Sand County Foundation

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Building Knowledge Through Shared Experience

Improving Fisheries Management

FINDING A BETTER WAY

A Report on the Sand County Foundation Workshop

Improving Fisheries Management

This two-day workshop in Mystic, Connecticut on 13-15 November 2007 had an Atlantic Ocean focus and drew upon select examples from other regional and international case studies. The intent is to inform improved management of U.S. east coast fisheries.

Improving Fisheries Management

FINDING A BETTER WAY

A Report on the Sand County Foundation Workshop
Mystic, Connecticut | 13-15 November 2007

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Sand County Foundation wishes to thank the following underwriters who were among the sponsors of this workshop:

Alex C. Walker Foundation
Sand County Foundation Bradley Fund for the Environment
Brenda Christensen & Tom Barry
Kingfisher Foundation


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Executive Summary

FISHERIES MANAGEMENT in the United States and Canada is continually evolving, but never before has the momentum for change been so great. Many factors are driving this change, including the need to rebuild collapsed fish stocks; reduce waste associated with bycatch problems by adopting more selective fishing practices; change fishing regulations to reflect actual fishing practices, thus improving safety and efficiency; increase awareness of ocean ecosystem dynamics; and increase the market value of aquatic resources. The push for change is coupled with recognition that top-down, centralized management needs to be replaced by a system that encourages sustainability of both aquatic resources and fishermen's livelihoods.

As fisheries management has evolved, the role of fishermen has also changed. Fisheries managers realize fishermen have an important role in preserving aquatic resources. They need to collaborate effectively with scientists and researchers, promote efficiency and diminish waste through better management methods, realize the full economic potential of the harvest through smarter marketing strategies, and represent the interests of local communities in the fisheries management decision-making process.

Leaders in fishing communities in the United States and Canada have tried to enhance the role of fishermen in all these areas. The stories described in this report show how fishermen—working with scientists, managers, buyers and each other—are helping to improve the overall conservation and economic performance of commercial fisheries throughout the world.

The main conclusions of our report are:

1. All parties in the fisheries industry recognize change is needed: The top-down, "one size fits all" approach doesn't work anymore;

2. Fishing communities in the U.S. and Canada have an opportunity—perhaps limited—to "push the system" towards co-management of fisheries;

3. Case studies in this report offer examples of fishing community leaders—the vanguard of change in the industry—who are acting on this opportunity. The challenge is how to apply their successes more broadly;

In the United States, the reauthorization of the Magnuson-Stevens Fishery Conservation and Management Act in 2006 renewed the nation's commitment to managing its fishery resources, and opened the door to new ways to meet this challenge. In Canada, the introduction of Individual Transferable Quotas in the early 1990s opened the door for greater regulatory flexibility and efficiency. That has led to current efforts to integrate the quota management system across fishing sectors.

Case studies in this report show that transformation of fisheries management is well under way. The challenge now is to disseminate successful management methods, while avoiding past failures. Participants in the Sand County Foundation "Improving Fisheries Management" workshop in Mystic, Connecticut, in November 2007 concluded that successful commercial fisheries management requires networking among fishermen across fisheries, regions, and even national borders. But participants also recognized that managers, scientists, and environmentalists must be involved in this process if fisheries management is to be successful. For this reason, communication plays a vital role—by enhancing trust and fostering cooperative relationships and instilling a healthy sense of mutual interdependence.

The stories described in this report show how fishermen are helping to improve the overall conservation and economic performance of commercial fisheries throughout the world.

4. Consolidation of the fishing industry is creating a core group of fishermen ready to make a long-term investment in fishing. But to ensure sustainability, they will need to push for changes in fisheries management to ensure sustainability of both aquatic resources as well as livelihoods;

5. Profitable fishing operations allow fishermen to invest in the management system (e.g., through monitoring, research, quality control, etc.); and

6. Commercial fishing is evolving into a very sophisticated business, and the role of commercial fishermen in management, research, and marketing has great potential to embed a sound ethic of responsibility toward the sea and its resources. Those who recognize this change, and are able to work cooperatively with others while assuming the responsibilities of stewardship, stand to gain the most.

From 13-15 November 2007, fishing community leaders from various parts of the United States and Canada gathered in Mystic, Connecticut to exchange experiences and explore ideas on how to improve fisheries management. Participants used case studies, group discussions, and informal conversations to learn about pilot study designs and new management strategies and to discuss how to change the role of fishermen in research and marketing. Participants had a central, basic goal: Find a better way to manage fisheries.

Modeled after the Sand County Foundation workshop held in Del Mar, California, 11-13 January 2005, the Mystic workshop provided fishermen and other leaders in the fishing community an opportunity to consider their own roles in the future of fisheries management. Participants agreed that top-down, centralized fisheries management has, on the whole, not been effective: It needs to be replaced with a more flexible system based on sound science.

At the same time, participants also realized that fishermen—long held to be the principal culprits in fisheries problems—must become more aware of their stewardship responsibilities and become integral players in finding and implementing solutions. The case studies collected in "Finding a Better Way," in combination with those previously published in "From Racing to Rights" (Fahn, 2005), show fishermen have an essential role to play in governance and resource management, collaborative research, and developing innovative marketing strategies.

Brent Haglund, President of the Sand County Foundation, related the writings of Aldo Leopold—conservationist, landowner, and author of A Sand County Almanac—to the issues facing "the farmers of the sea." He pointed to Leopold's strong belief in land ethics, personal responsibility, objective science, and respect for the human and biotic community. The work of those gathered in Mystic exemplifies those basic values, as well as the principles that guide the Sand County Foundation: leadership, ecology, and economics. As Haglund explained, "Through leadership emerges the right ethic—in this case, doing what is right for ocean resources. The right ethic merges with good science and affordable economics." In the end, as Haglund suggested, it may simply be a matter of "doing an honest day's work and leaving the oceans better off . . ."

Barrett Walker, Director of the Alex C. Walker Foundation, was a co-sponsor of the Mystic workshop along with the Sand County Foundation's Bradley Fund for the Environment. In his welcoming remarks, Walker laid out the key challenge in the next phase of fisheries management: "We need to assess these successful case studies and, in turn, assess how to more broadly apply them."

This is a story about change - about finding a better way

As fisheries management is evolving, so too is the role of fishermen. The old adage about "not letting the fox guard the henhouse"—or, in this case, not vesting fishermen with a meaningful stake in the management process—is amply refuted by the stories that follow. As this report shows, leaders in the fishing community are thinking about and practicing fisheries management in a whole new way. This is a story about change—about finding a better way.

Dennis Nixon, Professor of Marine Affairs and Associate Dean for Academic Affairs, College of the Environment and Life Sciences at the University of Rhode Island, provided a backdrop for the case studies that follow. "In going forward, we need to first understand where we've been," he said. Drawing upon his love of history and the law, Nixon told the story of fisheries management in the United States.

As Nixon explained, in the early days of exploration and settlement of North America by Europeans, the principle of freedom of the seas prevailed. Fishermen operated under an open access approach, fishing wherever they chose. The principle of national jurisdiction held that if a nation could defend an area of the sea, it could claim the resources therein. During the Jeffersonian era, this equated to a three-mile territorial limit.

In the late 1800s, with a centralized government and individual states well established, the question arose whether individual states could control the fishery resources off their coasts. Nixon cited a precedent-setting U.S. Supreme Court case over fishing rights, Manchester vs. Massachusetts, in which a Rhode Island fisherman operating in Massachusetts waters claimed the right to fish there while the state claimed the right to deny this activity to a non-resident. The U.S. Supreme Court found that in the absence of federal law, the state could exercise control—with the understanding that if federal law over fisheries were developed, it would supersede state law.

The issue of territorial seas became important during and after World War II. Access to whales off the coast of Chile—and a fight over cod between Iceland and Great Britain—helped shape what became the norm under the Law of the Sea Treaty. Under this agreement, a nation could extend jurisdiction over fishery resources 200 miles from its coast. This limit extended further for undersea land subject to oil, gas, and mineral exploration and extraction. At the same time, countries accepted a 12-mile limit for their territorial seas.

Magnuson-Stevens Act (2006)

- Deadline to end overfishing – Requires Councils to establish fishery management plans specifying annual catch limits at levels that prevent overfishing and to develop and implement stock rebuilding plans where necessary. The catch limits must be established by 2010 for fisheries already subject to overfishing and 2011 for other fisheries.
- Making biological limits a priority - Mandates the establishment of scientific and statistical committees (SSCs) to provide the regional Councils with ongoing scientific advice for establishing acceptable biological catch limits that would prevent overfishing and achieve rebuilding targets, as well as to institute and use a peer review process. Annual catch limits set by the Councils cannot exceed these fishing level recommendations.
- Bycatch reductions - Requires the establishment of bycatch reduction programs which may utilize incentives for individual bycatch quotas, cleaner gear, and other methods aimed at reducing total bycatch and seabird interactions.
- Opportunity for Limited Access Privilege Programs (LAPPs) – Provides regional councils with the option of implementing rights-based management approaches through the development of LAPPs. LAPPs must be designed to improve fishing safety, fishery conservation and management, as well as social and economic benefits.
- Fisheries conservation and management fund - Calls for the creation of a fisheries conservation and management fund to help with harvest data collection, cooperative fishery research and analysis, and development of new technologies.
- Cooperative research and management program – Requires the development of a regionally-based cooperative research and management program to fund projects addressing critical needs identified by the Councils in consultation with the Secretary
- Study and testing of ecosystem management – Requires the Secretary and Councils to undertake a study on the state of the science necessary for advancing the use of an ecosystem approach in regional fisheries management, and provides for the testing of ecosystem concepts in pilot programs.
- Council membership - Establishes mechanisms to address financial conflicts of interest of Council and SSC members, and directs the development of a training course for council members, staff from the regional offices and regional science centers of NMFS, and others on various aspects of fisheries law, science, and practice.

Source: "Announcement of Legislative Development – Magnuson-Stevens Fishery Conservation and Management Act Reauthorized". National Sea Grant Law Center (MASGLP 07-007-03). March 2007.

