

C O M M E N T A R Y

Building a Sustainable Seafood System for Maine

By Robin Alden

Maine could have one of the premier marine food systems in the world: people working the length of the coast, on rocks, on flats, in coves, and on our nearshore and offshore waters, producing fresh, healthy, top-quality seaweed, shellfish, crabs, lobsters and fish, getting paid top dollar for their efforts and providing a flow of high-quality protein into meals in Maine and beyond.

Maine has location. The state's more than 5,000 miles of shoreline abuts the Gulf of Maine, a marine area roughly equivalent to the area of the state of Maine, 30,000+ square miles of relatively clean water and a highly productive ecosystem. Every year, the currents and sunlight and marine plankton combine to produce more for us to harvest, truly something out of nothing. It is a stunning location to build a sustainable marine food system. Indeed, the food supply from the Gulf of Maine is one of the state's greatest natural assets. In 2010 the landed value of Maine seafood was \$449 million, with a final value to the Maine economy estimated at \$1 to \$1.2 billion (Charles Colgan, personal communication, May 2011).

Despite this, fisheries are often left out of the thinking about systemic change in the food system. Understanding the reasons for this is a first step toward building a unified food system.

Fisheries start out as wild food—something wholly different from almost anything else that we consider part of the food system. Hunting and fishing is now considered sport, not food production, and aside from some mushrooms and berries, little wild product makes its way into mainstream food commerce anymore. Fishermen, the primary producers, have a unique connection to the natural world. They spend their days engaged in that primal human activity, trying to catch things, using their wits to observe and exploit the natural systems that each year, if we are lucky, produce more for them to catch—and for us to eat.

But for just this reason, fish and fishermen are often outside the ken of food-system thinking. From the land side, perhaps the marine source of supply seems too unreliable, depending as it does on the serendipity of water, temperature, sunlight, and restraint on man's greed—and the resultant bewildering myriad of regulations. And from the fishing side, with few exceptions, fishermen do not think about the size or desires of the consumer market or the order from the customer before they leave the dock. Instead, the fisherman's preoccupation is that of the hunter, figuring out how to harvest the bounty of the Gulf of Maine. The product on deck is the "catch," not food. The market is the guy at the dock—and he unloads and buys the whole trip's catch.

AQUACULTURE

Aquaculture, the marine equivalent of agriculture, is another part of marine food production in the state. Its value has varied in recent years between \$35 and \$100 million, which represents 11 to 18 percent of the state's marine landings, the variation closely tied to both variation in production of Atlantic salmon and

the price of lobster. Nationally, aquaculture has grown almost 400 percent during the 1980s and 1990s, to a level of almost \$1 billion, 20 percent of which is marine species (U.S. Commission for Ocean Policy 2004; U.S. Department of Commerce 2011). However, aquaculture is not the focus of this commentary for two reasons. First, aquaculture producers are well-aware that they are producing food and are part of both the industrial-scale food system (salmon) and the niche and high-value local food markets (oysters).

More importantly, however, the primary challenge and strategic requirement for a healthy, sustainable marine food supply for Maine is, first and foremost, adequate stewardship of the Gulf of Maine ecosystem. Aquaculture is one user of that ecosystem, but should not be viewed as the inevitable evolution of most marine food production for the state. In the short term, per acre aquaculture production looks impressive. Experience with marine aquaculture in Maine during the last 30 years, however, has brought us face-to-face with the some of the adverse consequences of intensive culture in the marine environment that present real ecological limits to this business. Salmon aquaculture is chasing cures to disease and parasites, all of which have documented implications for the health of the marine environment. And, as disease has struck the oysters in the fabled Damariscotta River, the security of the future of shellfish culture has also been shaken. Nationally, the Oceans Commission, while acknowledging the promise of marine aquaculture, also identified issues with marine governance, use of forage fish as feed, invasive species, and the ecological effects of offshore aquaculture among the concerns about all scales of marine aquaculture from local stock enhancement to ocean ranching (U.S. Commission for Ocean Policy 2004).

C O M M E N T A R Y

Maine is investing in the development of aquaculture of both native species and ornamentals, which are used not for food but for the aquarium trade. The state has identified aquaculture as one of the state's sustainable technology clusters (Maine Technology Institute 2008). Over the last 11 years the Center for Collaborative Aquaculture Research at the University of Maine has developed 200 broodstock halibut and is exploring commercial-scale, on-land halibut production. The center is also raising green sea urchins, looking to options for on-land, sea-cage-rearing and sea-ranching for commercial culture. A federally funded program to teach commercial fishermen cod farming is also underway. Downeast Institute is working on the commercial-scale techniques for several shellfish species including hard clams, sea scallops, and softshell clams. There is a place for aquaculture, if we learn from the history of agriculture and explore how aquaculture can be practiced within the limits of a healthy marine system.¹

FISH AS FOOD: NEW POLICY INSIGHTS

Viewing marine-resource products as food can put the complexity of fisheries issues into a coherent framework that makes sense for both business and the natural environment. It can assist the state to improve fisheries policy, capture more value for each pound caught, and make the bounty of the Gulf of Maine a foundation for the state's food security. Fisheries policy can emerge out of the obscure world of never-ending regulatory conflict that isolates it from the rest of the public, connecting the fishery perspective with that of "shore people," who interact with fish first and foremost as a meal. Food-

system thinking can provide some clarity to Maine fisheries policy.

