2. **History and Behavior.** Fundamental questions exist about larval and juvenile growth, behavior, and susceptibility to various environmental conditions for all of the fisheries. Answers to these questions are essential for understanding recruitment, understanding where the effective broodstock is, and for assessing the cost-effectiveness of any enhancement efforts.

There were also two consistent messages about research process:

1. **Research should be Collaborative and Cross-border.** Although research process questions were not on the agenda, every meeting included discussion of how scientists and fishermen should collaborate and contribute their complementary expertise and insight to the research process. There is energy and expertise within the fishing industry, and willingness to participate in both research design and execution. The

industry has a profound interest in basic biological and oceanographic questions as well as applied stock assessment research questions. Both scientists and fishermen expressed enthusiasm for collaborative work. There was also strong interest in cross-border collaboration with Canada, particularly concerning scallops, urchins, and lobster.

2. Build on Previous Work. Several areas of the Maine coast have already been studied in some depth, notably Penobscot and Cobscook bays and, to a lesser extent, Casco Bay. These projects have revealed fascinating, and sometimes startling results that lead to far more questions. Research should build on these studies and continue to be focused on these areas in order to decipher some of the basic oceanographic and life-history questions that exist for all of the species.

Many species-specific research questions were articulated and do not lend themselves to generalization. Below is a partial list of the areas of interest for each species:

Lobster

- Improve abundance estimates through an inshore Maine trawl survey.
- Understand juveniles and juvenile abundance.
- Develop emergency plans for a downturn in the event that lobster stocks decline.
- Develop better population models to interact with the federal and interstate processes.

Clams

- Understand the ecology of clam flats: water quality, successional changes, impact of digging, habitat/multi-fishery management.
- Improve assessment methods.
- Improve information exchange and collaboration.

Urchins

- Examine the biological and ecological aspects of reseeding and closed areas.
- Improve the use of larval surveys in assessment.
- Understand the ecological interactions that lead to successful reproduction and growth.
- Examine the potential of local urchin management capability and assess how this relates to questions of privatization.

Scallops

- Improve our knowledge of the biology, oceanography, and the socio-economics of enhancement.
- Complete credible gear and habitat research.

Shrimp

- Expand research concerning shrimp life history and behavior, both locally and relative to large-scale oceanographic changes, such as the North Atlantic Oscillation.
- Examine limited access issues, loss of flexibility to switch fisheries, and multi-species management.
- Assess the impact of gear on benthic communities.

CONCLUSION

The challenge now for the DMR, the broader research community, the fishing industry, and citizens of Maine is to take the next steps in implementing some of the higher priority research questions identified in these meetings. This will require a collaborative effort among all sectors to build on existing research, develop new funding sources to support research designed to increase our understanding of the complex Gulf of Maine ecosystem, and translate

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that understanding into effective marine resource management that will restore and maintain marine resources to sustainable levels. In addition, there are numerous other species for which research questions need to be identified through a continuing process. 🐟

Acknowledgments:

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Robin Alden is a fisheries consultant focused primarily on projects that develop local capacity for collaborative research and fishery management. She is also a co-chair of the Stonington Fisheries Alliance, a principle-based community alliance dedicated to the future of fishing and the community on Deer Isle, Maine. From 1995–1997, Alden was Commissioner of the Maine Department of Marine Resources. Prior to that, she was publisher and editor of Commercial Fisheries News, a regional trade newspaper she founded in 1973.



Linda Mercer is Director of the Bureau of Resource Management of the Maine Department of Marine Resources, where she manages programs in fisheries research and monitoring, shellfish sanitation, anadromous fish restoration, and marine education. Prior to joining the department in 1995, Linda was a senior biologist with the North Carolina Division of Marine Fisheries. She received her Ph.D. in Marine Science from the College of William and Mary's Virginia Institute of Marine Science in 1978.