In response to pressures from domestic fishermen to end foreign fishing off its coast, the United States enacted the Magnuson-Stevens Fisheries Conservation and Management Act in 1976, extending the U.S. jurisdiction over fishery resources to 200 miles. With this action, momentum increased to harvest the fishery resources to which the nation was laying claim. Government incentives to expand the domestic fishing fleet thus followed—resulting in overcapitalization of the fishing industry and the overfishing situation of the 1980s and 1990s.

In Nixon's view, both the Magnuson-Stevens Act in 1976 and the Sustainable Fisheries Act of 1996—which strengthened the former law—failed. "We cannot be too proud of this time period . . . There was a huge breakdown between the scientific community and the industry." Nixon attributed this breakdown to two central flaws in the original law. First, the definition of optimum yield allowed the maximum sustainable yield to be modified by any relevant economic, social, or ecological factor. Second, regional fishery council members were exempt from conflict of interest rules.

Due to these two flaws, scientifically determined catch numbers were continually lowered to accommodate social and economic interests, so that hardships could be avoided. Additionally, council members were pressured to make decisions based on the needs of the moment. As Nixon said, "They (council members) were put in an impossible situation and made bad decisions."

By the mid-1990s, environmental groups noticed violations of the part of the law requiring councils to prevent overfishing. These groups subsequently filed lawsuits to end this practice. In 1996 the Act was amended. As Nixon summarized, "Conservation was put back into the law."

In the reauthorization of the Act in 2006, the emphasis on conservation was reinforced with a statutory requirement to end overfishing by 2011. Science and statistical committees of councils are now responsible for recommending catch limits that councils cannot exceed. In turn, fisheries management plans are required to implement these catch limits and include accountability measures The reauthorization also opened the door to new management options by providing guidelines for the adoption of Limited Access Privilege Programs (LAPPs) by regional councils.

According to Nixon, "This is the last great chance we have to do successful fisheries management in the U.S. It is a tremendous challenge . . . but finally there is a recognition we are all in this together. It is an historic juncture."

North American Fisheries Case Studies

FROM DEL MAR TO MYSTIC – MAKING HEADWAY

"On the Road to Co-Management"

PETER HALMAY, SAN DIEGO WATERMEN'S ASSOCIATION
CALIFORNIA

IN SAN DIEGO, CALIFORNIA SEA URCHIN FISHERMEN have been pondering the future of their fishery and discussing the question: "If we were in charge, how would we do this?" Through their discussions they have decided that a successful management program should include three major components: collaborative research, community-based cooperative management, and marketing and business development.

As Peter Halmay, a sea urchin fisherman based in San Diego explained, "We are on the road to co-management." After attending the Del Mar workshop in 2005, Halmay worked with others to form a sea urchin fishing cooperative, one of the first such cooperatives formed in that area in many years. Although the focus now is on the sea urchin fishery, they named their organization the San Diego Watermen's Association, with the idea of ultimately including all fishermen in the area.

Schroeter of the University of California, Santa Barbara. Sea urchin fishermen collect 18 pieces of data at every site they visit, greatly augmenting the fishery database. The information is put in Geographic Information Systems (GIS) format, and will be used in a peer-reviewed stock assessment. The goal is to have this information used to regulate the fishery. The fishermen plan to formalize this approach in a Memorandum of Understanding with state regulators to "ensure that [they] would be trusted to

Sea urchin fishermen have been moving in the direction of ecosystem-based monitoring

In keeping with the collaborative research component of their management strategy, the sea urchin fishermen have been working with Dr. Ray Hilborn of the University of Washington and others on a stock assessment project for the area they fish—about six to seven miles long. Stock assessments for sea urchin populations are difficult because populations are patchy and sea urchins move. Due to this problem, the fishermen and scientists have been trying to obtain a density calibration that meets this patchy distribution pattern. The density calibration work is being done in collaboration with State of California Department of Fish and Game biologists and Dr. Steve

collect data for [their] fishery," according to Halmay. But the information gathering has not stopped there. As Halmay explained, "The sea urchin harvest is dependent on the kelp." The California Department of Fish and Game does an over-flight of the area every year, but analysis of data is a slow process. "We had the 2005 kelp data available at the end of 2007," said Halmay. To improve on this, sea urchin fishermen now use their own boats to go around the periphery of the kelp beds, tracking the information on their computers. They do this four to five times per year. The information is plotted and made available relatively quickly to both fishermen and biologists.

Diver Kenny Kinkade

It is important to continually track the distribution of kelp beds and relate the species to its environment. As Halmay joked, "'Uni' is the term for our product in the Japanese market. I am sometimes accused of having 'uni' vision." But in taking the time to track kelp beds, and record several categories of data at the sites they fish, the sea urchin fishermen have been moving in the direction of ecosystem-based monitoring

Working with National Oceanic and Atmospheric Administration (NOAA) personnel on board their vessels presented another opportunity for the sea urchin fishermen. Deep-water survey work revealed sea urchin populations to a depth of 480 feet—a population that no one had considered before because, until they move inshore, the technology is not available to harvest them. But Halmay observed, "If I were managing the fishery . . . I would put this off limits in a protected area."

The Association has been focusing on establishing a community-based cooperative management approach and, as Halmay pointed out, it is a matter of building social capital. "Guys at the docks have to be comfortable enough to, at times, share trade secrets and move towards taking on a collective obligation for some aspects of management." Ultimately, fishermen want to be able to establish the rules based on how they fish, and they know they will need to develop enforcement capabilities to enable that to happen. Association members have begun to realize that, in developing a community system for management, they will also need to devise a means to pay the costs. Halmay noted, "We have to pay for all of this (data collection, management, enforcement) and we have to find a sustainable way to pay for it."

The problem of how to finance such a management system is related to marketing and business development. Right now the sea urchin fishermen sell 95 percent of their product to just one distributor. They realize they need to increase their distribution channels and improve product quality and variety. To accomplish this, members of the Association have been working with local restaurants to include specials on their menus featuring sea urchins. They have also experimented with temperature-controlled tanks on land, and underwater cages for feeding sea urchins, to improve quality control.

As Halmay observed, "For too long we have stopped fishing at the water's edge. We are not used to working on land but we need to start going inland with our sea urchins to make money."

Looking at the bigger picture, the San Diego Watermen's Association has been making headway on all three strategic fronts. But now they need to figure out how these individual projects fit into a long-term strategy. They also need to continue collaboration with scientists, state and federal agencies, environmental organizations, and private foundations. Still, the journey to co-management is under way.

"Stewardship for One's Own Backyard"

LEESA COBB, PORT ORFORD OCEAN RESOURCE TEAM
PORT ORFORD, OREGON

IN THE REALM OF FISHERIES MANAGEMENT, people tend to organize themselves around specific fisheries or gear types. But in Port Orford, Oregon, a small town located along a remote section of the southern Oregon coast, the approach is different. Instead, the whole community—fishermen, city council members, port commissioners, local residents—have been focusing on stewardship of its ocean resource. In Port Orford, a sense of place very much permeates the discussion of local fishery issues.

Port Orford is located along the open coast without a natural harbor nearby. Fishing vessels are lifted out of the water and dry-docked every day after unloading their catch to protect against storms. Due to this situation, boats operating out of Port Orford are smaller (< 40 feet) than many fishing vessels. Nevertheless, their size enables fishermen to access the reef ecosystem directly off their coast on a daily basis. They depend on a variety of fish species and fish accordingly, rotating on a seasonal basis.

Leesa Cobb, a member of the Port Orford Ocean Resource Team, participated in the 2005 Del Mar workshop and attended the Mystic workshop to report on the Team's progress. According to Cobb, the Team has experienced successes and disappointments, but her report revealed the Team's resolve to stay organized and move forward, giving the local community more of a voice in resource management decisions.

As Cobb explained, the Port Orford Ocean Resource Team was formed in 2001. The purpose of the Team was to help fishermen and community members develop and implement a strategic plan for the local marine ecosystem and the social system that depends on it. She said when the project was first started, "Fishermen felt disenfranchised from the management process. Outside people did not understand our issues. Meetings were held far away, and our community felt isolated."

In forming the Resource Team, fishermen and community members incorporated the best science and local knowledge they could obtain into the decision making process, as well as input from the local community. They also mapped out a stewardship area off the coast encompassing their traditional fishing grounds, and developed economic and ecological goals for the designated area. In addition, they formulated principles to guide the management process.

Cobb noted, "Mapping out a stewardship area made our project suspicious in the eyes of the rest of the state. It makes neighbors to the north and south nervous. But we fish where we live."

Their goal was to increase flexibility in the "one size fits all" approach to fishing regulations set up by federal and state fisheries managers. The local community wanted to ensure sustainable fisheries but also promote jobs and owner/operator fishing practices in their community.

Information has been critical to these efforts. The Resource Team has been working on organizing a port sampling project aimed at gathering biological data such as spawning times specific to their near-shore fishery. Such information is important in considering specific time and area closures.

They have also used socioeconomic data collected confidentially from members of the local fishing community to create a community profile. The Resource Team developed a report that included cost, earnings, labor, and a geospatial analysis—all information that is useful in assessing impacts from area closures and substantiating decisions about the management process.

In recent efforts, the Team worked on a halibut proposal for submission to the Pacific Fishery Management Council (PFMC). When fishing for halibut, the small boats in the Port Orford fleet found themselves in a fishing derby, with

the fishery open for just ten hours. Harvest of the allotted quota for the fishery in such a short time resulted in a large closed area off their coast that has had an impact on the Port Orford community.

The Team worked with scientists to review local stock assessments and developed a more flexible set of halibut fishing regulations for their area. They received, initially, state support from the Oregon Department of Fish and Wildlife (ODFW). However, when it was time to present their proposal to the Pacific Fishery Management Council, the ODFW pulled support. According to Cobb, "This was one of the most discouraging things I have ever been involved in."

Despite such setbacks, the Resource Team continues to move forward, and has begun to engage in some conservation activities such as release of spawning female rockfish and follow-up tagging studies to find out if they survive. In addition, the Team conducted surveys to determine salmon staging areas and spatial distributions in a more area specific way. They also distributed a "Stewardship News" publication to keep area residents informed.