Diverse, community-based seafood production should be Maine's top fisheries priority if the state is to achieve a sustainable seafood system. This focus on community-scale production is important for both ecological and food system reasons.

Ecology and Governance

First, it is important to understand that there are two basic approaches to fishing: highly mobile or local. The highly mobile fisherman fishes abundance, moving from area to area wherever there is lots of product. The local, or community-scale fisherman stays within range of his or her own harbor, fishing a smaller area, usually shifting between species depending on seasonal availability and local abundance. Much of the tension within fisheries management occurs in the push-pull between these groups as they compete for access to resources.

The real challenge for the state, however, is to make sure fishermen don't destroy the resources. Small or large, local or centralized, the bald fact is that with no fish, the state will have no fishermen, no processing, no Maine seafood.

New science has introduced a critical ecological reason for focusing on more local fishing and management of marine resources. Our understanding of ecological scale in marine science has advanced dramatically in the last 30 years. In the 1970s when the federal Magnuson Stevens Conservation and Management Act was passed, the common scientific wisdom was that marine systems were large, open systems. It was thought to be necessary, for example, to manage all the cod from Eastport to Cape Cod as one unit. Now, however, marine science has not only revealed far more local stock structure in

marine populations than previously understood, but that those local structures and events often exert the dominant influence on the species. The local "ecosystem dynamics create stronger intra- and inter-specific interactions within local modules...than over the much larger footprint of the entire ecosystem" (Steneck and Wilson 2010: 410). Within the Gulf of Maine, for example, it is now known that smaller subunits of cod have extensive genetic, physical, and behavioral differences (Ames 2004; Cadrin et al. 2009; Kovach et al. 2009; Steneck and Wilson 2010).

When management is done at the Gulf of Maine-wide scale, per the 1970s thinking, however, the management structure favors highly mobile boats and these localized subunits can be fished out in what is called serial depletion. This is what has occurred off the Maine coast in the last 30 years. In waters off eastern Maine and other inshore grounds, groundfish have been depleted and have not recovered, despite recovery off southern Maine and New Hampshire, probably the result of localized ecological phenomena or the extirpation of local populations of fish (Cadrin et al. 2009).

When serial depletions are taking place, neither the management system nor the fishermen receive feedback about these depletions: When catches go down, fishermen simply move on to areas of higher abundance. Because catches are being measured at a larger scale, spread over the areas, management science may not recognize the depletion, and because fishermen are still fishing, managers will not have to grapple with the implications of the depletions. This approach favors boats that adopt a highly mobile strategy, moving from one area of abundance to another. This strategy is described, using a term from economics, as "roving banditry" (Olson 2000).

COMMENTARY

A counterexample to this is lobster where there is a level of local governance that better matches the finer-scale ecology. Recent science has also shown fine-scale ecological complexity for lobster. For example, instead of lobster larvae drifting great distances, creating one big lobster population as previously thought, there are local “hotspots” where eddies keep the floating larvae near where the eggs were released, thus resulting in local production (Steneck and Wilson 2010). Maine’s lobster management has several local elements that operate at close to this ecological scale. The fishery is traditionally territorial and based on day boats. Maine created an additional level of local lobster management, nested within state management, through creation of seven local zones. The local lobster zone rules are nested within statewide rules, then regional rules developed with other lobster-producing states within Atlantic States Marine Fisheries Commission, all working with the federal government (Acheson 2003; personal experience).

Given the complexity of marine ecological systems, multi-level governance is always required. “... the various approaches used together can slow down the roving bandit effects, and can replace destructive incentives with a resource rights framework that mobilizes environmental stewardship, i.e., one that builds the self-interested, conserving feedback that comes from attachment to place” (Berkes et al. 2006: 1558).

Without state policy that pays specific attention to preserving the niche for local harvesting, Maine could easily have a fishery entirely made up of highly mobile harvesting units: large-scale groundfish boats, lobster boats that roam the entire coast, going to areas, such as is the case right now off the eastern part of the state, where lobsters are abundant, roving peri-

winkle harvesters or clam-digging crews. However, what the state would lose is any incentive for all fishermen not to simply strip mine and move on. The state would also lose the local ecological knowledge and real-time feedback that harvesters can contribute to local and state stewardship when they know and observe and work the system at the level of the urchin ledge, or the cove, or the bay.