Outreach is an ongoing process. As Cobb says, "We are always trying to bring fishermen into meetings. We try and build consensus in our community for moving forward."

"Acting on Core Beliefs"

CHRIS BROWN, RHODE ISLAND COMMERCIAL FISHERMEN'S ASSOCIATION PT. JUDITH, RHODE ISLAND

FINDING SOLUTIONS TO PROBLEMS AND CREATING CHANGE is not easy. As Chris Brown, President of the Rhode Island Commercial Fishermen's Association reflected, when he attended the Del Mar workshop in 2005, he saw what other people had been accomplishing and he "was in awe of what they had done." He came away from that experience armed with many ideas, all of which he felt were consistent with the core values of his organization. He was inspired and energized, but the journey has been anything but easy.

He and others started work on the Rhode Island Fluke Conservation Sector Allocation Proposal. It was based on a pilot project that would allocate quota to a sector or group of fishermen who would be able to fish the allocation according to their own plan. Its goals included giving fishermen more flexibility in catching their harvest, ending the race to fish, increasing the efficiency of individual fishing operations, and lessening safety risks at sea. Most importantly, the proposal was aimed at helping reduce the bycatch problem in the fishery, a problem exacerbated by current input control management practices.

That was two years ago. But what a difference time makes. In a recent vote, the state Fluke Advisory Panel agreed to have the Rhode Island Marine Fisheries Council review the fluke sector allocation project. In addition, at the regional level, the New England Fisheries Management Council is considering 18 different sector allocation proposals in the groundfish fishery.

Why the turnaround? In rethinking its strategy, Brown's group realized that following the law and good management are not equivalent. As Brown stated, "There is a great deal of difference between simply satisfying the law and doing a good job managing fisheries and making it profitable for fishermen . . . Therein lies the essence of our battle today."

There is a great deal of difference between simply satisfying the law and doing a good job managing fisheries and making it profitable for fishermen . . . Therein lies the essence of our battle today.

As Brown recalled, his organization developed a proposal and presented it to the Rhode Island Department of Environmental Management, which in turn encouraged the group to present it to the Rhode Island Marine Fisheries Council. But, as a colleague of Brown observed, he and the others had "failed to do adequate battlefield preparation." Brown said, "I thought it was a good idea and I still do, but I got chewed up and spit out and it was not pretty." Adversaries called for free and open fisheries and criticized Brown and others for trying to privatize a public resource. Brown's opponents took their attacks to the local newspapers, and ultimately the proposal failed to win the approval of the advisory committee.

In the fluke fishery, fishermen know there is a big discard problem. Management has been responding to declining stocks by lowering the Total Allowable Catch (TAC) limits. But that was not solving the waste problem. Fishermen needed the ability to fish in a flexible way to avoid bycatch problems, and the first step was to convince fishermen to accurately report the fish they were discarding. Stock assessments needed to reflect the problem and take into account the real discard mortality going on in the fishery. As Brown explained, "We had to show that the management of the day was ineffective and wasteful even though it was

satisfying the law." Their efforts revealed the previous discard mortality figure of five percent, which was being used in stock assessment calculations, should have been 45 percent. Discovering this discrepancy opened the door for considering new management options.

In the interim, proponents and opponents of this particular sector allocation idea have both been making concessions and working together to solve problems. For example, full-time commercial fishermen have agreed to avoid fishing their part of the allocated quota in hot spot areas where recreational and near-shore fishermen do their best fishing. Such concessions have helped reduce mistrust and made it easier to find solutions.

If approved and implemented, the sector allocation pilot project for fluke will have to be carefully evaluated at the end of a year. But Brown's hope is that "with a fluke sector and groundfish sector up and running at the same time, we will have the first full retention, multi-species, integrated bottom trawl fishery in New England. We will have accomplished something as a community that would have been otherwise beyond our reach. Others will see our success and want to join in. It will be absolutely phenomenal."

Photo: Tim O'shea

FROM DEL MAR TO MYSTIC – MAKING HEADWAY: SUMMARY

These case studies show there is much work to be done outside the government realm to enable fishermen to be effective partners in fisheries management. Much of that work involves developing working relationships among fishermen, and between fishermen and scientists. In summary, fishermen need to:

1. Share information and explore new ideas with fellow fishermen, as well as work together to solve problems;
2. Work with scientists to increase the knowledge that drives management decisions;
3. Develop leadership and other personal skills;
4. Use pilot studies before committing to a new approach;
5. Form teams with university scientists to collect data, formulate hypotheses, and direct scientific inquiry;
6. Establish fishermen panels to implement quality control over scientific proposals;
7. Improve the credibility of fishermen's associations so they can receive research funding directly and control its use; and
8. Document all research work and have credible spokespersons publicize project activities.

Fisheries Case Studies

GOVERNANCE AND REGULATION

"Point System – Alternative to Days at Sea"

VITO GIACALONE, NORTHEAST SEAFOOD COALITION
GLOUCESTER, MASSACHUSETTS

MANAGING THE MULTI-SPECIES FISHERY OFF THE COAST OF NEW ENGLAND presents some stiff challenges. Fishermen pursue about 12 different species, including haddock, cod, and various types of flounder, each with a different level of abundance. At any time it is easy for each of the stocks to become bycatch species, depending on what an individual fisherman is targeting. Having excessive bycatch then triggers more input controls, including lowering Total Allowable Catch limits and decreasing days at sea. As Vito Giacalone of the Northeast Seafood Coalition in Massachusetts observed, "Managers keep ratcheting down effort through input controls . . . We are fishing at a yield of 50-60 percent because of the inefficiency of management. We see input control as an entirely inefficient way to manage a fishery."

Giacalone operates a trawler out of Gloucester, Massachusetts and is a third generation fisherman. He also serves as a policy analyst for the Northeast Seafood Coalition, a diverse group of fishermen representing some 160 vessels. The Coalition is 100 percent industry funded.

Frustrations with the current management system are running high. As Giacalone pointed out, "The 'days at sea approach' does not associate value with any of the species that you are catching. Under the current system, management has to predict what the behavior of the fleet will be . . . how the fleet will act. If they spend so many days fishing how much of this species will they catch? It is a disaster."

Giacalone and other fishermen in the Coalition have been exploring alternative management strategies. They have been thinking "outside the box" and are trying to build a consensus in the industry around certain ideas.

One of those new ideas incorporates a "pay as you play" approach—i.e., a point system—aimed at emphasizing output controls. Under a point system, permit holders would be issued "common currency access units," or points, based on their catch history. Different values would be associated with each species, and fishermen would be able to make individual decisions on how to "spend" their points. On a fleet-wide level, the point system uses output controls by putting landings and catch trajectories into a computer model and altering point allocation on a stock-by-stock basis. In other words, managers can control the number of points issued depending on the biological impact of individual fishing operations.

One way to look at different resource management systems, according to Giacalone, is to picture the fishery as a supermarket with a door every six feet around its perimeter. For example, according to Giacalone, a "days at sea" program is analogous to shoppers having only 15 minutes to shop. Under such a system, shoppers would likely go

directly to the meat aisle, Giacalone said, because they would not have to pay extra, even though meat is more expensive than other grocery items. In contrast, a point system would limit how much a person could spend at the store, but not how much time the person could spend in the store. Each of these systems would result in different values being assigned to different choices.

Proponents of the point system view it as a way of enabling fishermen to be selective; develop efficient business and fishing strategies; and, most importantly, use the point system as a form of currency to in turn use quota to match their catch. Some people, however, question the system's ability to end the race to fish for certain species. They also question the reliability and timeliness of the model that would drive the currency value of the species points. From the National Marine Fisheries Service's (NMFS) perspective, the point system presents difficulties. According to Giacalone, agency administrators say they simply do not have the resources to implement and monitor such a system.

Fishermen in New England have also begun to coalesce around the idea of sector allocation. Giacalone points to two models of sector allocation used in New England: the Georges Bank Cod Hook Sector and the Georges Bank Cod Fixed Gear Sector. Under the sector option, fishermen would have the choice to remain in a common pool of fishermen or join a harvesting cooperative. The Northeast Seafood Coalition has been involved in helping to organize 12 of the groundfish sector proposals now under consideration by the New England Fishery Management Council.

Some people believe sectors would slow consolidation of the fleet by having groups coalesce around affinities, thus making corporate takeovers more difficult. Sectors could also help fishermen stay within catch limits. Proponents of the point system see it used along with a sector structure. Fishermen pushing for the change believe a new system could be ready to implement by 2009. But according to Giacalone, the managers disagree. "The NMFS response is we do not have the time to do something new."

Whatever the option, pressure for change appears to be mounting within the New England fishing community. As Giacalone concluded, "We are squandering economic potential because of constipated management . . . We need to improve economic output so it is enough to support the costs of management." Giacalone and others believe that the industry's growth potential is great enough to merit fishermen-funded management. They also believe the current system's inefficiency and waste may actually create an opportunity for change.

"British Columbia Integrated Fishing Process"

WES ERIKSON, BRITISH COLOMBIA INTEGRATED GROUNDFISH FLEET
VANCOUVER, BRITISH COLUMBIA

WES ERIKSON, A COMMERCIAL HOOK AND LINE FISHERMAN FROM VANCOUVER, British Columbia, opened his presentation with a dramatic slide illustrating a serious safety problem. The picture showed three crewmembers on deck—dressed in foul weather gear—precariously holding on as they waited to haul in the catch. The boat's railing was a couple feet under water and the crewmembers were waist deep in water. Erikson said, "We were down to a six day fishery and this was causing safety at sea issues as fishermen competed for fish . . . we lost seven vessels in 1987."

According to Erikson, lack of attention to safety was not the only problem. The strategy also failed to consider marketing issues. "It was like cattle farmers killing all their cattle in one week and going to market. Prices were down. It made no sense."

In British Columbia, Erikson and other fishermen are part of a multi-species fishery, catching species such as halibut, sable fish, and rockfish. Today, the fishery operates under a multi-species individual quota program, and has evolved into what Erikson calls a fully integrated fishery.

As Erikson described, the initial debate was about how to get out of the race to fish and allow more flexibility. The central question was whether or not to go to an Individual Transferable Quota (ITQ) system. Critics of the ITQ approach voiced concerns about the likelihood of high grading practices; job loss; rewarding cheaters, if the quota was based on historic catch; devastation to coastal communities; and privatization of a public resource. They also predicted doctors, lawyers, and environmental groups would buy up the quota, and suggested sports fishermen, Native American fishermen and others should change their ways first. Participants in the discussion went back and forth on the issue.

Eventually, the fishermen commenced a two-year individual quota pilot program in which fishermen were not allowed to transfer quota. As in most ITQ discussions, the initial allocation was the major stumbling block. Erikson recalled, "As we discussed different formulas, the smiles would shift around the table. We found that when no one was smiling we had probably hit the right formula." Ultimately, the ITQ system was formally adopted in 1991.

Implementation of the individual quota program helped end the fishing derby, but other problems remained. Fishermen needed a way to share fish. One fleet's directed catch was another fleet's discards. At the same time, however, interested parties wanted to maintain the autonomy of individual sectors, in order to prevent the system from becoming just one groundfish license with, as Erikson stated, "Everyone catching everyone else's fish."

These problems motivated fishermen to design their own fishing and monitoring program.

During this time, an environmental report claimed that fishermen were discarding a large amount of fish. Fishermen knew discarded amounts were not as great as claimed by environmentalists, but their logbooks could not be verified. As Erikson said, "Scientists did not believe our logbooks, with good reason. We needed to prove ourselves." Dianna Trager, of the Canadian Department of Fisheries and Oceans, warned the fishermen to "clean up their act." "We want you guys to prove you are not discarding as much as they say you are," she said.

These problems motivated fishermen to design their own fishing and monitoring program. But the process was not easy due to mutual distrust. Erikson recalled how it felt to be a hook and line fisherman with a 45-foot boat, while sitting across from a trawler fisherman with a 120-foot boat. "I did not trust him. I was not going to deal with him. I thought he scraped the bottom and destroyed the environment—but he had the fish that I needed in order

to conduct my fishery." In time, however, the fishermen learned to work together, and ultimately established a three-year integrated fishery pilot program.

Central to the program has been the implementation of a 100 percent coverage monitoring program. Fishing vessels in the hook and line sector, for example, now go to sea with two cameras mounted on board. Every fish caught—whether kept or discarded—is recorded. Trawlers, on the other hand, have observers on board. The cost of both approaches is covered by the fishermen, who see it as the cost of participating in the fishery.

The fishermen's group also developed ten guiding principles for sharing fish among sectors. Now fishermen trade over 70 species in seven statistical areas among six sectors. They are able to keep all species caught and account for all species discarded. In addition, scientists and managers are now using information in fishermen's logbooks, because it is verifiable.

The integrated fishery program—now in its second year—already has some notable successes. The halibut fishing period has grown from a mere six days to nine months. Also, the fresh market has encouraged higher quality and prices. Catch levels never exceed Total Allowable Catch, and in most cases are below it. Using knowledge of the natural history of the fish and gear modifications, fishermen are able to target the species they want, thus limiting waste. As Erikson noted, "When fishermen realized that the way they fish would cost them money, they learned how to be selective."

Erikson used his own situation as an example. According to Erikson, "It costs me about $0.09 per pound for all the fish I catch and land to have this program in place." However, Erikson also said he earns three times more money for his catch.

The profitability of the integrated fishery program, which was completely designed by fishermen, may convince others to adopt it. According to Erikson, "The fishermen made the decisions about how to design this program. The Department of Fisheries and Oceans gave us a destination and we had to figure out how to get there . . . it is now up to fishermen to sell it to other fishermen."

All in all, Erikson seems proud of this fishermen-initiated program, even though it is still a work in progress. As Erikson said, "We are accountable, responsible, sustainable, and we can prove it."

"A Campaign to Build a Sustainable Groundfish Fishery in Downeast Maine"

ANNIE TSELIKIS, COMMUNITY COORDINATOR,
PENOBSCOT EAST RESOURCE CENTER | STONINGTON, MAINE

AN INITIATIVE HAS BEEN UNDERTAKEN ALONG THE UPPER COAST OF MAINE that, in many ways, mimics efforts in Port Orford, Oregon to develop local stewardship. Like their counterparts on the West Coast, members of small, relatively isolated communities along the Maine coast from Port Clyde to Eastport, near the Canadian border, have designated a coastal area they want to place under community-based management. These residents want to take charge of their own destiny.

The Downeast Initiative (a reference to the region's traditional nickname) is a pilot project started in May 2007 by a coalition of fishermen, marine biologists, sustainable development organizations, and fishing community members. The aim of the initiative is to use community-based management to bring back collapsed fish stocks in the eastern portions of the Gulf of Maine and regain access to them.

Area residents feel a strong need to change fishery management methods. Groundfish stocks are not rebuilding in the eastern part of the Gulf of Maine as well as they are in other parts. As a result, the area has developed a dangerous, over dependency on one fishery—lobster. As Annie Tselikis, Community Coordinator for the Penobscot East Resource Center explained, "The impact of the lobster fishery in Downeast Maine is enormous. Some 89 percent of seafood being landed comes from the lobster fishery . . . 300 lobster boats dock in Stonington, Maine . . . everything is based on a lobster economy."

Fishermen in this region would like to build up the groundfish stocks to the point they can create seasonal rotational fisheries to supplement the lobster fishery and provide some local seafood security. But federal management practices, as they see it, have not been working in eastern Maine. They want to use local knowledge to develop management measures better tailored to local stocks. Protection of critical habitat and spawning areas is especially important to these fishermen.

Access to rebuilt stocks is another local concern. With the collapse of groundfish stocks, permits and boats are few. Now only two active federal groundfish permits remain in the region. Under a community-based approach, the community might buy back permits collectively. After stocks rebuild, permits could be sold again—giving small-scale, local fishermen a chance to obtain a permit.

An inspiration for the new initiative is the Stonington Fisheries Alliance, an organization of fishermen in Stonington, Maine. The Alliance was formed in 1999 to promote responsible local fisheries management based on education, advocacy, and science. An offshoot of the Alliance is the Penobscot East Resource Center, established in 2003 as a place for fishermen to meet, work, plan, and exchange information. The Alliance—as well as lobster zones created along the coast to encourage discussion among lobstermen—is the model for the Downeast Initiative.

As part of the Initiative, Tselikis and others have brought fishermen together to discuss mutual interests and formulate proposals to solve common problems. Ideally, these discussions will prepare local fishermen for Amendment Number 17—an attempt to modify the New England Fishery Management Council's Groundfish Plan.

Most importantly, Tselikis sees the Initiative as a way of "giving people hope . . . something they have not had for a long time. They feel as though they have been excluded from the discussion . . . This can give them access to the process of management . . . There is a need to look at new alternatives to managing the resource."

GOVERNANCE AND REGULATION: SUMMARY

Generating and testing new ideas; and gaining acceptance for them are essential to establishing co-managed fisheries. This process is usually fishermen-driven, thus bottom-up, and often conflicts with the prevailing top-down management model. In order to transform the system of governance, the preceding case studies make the following suggestions and conclusions:

1. Change, if it is to be accepted by fishermen, must improve both resource conditions and the economic viability of fishermen;
2. Pooling resources among fishermen and others can serve as the basis for permit buy-back programs, financial assistance for new entrants, and apprenticeship programs;
3. Improved monitoring and stock assessment are essential to community-based management programs and require trust, cooperation, and money;
4. Creativity is needed to solve complex problems associated with managing multi-species fisheries;
5. Output controls are more effective and flexible than input controls; and
6. A useful measure of success is whether fishing is an attractive prospect for future generations.

Fisheries Case Studies

MANAGEMENT OPPORTUNITIES

"Sector Management at Work"

ERIC BRAZER, CAPE COD COMMERCIAL HOOK FISHERMEN'S ASSOCIATION
JAN MARGESON, GEORGES BANK COD FIXED GEAR SECTOR

ON THE OUTERMOST REACHES OF CAPE COD, the cod fishery is at the center of attention, just as it has been since the early days of New England fishing. With approval of the New England Fishery Management Council, cod fishermen in the area have developed and implemented a sector allocation program. By doing so, they are laying the groundwork for a more decentralized approach to fisheries management.

In the sector allocation program, groups of fishermen obtain a portion of the quota and manage it according to their own plan. The goal of the program is to remove fishermen from the "race to fish," reduce regulatory discards, and allow fishermen to manage their harvests more efficiently.

According to Eric Brazer, Fisheries Policy and Management Coordinator for the Cape Cod Commercial Hook Fishermen's Association (CCCHFA), the idea of sector allocation emerged in an atmosphere of discouragement about existing management policies. "There was a growing feeling of despair. Fishermen felt they were being regulated out of existence . . . they felt they were not being heard and they felt they needed better representation."

Paul Parker, current Executive Director, worked with the fishermen members of CCCHFA to change policy. Internally, the hook and line portion of the Georges Bank cod fishermen developed a sector allocation proposal that would assign them a portion of the total quota for cod, based on historic catch records. In 2003, the New England Fishery Management Council (NEFMC) approved the plan and the following year the Georges Bank Cod Hook Sector began operating.

Subsequently, the Georges Bank Cod Fixed Gear Sector—those fishermen using both hook and gillnet gear ("fixed gear")—got approval for its own sector plan from the NEFMC in 2006 and received its allocation the same year.

Both sectors operate as 501(c)(5) organizations. They both have bylaws, including an elected Board of Directors; an infractions committee; defined penalties; and fee structures. In addition, each sector has a manager whose job includes monitoring sector activities and reporting to the National Marine Fisheries Service (NMFS). Brazer, who serves as manager for the fixed gear sector, discussed the importance of these functions: "We feel there is a lack of accountability in New England. We have come to realize that in order to manage ourselves we need to be able to quickly, accurately, and transparently report and monitor ourselves." Under the system, fishermen must report catch data to the sector manager within 48 hours of landing, and the manager reports monthly to NMFS how much cod has been caught and what has been discarded. As each sector approaches its Total Allowable Catch, reporting frequency increases from a monthly to a daily basis.