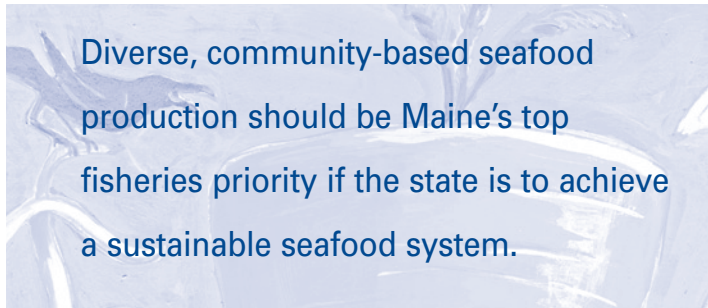
For the future of Maine’s fishery, the lesson from the new ecological science and governance work is the importance of prioritizing preservation of local-level fishing and creating mechanisms so that feedback about local changes in conditions can be integrated into management and business decisions at all levels. As long as this happens, the allocation decision between local and mobile harvesting is not a zero sum game. Statewide and regional management structures are already well in place and highly mobile boats in any fishery will survive better if local fishing and management produces a healthy marine ecosystem with surplus. This is a far better outcome for them, as well, than if they are permitted to skim the abundances for short-term profit with the unwitting result that the productivity of the marine system is degraded.

Food

Farming has shown us, in Maine and nationally, that industrial-scale production alone is not the answer to healthy food, farm jobs, or food security. In fisheries, larger-scale offshore fish

harvesting and industrial-scale food production and distribution have been and will continue to be an important part of Maine’s seafood system. But these businesses operate outside the bounds of the state’s fisheries production, often sourcing raw product globally to fill in for seasonal or resource- and regulatory-driven supply shortages.

What is critical for Maine is that state policy prioritizes a healthy business environment for community-scale fishing and the distribution and processing infrastructure that can support it. Sustaining diversified, community-scale harvesting so that Maine fishermen are able to harvest and sell the resources adjacent to their communities will provide the state with the resilient and adaptive capacity to use its marine resources long into the future.



Diverse, community-based seafood production should be Maine’s top fisheries priority if the state is to achieve a sustainable seafood system.

Three elements are necessary for Maine to have a sustainable marine food system: abundant and diverse supplies of fish, the rights to catch them, and a business model that supports local seafood production by Maine fishermen the length of the coast. These three are similar to the elements Russell Libby describes in his commentary on agriculture in this issue: ecologically sustainable farm practices, farmland, and a food system that returns value to farmers and provides food security to the state.

C O M M E N T A R Y

WHERE WE ARE NOW

Abundant and Diverse Resources

Maine fisheries have abundance, but face a potentially critical lack of diversity. Today, Maine's seafood story is lobster—lobster and virtually only lobster. This situation is the state's greatest fisheries strength and its greatest vulnerability. Lobster accounts for a staggering 83 percent of Maine's wild fishery in terms of value. In 2010, Maine's fishery products had a landed value of \$449,000 million, of which 17 percent was cultured Atlantic salmon; \$308 million of the remaining \$371 million value came from lobster. Maine's other well-known fisheries barely contributed whole percentages of the total value: shrimp, four percent; clams, four percent; herring, two percent; worms, two percent; urchins, one percent; and groundfish (a collective term for about 18 species of white fish that include cod, haddock, and flounders), one percent; sea scallops made up only 0.4 percent (Maine DMR 2011a).

The picture is only somewhat different when viewed by weight. In 2010 lobster accounted for 37 percent of the tonnage of marine products landed; 23 percent of the state's landings were Atlantic herring, a species that is no longer processed for food in-state, but instead is used as lobster bait; 10 percent of the weight was farmed salmon. If one takes out the herring landings because they are not food, lobster accounts for 48 percent of the total landings and farmed salmon for 13 percent (Maine DMR 2011b).

No one understands for sure why the Gulf of Maine is producing such an abundance of lobster, particularly in the eastern part of the state. It is agreed that this is not simply a change in fishing effort. It is

an ecological phenomenon that some suggest is a result of the removal of apex predators such as cod (Steneck and Sala 2005). The fishery also is recognized for its excellent management, protecting all critical life stages, habitat, technology and the mobility of the fishery (Acheson 2003; Ames 2010). The 40-year average lobster landings from 1950 to 1990 was approximately 20 million pounds; since then, lobster landings have increased steadily to the staggering 93-million-pound production in 2010.