Photo: Sue Linnell

This system is a big improvement over the past. Under the old system, the quota was frequently exceeded since NMFS sometimes went months without receiving current catch data. The sector system has also helped in other ways. According to Jan Margeson, a gill-net fishermen and member of the Fixed Gear Sector, sector allocation "has helped tremendously with the bycatch problem. Sector allocation was our way of taking care of the bycatch."

In the past, fishermen in the gill-netting area of the fishery would go to sea, set their nets, and return another day. The system was extremely wasteful. As Margeson explained, "When the fish arrive in an area, you might have five nets set and ready to pull in. Sometimes you caught your daily trip limit in the first haul. But the other nets needed to be pulled." He continued, "When you see all these fish come up out of the water, and there are tons of them, you are just sick to your stomach...because you know you have to discard thousands of pounds of fish. It really turns your stomach."

Seeing such waste inspired change. Now, under the new system, according to Margeson, "When you catch fish it puts a smile on your face instead of a frown." Fishermen now have the flexibility to land what they haul and then limit their fishing accordingly.

Bringing about change was not easy, however. As Margeson said, "Getting us together was the hardest step. At the time there was no trust and a lot of animosity. We had spent a lot of years competing with each other." In time, however, the fishermen worked through their differences. The Fixed Gear Sector also benefited from the experience of the hook and line group.

According to Margeson, fishermen have needed some time to accept the new system. "A lot of people were interested in the beginning . . . but when it came time to sign the contract the number dropped. But after one year these people saw that it was working well and wanted to join."

The concept of sector allocation is starting to spread in New England. The New England Fishery Management Council now is considering about 18 different sector proposals for the groundfish fishery. At the same time, the cod sectors on Cape Cod are continuing to press for more flexibility. They would like to dispense with the restriction on number of days at sea. However, NMFS staff worry the agency doesn't have enough resources to ensure overall accountability in the fishery.

But the proverbial "genie" may already be out of the bottle as people beyond Cape Cod take this idea to their communities. As Brazer reminded the participants at the workshop, fisheries management is about managing people. "Our sector is basically built upon our community. It allows us to manage our community according to how we fish, based on what we catch, codfish, our small boats, our hook and line fleet, our gill net fleet, our day boat fleet. This concept has started to take hold."

"Scotia Fundy Ocean-to-Plate Integrated Groundfish Pilot – Steering a Better Course"

JEAN GUY D'ENTREMONT, SCOTIA HARVEST SEAFOOD, INC
NOVA SCOTIA, CANADA

FOR JEAN GUY D'ENTREMONT, fisherman and owner of Scotia Harvest Seafood in Nova Scotia, his is a family business. His wife is the bookkeeper; one of his sons is the general manager; another skippers a boat; while a third son works on another boat. D'Entremont himself oversees all aspects of the business. Now that his sons are involved in the business and the Nova Scotia groundfish fleet has adapted to the ITQ system introduced in the early 1990s, d'Entremont has more time to look beyond day-to-day business decisions, however. He is particularly interested in how to make his company—and Canada—globally competitive in the seafood business.

From d'Entremont's perspective, Canada's groundfish fishery "suffers from a lack of flexibility in the transferability of quota because the current industry is still maturing and was created in stages . . . The quota system was not created to put people together." He has spent time studying the Icelandic approach to fishery management and concludes that Iceland has a better system. Fishermen there can carry over quota from year to year and they can more openly trade quota among fleets, making the overall system more transparent, flexible, and efficient. As d'Entremont sees it, "When you are not totally flexible, you forgo yield, employment, revenue, quality, efficiency and self-reliance."

When fishermen leave harvestable fish in the water because they are running out of quota of another species, it is not efficient. But conservation concerns are very real. Looking to the future, d'Entremont warns that "if a fishery is not sustainable, fishermen might not be able to keep selling their catch for the long term . . . and if we catch too many [of an at-risk species] the regulators can close our whole fishery so we need the ability to trade quotas between the quota holders regardless of which fleet he/she belongs to."

Spurred by these concerns, d'Entremont has been working with others to improve Canada's quota system, aiming towards a more flexible approach. These efforts include participating in the "Ocean to Plate Groundfish Pilot Initiative" (d'Entremont thinks of it as the "Boat to Throat" Initiative). The goal of the program is to "steer a better course" for the Scotia-Fundy groundfish fisheries by developing a more flexible quota trading system among all groundfish fleets in the region.

Under the program, a pilot fleet has been formed, which includes representatives of various boat sizes and fishing gear types. Industry participants have agreed to ground rules for responsible fishing practices; degree of observer coverage; and quality of seafood landed. For example, members of the pilot fleet agree to follow a "land all groundfish" policy that permits no discard. They also agree to pay an access fee for observer coverage, keep accurate logbooks, land the highest quality seafood possible, and abide by internal conflict resolution procedures instead of involving politicians in disputes.

The pilot program also spells out responsibilities for the Canadian Department of Fisheries and Oceans (DFO), including allowing transfer of quotas among members of the pilot fleet, facilitating member discussions, and tracking the price and value of the catch as part of performance evaluation.

The relationship between fishermen and the DFO seems to be cooperative. Fishermen ask DFO staff, "What is the least amount of survey information you need to give us an index of abundance? Tell us what you need and we will help you gather the information and interpret it." As d'Entremont pointed out, "[Fishermen] trust that the DFO has the best people to do the science."

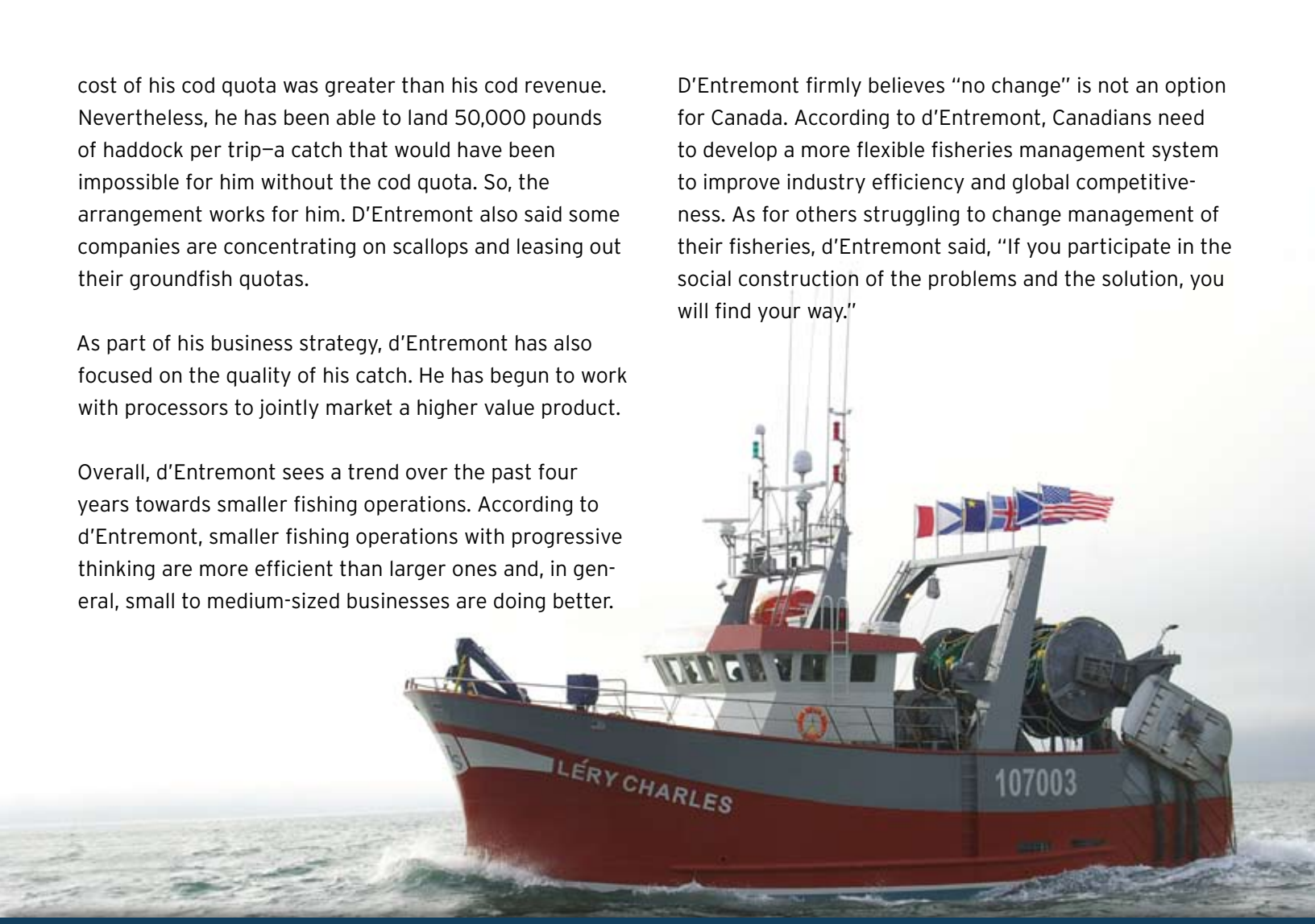
After it is approved, the pilot project will continue for a total of five years, with review beginning after the third year. Using the experience of his own fleet, d'Entremont described how the program could work. He said he uses his quota to land about 80 percent of his fish and buys the remaining 20 percent from others—an arrangement that has been profitable for him. D'Entremont also said the

cost of his cod quota was greater than his cod revenue. Nevertheless, he has been able to land 50,000 pounds of haddock per trip—a catch that would have been impossible for him without the cod quota. So, the arrangement works for him. D'Entremont also said some companies are concentrating on scallops and leasing out their groundfish quotas.

As part of his business strategy, d'Entremont has also focused on the quality of his catch. He has begun to work with processors to jointly market a higher value product.

Overall, d'Entremont sees a trend over the past four years towards smaller fishing operations. According to d'Entremont, smaller fishing operations with progressive thinking are more efficient than larger ones and, in general, small to medium-sized businesses are doing better.

D'Entremont firmly believes "no change" is not an option for Canada. According to d'Entremont, Canadians need to develop a more flexible fisheries management system to improve industry efficiency and global competitiveness. As for others struggling to change management of their fisheries, d'Entremont said, "If you participate in the social construction of the problems and the solution, you will find your way."



MANAGEMENT OPPORTUNITIES: SUMMARY

Whether it is reduction in waste associated with discards or improved efficiency and competitiveness, these two case studies highlight benefits associated with more flexible management methods and closer cooperation with other fishermen. These case studies also demonstrate:

1. Compliance with regulations such as trip limits can result in unintended consequences such as periodic discards of 50 percent or more;
2. Rigid adherence to regulations such as days at sea can drive up costs of operation and/or reduce landed value without achieving conservation benefits;
3. Limited access programs can result in sectors or fleets that are more homogeneous or heterogeneous. Fishermen need to understand the trade-offs associated with each option;
4. From an economic standpoint, a fully integrated operation with the flexibility to maximize catch per unit of effort and landed value across a multi-species complex will be the most valuable;
5. Fishermen must be willing to invest in state-of-the-art technologies such as super chillers that can preserve unfrozen fillet quality for up to 15 days after being caught; and
6. In maturing quota fisheries, such as in Iceland and parts of Canada, smaller operators can out-compete larger boats on the basis of efficiency and flexibility.

Fisheries Case Studies

COOPERATIVE RESEARCH

"The Eliminator Trawl – Gear Solutions Using Collaborative Research"

KATHY CASTRO, RHODE ISLAND SEA GRANT PROGRAM
UNIVERSITY OF RHODE ISLAND

GROUNDFISH FISHERMEN IN NEW ENGLAND FACE A MAJOR PROBLEM. The fishery comprises commingling species, of very similar size and shape, which are very different in abundance. As a result, fishermen targeting an abundant species often inadvertently catch depleted species.

In the case of haddock and cod, the problem is how to catch haddock—a fully recovered, available species—without also catching cod, which is still in need of rebuilding. By regulation, fishermen must forgo catching and landing the available quota of haddock due to the discard limits for cod. In essence, cod has become the limiting factor in catching haddock.

The economic impact of forgoing the haddock catch due to cod bycatch limits is substantial. Data analysis by researchers at the University of Rhode Island Sea Grant Sustainable Fisheries Extension Program shows that from 2002-04 lost haddock revenue was $37 million. As Kathy Castro, Director of the Program, explained, "The question was how to find a way to fish selectively to recover the value being lost in the haddock fishery without causing more damage to the fish we did not want to harvest."

To solve this problem, Rhode Island fishermen Phil Ruhle Sr., Phil Ruhle, Jr., and Jim O'Grady decided to use large-mesh squid nets to fish for groundfish instead of traditional six-inch mesh groundfish trawling nets. The fishermen knew from years of experience cod tend to go low in the net along with flounder and skates, while haddock tend to go higher. Their idea was to use the large mesh in the lower part of the net as an escape mechanism, enabling cod and other fish they were not targeting to escape back into the water column.

The squid net had eight-foot meshes in the wings, forward side panels, jibs, and a lower bottom belly. The webbing size decreased to the legal six-inch webbing. A two-panel kite was found to give the net a better shape than using traditional floats for the vertical opening. The major change they made to the squid net was using a rockhopper sweep so the net could function more efficiently in the harder bottom groundfish inhabit. The rockhopper sweep design was unique because the large rockhopper discs were spaced two feet apart so that bottom contact was minimal. This provided additional space for bottom-dwelling fish to escape and reduced habitat impact. These modifications, they hoped, would enable them to fish cleanly—bringing on deck primarily the targeted species, haddock.

Jon Knight (the Eliminator designer and builder) and the fishermen used their own money to construct a model and explore the net's potential at the Marine Institute of Memorial University in Newfoundland. The idea showed promise. As a result, they modified the squid net to work on the harder bottom of Georges Bank. Then they needed an experimental design to test in the field and, if successful, a way to change restrictive regulations.

The fishermen established a partnership with Castro, Laura Skrobe, and David Beutel, scientists from the Rhode Island Sea Grant Program. The URI team helped the fishermen develop an experimental design, write a proposal, and secure funding. The fishermen agreed to supply the vessels needed to test the newly designed net at sea, next to the control net.

Representatives from the National Marine Fisheries Service (NMFS) were also involved in the project from the start. As Castro carefully noted, "It was very important to have NMFS involved in the beginning so in the end there could be changes in the regulations."

The data tell the story: In the normal net, different species were caught, including cod and haddock. In the experimental net, the target species, haddock, was caught with very few bycatch species. The catch was considered "clean."

The experiment is producing results. The New England Fisheries Management Council (NEFMC) approved the use of this net. As a result, the NMFS Northeast Regional Office is considering changes to its rules for days at sea and access to closed areas in connection with using the net. Gear researchers from Great Britain have also bought an Eliminator net to test in their North Sea haddock fishery. In addition, funds have been received to test two smaller versions of this net in the inshore waters of the Gulf of Maine.

The NEFMC is considering using the report from this project as a model for organizing other fishery research reports. The project team also won the 2007 International Smart Gear Competition sponsored by the World Wildlife Fund. The competition was created to "inspire innovative, practical, cost-effective ideas that allow fishermen to fish smarter—to better target their intended catch while reducing bycatch."

The experiment also yielded some important lessons in collaborative research. The Commercial Fisheries Research Foundation, set up through the foresight of a few members of the Rhode Island Commercial Fishermen's Association (RICFA) and other Rhode Island groundfish fishermen, served an important role. It partnered with the university to administer the project and received revenue from fish sales during the project. This revenue funded a one-week research trip and subsequent outreach programs. As Chris Brown, president of the Association, said, "The Research Trust Foundation has been our crowning achievement. And having that association with the University helped us be more responsive."

Perhaps most importantly, the experiment showed the value of a team approach. The fishermen saw a problem and proposed a solution. University scientists helped develop, implement, and analyze results from the experiment. They also ensured the experimental design could stand up to scientific peer review. NMFS scientists were involved from the start to ensure that the experiment produced valid evidence that could be incorporated into the management system. As Castro pointed out, "These types of collaborative research projects need to be based on trust . . . and they need to be built to use the strengths of each of the groups."

"Fishermen and Scientists Research Society – A Proven Model for Effective Collaboration"

PATTY KING, FISHERMEN AND SCIENTISTS RESEARCH SOCIETY
NOVA SCOTIA, CANADA

THE FISHERMEN AND SCIENTISTS RESEARCH SOCIETY, based in Nova Scotia, is a non-profit organization that—as its name suggests—emphasizes research collaboration between fishermen and scientists.

According to Patty King, general manager of the society, "Scientists recognized that fishermen had a lot of valuable experience and knowledge. But the challenge was they were having difficulty using that because it was considered anecdotal information. They had to find a way to get that knowledge into the system of fisheries science in a way that could stand up to peer-review."

At the same time, scientists—especially government scientists—realized they needed to work with fishermen to gather new information. With limited government resources to support research, scientists need fishermen's help to identify research priorities, collect data, and take them out on the water in their vessels. In addition, as King pointed out, "Fishermen teach scientists how to talk in a way that can be understood—instead of in terms of complex models."

Fishermen teach scientists how to talk in a way that can be understood—instead of in terms of complex models.

The Fishermen and Scientists Research Society, in operation since 1994, has 396 members, including fishermen, government and private sector scientists, and other interested individuals from Atlantic Canada and beyond. The Society's overall mission is to promote collaborative research and co-education of fishermen and scientists. Its specific work centers on collecting information regarding the long-term sustainability of the area's fishery resources; analyzing and disseminating data in a timely manner; and facilitating discussion among scientists, fishermen, and the general public through various forums. The Society also trains fishermen regarding the scientific process and trains scientists how to communicate their work to the public. At times, members of the Society participate in research led by other institutions.

The Society operates in much the same way as other institutions do. Its structure includes an executive committee of fishermen and scientists, program committees, and support staff. Fishermen play a key role in setting research priorities.

Research activities that members are involved in include an inshore ecosystem project where everything that comes up in a fisherman's gear is identified and recorded; a groundfish survey off the eastern Scotia shelf; crab and dogfish sampling; and lobster research, including v-notch and tagging studies, and berried lobster surveys. Researchers and scientists have also experimented with the use of artificial collectors to measure the yearly settlement of young lobsters.

An early research project involved recording fishermen's knowledge about resource abundance and distribution. This information has been converted into GIS maps and is used to track changes in fishery resources over time.

The Society's largest project is a lobster recruitment study begun in 1999. The project's goal is to estimate the number of lobsters that will molt into legal sizes each season. The project involves the volunteer work of about 190 fishermen from ten different fishing areas in Nova Scotia. The data collected by the fishermen is being used by lobster biologists in Canada's Department of Fisheries and Oceans as part of their stock assessment process. It has been invaluable. The quality of the information far exceeds what government scientists could have obtained alone.

The Society offers a way to build trust in the data collection system. As King said, "Fishermen have told me they feel they can trust the data because they collect it themselves. If fishermen are doing the science, they believe it to be true. How can you argue about something you collected?"

At the same time, the Society protects the confidentiality of data sources, making it more likely fishermen will provide accurate information. With the Society involved, government scientists consider fishermen's logbook information differently. The data is viewed as credible and reliable. In turn, the Society is able to collectively analyze the data quickly and provide timely answers to fishermen's specific questions. As King explained, "We feed into the whole system—we are a valuable part of the system of management."

One thing the Society is not, however, is a lobbying group. Its bylaws specifically prohibit the Society from undertaking any lobbying, or taking positions on management or allocation issues. The information it collects and analyzes is available to all interested parties, but decisions are left up to the management system.

King pointed out that the Society faces a constant struggle for funding. It also has to work continuously to build and maintain trust among its members. But real partnerships are key to the Society's success. As King said, there is much to be gained from "scientists meeting fishermen on the wharf . . . it is a process of humanizing each group in the eyes of the other."

In Nova Scotia, scientists and fishermen have learned that it is possible to work together. They have learned how to check their vested interests at the door.

"Use of Underwater Video Monitoring"

BILL LEE, ROCKPORT, MASSACHUSETTS
CAPTAIN F/V OCEAN REPORTER

CAPTAIN BILL LEE, OWNER AND OPERATOR OF THE F/V OCEAN REPORTER IN ROCKPORT, Massachusetts, is successful in a way many people only dream of. He has, as he said, "turned a hobby into a business."

Bill Lee shoots underwater video—that is, underwater video with a purpose. He owns some 35 different cameras and uses them to shoot underwater footage related to fisheries issues and management. He works with fishermen and scientists on various projects and offers them a way to see for themselves what is really going on underwater. It is, as Lee said, "My new way of being a commercial fisherman."

A short sample of Lee's underwater footage displays a smorgasbord of monitoring and research activities. In one sequence, the viewer can watch a shrimp grate in action. Once caught inside the funnel portion of the net, shrimp tend to fall back, hit the grate and sit there. Eventually they fall through. The net portion has been modified to incorporate a hole near the top to enable the fish that have been caught in the trawl to escape unharmed. The fish, however, seem reluctant to exit through the hole. A closer look reveals why. A seal has grabbed hold of the grate and has situated itself near the net opening—a prime location for catching fish trying to escape. The video adds an unexpected dimension to the shrimp bycatch reduction effort—how to deal with seals riding along for a free meal.

Another scene shows a large piece of bait on the ocean floor with fish coming to the site to feed. This is part of a study using 52 different bait stations. For 25 minutes, the number of fish is counted. Using video offers a way to assess fish without killing them, an important consideration for species in need of rebuilding.

Other underwater footage shows different trawls, all with variations of the standard square mesh design. The catch in each type of net is observed using on-deck monitors, and the efficiency of different designs is determined. This observation method enables fishermen to evaluate different net designs, as well as bycatch rate in relation to towing time. In each sequence, once a tow is complete, a lollipop-type device is used to open up the cod end of the net, releasing the fish while the net is still below water. This method increases the chance the fish will survive, and reduces the need for an exempt fishing permit.

Lee has also worked at the Stellwagon Bank National Marine Sanctuary in Cape Cod Bay with a team of researchers from Boston University and the Massachusetts Institute of Technology. The focus of their work was the sand lance, a small, thin, delicate looking fish that whales congregate around and feed on. In the first phase, researchers spent time evaluating a net designed to descend through the water column vertically and close when it hits the bottom. The object of the work was to find the best way of capturing the sand lance for further study in the laboratory.

In the second phase, underwater footage of the sand lance was compared to echo sounder readings to determine the reliability of echo sounders in finding the sand lance. In the process, the video captured something never seen before—sand lance leaving the sand and coming into the water column to feed on krill.

"It is interesting as a commercial fisherman to begin seeing these types of things," said Lee.

The applications of underwater video are numerous. They include evaluating the effectiveness of various fishery gear and strategies, estimating the amount of biomass in a given area, and observing the natural behavior of targeted fish. Lee also said video can be a good way to assess the impact of fishing gear on the ocean bottom, a contentious issue in the bottom trawling industry.

Depth can be a limiting factor for video, however. One problem with shooting at great depth is that artificial light is needed—but light can affect the behavior of fish. Despite this limitation, Lee has so far used his equipment to a depth of about 1,200 feet.

Lee also noted that his equipment is all home-made, low cost, and within reach of almost any commercial fisherman. For as little as $200, a fisherman can outfit himself with some basic video tools. According to Lee, taking underwater video offers a wonderful way to gain a whole new perspective on fishing, and Lee is encouraging other fishermen to get involved. With the assistance of Ken La Valley at the University of New Hampshire Sea Grant Program, Lee has produced a how-to manual for building an underwater camera system. As Lee explained, "Fishermen can use this technology to document everything—scientists cannot dispute this." And, he continued, "There is a lot of work out there."

Peter Halmay, a sea urchin fisherman from San Diego, praised Lee, "My hat is off to Bill. Fishing for knowledge, fishing for data, fishing for fish—it is all fishing. This is the type of thing fishermen need to be a part of."

COOPERATIVE RESEARCH: SUMMARY

These examples prove there is much to be gained from scientists and fishermen working together. Whether they are trying to reduce bycatch and fish more selectively, improve stock assessments, or gain a better understanding of habitat and ecosystem dynamics, fishermen and scientists can accomplish more working together than working as separate groups. Some keys to successful collaboration are:

1. Everyone should recognize and respect the strengths and weaknesses each member of the research team brings to the investigation;
2. Researchers should value the "real-time" monitoring capabilities of fishermen. They should also value information from fishermen regarding how well regulations are actually observed at sea;
3. Fishermen should be involved in directing research goals and setting priorities;
4. Fishermen should help communicate the results of collaborative research to the fishing industry and the public;
5. Researchers should make research results—even if preliminary—available to team members as quickly as possible;
6. Scientists should adhere to data confidentiality rules, where applicable, and publish only generalized or aggregated data sets; and
7. Researchers should involve relevant state or federal agency staff from the beginning in collaborative science projects with potential regulatory implications.

Fisheries Case Studies

QUALITY AND SEAFOOD MARKETS

"Directed Seafood Marketing Program"

AMY GRONDIN, COMMERCIAL FISHING OUTREACH CONSULTANT
PORT TOWNSEND, WASHINGTON

WHEN IT COMES TO FOOD, SOME SAY PRESENTATION IS EVERYTHING. What appeals to our eyes, appeals to our stomachs. A pan-seared fillet of fresh salmon served with fresh morels and a reduced vinaigrette sauce sounds delicious, looks delicious, and as Amy Grondin of Port Townsend, Washington attests, is delicious. But the chef preparing the dish and the person eating it for the first time may have to overcome a certain bias: The salmon fillet at the heart of the dish does not exhibit salmon's typical red color. Instead, the salmon is actually light colored, with a marbled flesh. Grondin's challenge over the past several years has been to overcome this bias, as she promotes a local, freshly caught but slightly different fish product.

Grondin lives on the Olympic Peninsula in Washington, but spends about three months each year on a 76-foot Power Scow, the M/V Angie, off the Alaska coast with her husband. They buy salmon from commercial salmon harvesters and run the salmon to on-shore markets. At the start of each fishing season, they leave Washington and travel up the Inside Passage to the fishing grounds. For the remainder of the year, Grondin works with nonprofit groups in Washington, helping local fishermen and communities develop and market their local products.

As buyers of Alaska salmon, Grondin and her husband have learned a lot about quality standards for salmon. Alaska has a quality grading system for salmon, something absent in the lower 48 states. As Grondin said, "This helps ensure salmon coming out of Alaska is of high quality." She continued, "Back in Washington, some fishermen are working very hard to provide high quality fish for market, but others are not working as hard. It is important to sustain the reputation for a high quality product."

In the case of marbled Chinook salmon, the unique flesh coloration comes from a genetic anomaly—not what the fish eats or how it is handled. Between 30-60 percent of salmon caught along this portion of the Washington coast have marbled flesh, but it is not something you can detect from the outside. The challenge has been to educate local chefs, fish buyers and consumers that this type of fish is every bit as good as the typical red salmon.

To accomplish this, Grondin and others organize a lunch featuring the marbled salmon at the start of each fishing season. About 45 food writers, local chefs, and seafood producers attend the PR event, which has received good coverage in newspapers and magazines. The fishermen in the area are particularly excited to see their fish featured in this type of setting. Grondin observes, "The fishermen go back and take so much more pride in the work that they are doing bringing this fish to market . . . They are putting more effort into the quality of the product."

The approach seems to be working. When Grondin and others began to promote this product in 2004, marbled salmon was only about $0.35 per pound compared to dollars per pound for red salmon. But the price has increased. Red salmon now sells for about $4.50 per pound with marbled salmon selling for $3.50 per pound.

So why not aim big? Why not, for example, market this particular type of salmon at a place like the Boston Seafood Show? According to Grondin, "The problem is that the catch is small. If we market it too widely, we would not be able to meet demand." And there is also the issue of quality. She said, "We want to market fish that did not have to get on a plane to get there." For now, getting local chefs to realize that they have a very good local product only three hours away is the goal. Ultimately, having this fish absorbed into the Seattle marketplace, as Grondin said, "would be wonderful."

The fishermen go back and take so much more pride in the work that they are doing bringing this fish to market . . . They are putting more effort into the quality of the product.

The long-term goal is to have the ex-vessel price per pound for marbled salmon be on par with red salmon being caught at the same time, so every fish caught, marbled or red, is landed and brings money to the local communities. A high value for the marbled salmon would prevent the high grading of fish on the fishing grounds, i.e., the unsustainable practice of throwing back fish with a lesser value so landings only comprise high value fish.

So, next time you are in this particular area of Washington State you might ask for the marbled salmon fillet. Bon appétit!

"Serving Up Shrimp with Prayers"

JENNIFER PLUMMER, NORTHWEST ATLANTIC MARINE ALLIANCE
SACO, MAINE

FRESH SHRIMP ALONG WITH YOUR SUNDAY PRAYER SERVICE – in most places the connection would not seem commonplace, but in Rockland, Maine it is on its way to becoming routine. From mid-December to mid-March, near the end of the shrimping season, members of the First Universalist Church who have bought shares in the local shrimp harvest pick up their fresh Gulf of Maine shrimp in the church parking lot each Sunday morning. Along with the shrimp, they receive information on how to peel, cook, and store it. They also may get some peace of mind knowing they have helped fellow members of their community.

As a way of supporting local fishermen and promoting the local economy, church members established a partnership with the Midcoast Fishermen's Association in nearby Port Clyde, Maine to start a community-supported fishery program. The program is modeled after community-supported agriculture systems (or CSAs), in which local residents buy shares in small farms and share produce from the farm.

Jennifer Plummer, Administrative Coordinator for Northwest Atlantic Marine Alliance, helped form the partnership between the fishermen and members of the church. As Plummer said, "[With CSAs], the advantage is that it gives small, local farmers some capital to work with ahead of time instead of having to wait until the end of the harvest season. We wanted to do this for fishermen."

Members of the First Universalist Church taking part in the program may purchase a full share, equivalent to 10 pounds of whole shrimp per week, or a half share. A full share is $189.00, with a half share $94.50. The purchaser can pay the cost up front or in two installments—one when they sign up and another in the beginning of February. Economically, the system benefits both fishermen and shrimp buyers. Fishermen have been receiving a very low price for their shrimp—between $0.45-$0.49 per pound. In retail markets, shrimp sells for about $1.65 per pound. Through the community-supported fishery program, the cost to the shareholder is $1.35 per pound.

The shrimp caught in the Gulf of Maine are much smaller than shrimp from other areas The shrimp, although sweet and tender, "does not have the reputation it could have," according to Plummer.

The Northwest Atlantic Marine Alliance is working with local fishermen associations and community groups to launch these kinds of community supported fishery programs. The organization hopes to raise public awareness of the value of local seafood, as well as build relationships between coastal residents and fishermen. As Plummer noted, "The quality of seafood is connected to being harvested locally and delivered to the consumer within hours of being harvested from the ocean."

Ultimately, the aim of such programs is to strengthen the local food industry; area economy; and sustainability of the ecosystem. With these goals in mind, the Midcoast Fishermen's Association is implementing an overall marketing plan. If the shrimp pilot program goes well, the Association hopes to brand the fish they catch as local, high quality, sustainably caught seafood, and bring fishermen and consumers closer together in the market place.

Many problems must be solved, however, if the Rockland program is to expand. Right now, the Rockland program works because the shrimp are sold whole—not processed—and the manager of the shrimping cooperative in Port Clyde handles all aspects of distribution, using a local vendor's license. Expanding the operation would increase the regulatory burden substantially. But for now, it is prayers and shrimp on Sunday mornings in Rockland, Maine—a new twist to spirituality.

THE STORY OF "Catch a Piece of Maine" AS TOLD BY:
CINDY SMITH, GULF OF MAINE RESEARCH INSTITUTE, PORTLAND, MAINE
ANNIE TSELIKIS, PENOBSCOT EAST RESOURCE CENTER, STONINGTON, MAINE

IF YOU HAVE EVER CRAVED THE TASTE OF A SUCCULENT LOBSTER fresh from the icy cold waters of the Gulf of Maine and wanted it delivered to your doorstep, or wanted your own lobster trap hauled by a Maine lobsterman you know by name and face, it's now possible--even if you live in landlocked Nebraska. All you have to do is "catch a piece of Maine" to become part of the Maine lobstering experience.

"Catch a Piece of Maine" is the brainchild of John and Brendan Ready, two entrepreneurial brothers who started Ready Seafood, a wholesale lobster and seafood distribution company in Portland, Maine. As Cindy Smith from the Gulf of Maine Research Institute, and Annie Tselikis from the Penobscot East Resource Center described, the brothers grew up along the Maine coast and have been lobstering since they were kids helping out on their uncle's boat. Both returned home to Maine after attending college, business degrees in hand, to resume their passion—lobstering.

Ready Seafood has been doing well, but long hours and rising costs made the brothers wonder how they could add value to their lobster catch. They decided to try to reach people outside their immediate New England market in a novel way. After almost two years, they launched "Catch a Piece of Maine"—a program to offer the "Maine experience" to a national market.

For $2,995, customers can become lobster landlords for a year—effectively owning a lobster trap and its entire harvest for 12 months. The traps—operated by the brothers and six other Maine lobstermen—yield as many as 50-60 lobsters during the annual May-December lobster season. Customers are guaranteed at least 40 lobsters per year. The price includes free overnight shipping within the continental U.S. Customers also get other seafood items, bibs, cooking instructions, and other treats with shipment of four or more lobsters. The shipments can go to whomever, wherever and whenever the customer chooses.

The brothers are selling more than lobster, though—they are selling the lobstering experience. Customers can track the daily catch from their trap and interact online with the lobsterman overseeing their trap. The website even gives the personal history of each of the lobstermen involved in the program. In addition, customers receive a DVD with information about the company and scenes of lobstermen in action, as well as the company's monthly newsletter that keeps customers apprised of news from Maine's waterfront. Since ten percent of company profits are donated to the Gulf of Maine Research Institute, customers can also feel they are contributing to Maine's working waterfront and marine education.

Your partnership with 'Catch a Piece of Maine' is a complete experience giving you access to a lifestyle shared by only a handful of men and women along the Maine coast

According to the company's website, "Your partnership with 'Catch a Piece of Maine' is a complete experience giving you access to a lifestyle shared by only a handful of men and women along the Maine coast." Offering the whole experience—in addition to great lobster—gives new meaning to "value added" and attests to the entrepreneurial vision of the company's founders.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Quality and Seafood Markets - Other Stories Shared

EUGENE O'LEARY, FISHERMAN BASED IN WHITEHEAD, NOVA SCOTIA FISHES PRIMARILY FOR LOBSTER USING HIS 32- FOOT BOAT

EUGENE O'LEARY, A FISHERMAN IN WHITEHEAD, NOVA SCOTIA, said one of the key conclusions of a 2007 Nova Scotia lobster summit was the growing importance of eco-labeling. According to O'Leary, restaurant chains such as Red Lobster and large retail stores such as Neiman Marcus have confirmed this trend. He cited a Neiman Marcus spokesperson, who said after 18 months the company will no longer buy seafood without an eco-label. For this reason, MSC labeling—a stamp of approval from the Marine Stewardship Council—is going to become increasingly important.

In addition to O'Leary's comments about eco-labeling, he also gave examples of fishermen practicing smart marketing. He said a scallop fisherman from Guysborough County has found a market for whole scallops, shell and all, and is now selling his scallops for $3.00 each. The regulations permit harvesting 100 scallops per day.

He said, other fishermen in the Guysborough County area are working with a non-profit organization—the Ecology Action Center—and the fishermen's buyers to market sustainably caught shrimp. The first order has been made and the price of shrimp increased from $0.30 to $4.00 per pound.

Photo: CCCHFA

QUALITY AND SEAFOOD MARKETS: SUMMARY

Whether fishermen are just hoping to improve their business locally or want to be competitive nationally or globally, they need to invest time and money. The time when fishermen could focus only on fishing and getting the catch to the dock is gone. Fishermen need to find new and better ways to increase the landed value of their catch, due to intense competition both within wild fisheries and from aquaculture. With this in mind, fishermen are driven by the following considerations:

1. Price and availability are the main marketing variables; however, product quality—including freshness, consistency and aesthetics—is increasingly important;
2. Health-related factors—e.g., toxicity, chemical exposure, and processing conditions—are important;
3. Eco-labeling and seafood certification is becoming increasingly important and is driven both by big retailers and other customers' environmental concerns;
4. The trend towards "buying local" is becoming more important—spurred on by higher transportation costs, trade restrictions, climate change, and social valuation of distinct regional and seasonal foods;
5. Selling a unique experience, such as the "Catch a Piece of Maine" plan, is a model of a creative, comprehensive marketing strategy. Such a strategy suggests how high the "bar" is, in terms of developing successful, original marketing plans.
6. Introducing new products or repackaging old products in a new way are important; and
7. Fishermen should work with the restaurant, food preparation, and retail industries to create awareness and appreciation for specific seafood products and product attributes.

Conclusion: Which Way to Go

MARINE FISHERIES MANAGEMENT is at an important turning point. Commercial fishermen, in particular, are facing huge challenges in an increasingly competitive global marketplace. The stories above show that fishermen are responding to this challenge by expanding their role in management, research, and marketing. The above stories also show that fishermen's expanded role is becoming critical to successful fisheries management. Since the passage of the original Magnuson-Stevens Fishery Conservation and Management Act in 1976, U.S. fishing communities have experienced tumultuous change. Fishermen and managers alike now realize the difficulty of integrating biological, economic, and social goals into a comprehensive fisheries management plan.

The overcapitalization of the U.S. fishing fleet in the late 1970s—a result of trying to reduce foreign fishing in U.S. coastal waters—ultimately caused too many fishermen to pursue too few fish. As a result, this situation has generated a series of restrictive input controls aimed at curbing fishing and rebuilding stocks, as well as concomitant debate about stock assessments and effective management measures. These disputes have prompted consolidation of fleets and conditions discouraging people to get into the industry.

With the reauthorization of the Magnuson-Stevens Act in 2006, fisheries management in the U.S. has taken a new direction. The reauthorization has revealed a variety of new management options, emphasized the importance of science in fisheries management, and helped generate goals and mandates aimed at rebuilding depleted fish stocks.

In Canada, fisheries management in the 1970s and 1980s followed a similar pattern. Drastic overcapitalization of the domestic fishing fleet followed the declaration of a 200-mile limit, resulting in an imbalance similar to that faced in the U.S. In the 1990s Canada adopted an ITQ approach in its groundfish fisheries. Due to this situation, many Canadian fishermen are facing new challenges. Individual quota holders are now seeking a means of integrating across fishing sectors and gear types to create greater economic efficiency and maximize stock rebuilding efforts.

In both the U.S. and Canada there are new opportunities for experimentation and industry involvement which should lead to development of a better, more effective management approach. That approach includes collaborative and peer-reviewed science, flexible measures to achieve both sustainable fishery resources and economic solvency, awareness of consumer concern about sustainability, and marketing strategies that realize the full economic potential of high quality seafood.

As the pilot studies, research projects, and marketing strategies presented at the Sand County Foundation Mystic workshop demonstrate, finding solutions to fisheries management problems requires collaboration among fishermen themselves and among fishermen, scientists, managers, and environmentalists. It also requires that fishermen begin playing a new role in fisheries management—something they have already clearly begun to do.

Now is a challenging but exciting time in fisheries management. Moving in a new direction will take leadership, innovation, perseverance, collaboration, and trust. It will also require a commitment from members of the fishing community to participate in all aspects of fisheries management. The Mystic workshop and similar gatherings give fishermen a rare but valuable glimpse of what can be achieved. Seeing a hint of these possibilities is not enough, but it is an important step towards finding a better way.

Sand County Foundation's mission is to advance the use of ethical and scientifically sound land management practices and partnerships for the benefit of people and the ecological landscape.

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SAND COUNTY FOUNDATION

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