Softshell clams and Northern shrimp are two other species with good current abundance. Clams are managed locally by municipal clam committees, and where those function well, the flats produce a good living for local people. Northern shrimp is a cyclical species, currently at a high point in its cycles. Shrimp is at the southern extent of its range, and in addition to good fishery management, its abundance is dependent on such factors as water temperature and sunlight patterns in February when eggs are dropped and hatching.

Beyond these three, Maine's marine resources are not in good shape. The state has lost most of the production of our anadromous fish such as alewives, smelt, and salmon that run up rivers to spawn in fresh water and return to the ocean to live as adults. Herring, the other major forage fish in the ocean, is being fished offshore by mid-water trawlers and herring quotas are being lowered due to concerns about the health of the Gulf of Maine stock. Groundfish that once supported a fishery larger than the lobster fishery and were abundant inshore are no longer there. Now, groundfish stocks are rebounding off southern Maine, but east of Penobscot Bay the groundfish have been so depleted for 20 years that there has been virtually no commercial groundfish fishery in that

region. Our once-abundant nearshore sea scallops have been persistently depleted for more than a decade everywhere except in Cobscook Bay. Sea urchins, fished down in the early 1990s, are now at a chronically low level, abundant in only in localized areas year to year.

The Right to Fish and Diversity of Opportunity

It is inconceivable that an island fisherman somewhere on the Maine coast might not have the right to go fishing. Yet this situation already exists for numerous species, jeopardizing the long-term sustainability of fishing communities. During the next two years, Maine will reexamine the rules that control fishing and lobstering in Maine waters. This is a pivotal event: at stake in the 126th Legislature will be key questions such as whether rights to fish Maine waters will, for the first time ever, be bought and sold like a property right. The choices the state makes in the next two years will determine the shape of its fishing communities in the future. For Maine to have an abundant and sustainable seafood system, Maine's new licensing structure needs to be designed to support community-scale fishing and food production.

Access to licenses and permits is, for fishermen, the equivalent of access to farmland for farmers. Fish are a public resource, thus fishermen need permission to fish for them. These rights are, of necessity, limited as part of overall constraints to prevent fisheries depletion. The methods used to limit entry define the structure of a fishery. Abundant fish and lobsters could be jumping out of a healthy Gulf of Maine, but these resources would be of no use to a sustainable marine food system for the state if coastal Maine people don't have the right to catch them.

COMMENTARY

Current state and federal entry controls are a confusing mix of rules that differ for each species and at both levels. Both systems pose severe challenges to the ability of Maine fishermen to fish for a diverse mix of species near their homes. The cumulative effect has resulted in incredible regulatory complexity and a marked loss of diversity of opportunity for Maine fishermen.

Federal fishing permits are limited and are property, with fishing rights initially distributed as a windfall to those boats that caught the most prior to the distribution. This policy has favored large, specialized boats with hired captains rather than Maine's small-scale diversified, independent fishermen. After 34 years, federal management has essentially eliminated access by all but a few Maine fishermen to three major fisheries: groundfish, herring, and scallops. Before the Magnuson Fisheries Conservation and Management Act in 1976, most Maine fishermen would have participated in at least two of these fisheries in any given year. Their operations were diversified, fishing lobster, groundfish, herring, scallops, and shrimp at different points in the year and in their lives. Now, federal permits are acquired through purchasing a boat with a permit, often an insurmountable financial hurdle for a fisherman who only wants to fish seasonally. Prices for usable federal permits range from around \$10,000 or less to more than \$1 million depending on the fishery.

Maine fishing licenses are annual rights with annual fees, with a variety of different restrictions that range from the lobster fishery, which requires a two-year apprenticeship and in some locations, long waiting lists, to the scallop fishery, which is currently closed to anyone who did not have a scallop license when the fishery was closed two years ago, to

urchins, which require a lottery entry when someone gets out of the fishery.

As a result, in 2010 only 46 Maine fishermen pursued groundfish and only 38 were active in the herring fishery. In contrast, 4,292 fishermen went lobstering (DMR, personal communication, April 2011). (See Table 1.)

TABLE 1: Number of Active Commercial Harvesters in Maine*

Fishery	2008	2009	2010
Lobster/crab	4,523	4,372	4,292
Soft clam	1,636	1,709	1,725
Worms	693	767	759
Periwinkle	510	534	653
Elver/glass eels	362	285	307
Sea urchins	416	342	313
Other bivalves	142	191	344
Shrimp	205	130	220
Scallop	215	153	220
Halibut	119	174	152
Other species	94	111	133
Seaweed	76	61	56
Groundfish	67	55	46
Herring	33	39	38
Total			9,258

*2010 data are preliminary

Right now, the implications of this loss of diverse fishing rights has been masked by the unprecedented scale of the recent lobster harvest. However, when lobstering becomes less profitable, fishermen will have no alternative fisheries. Plain and simple, if the licensing situation is not corrected, Maine will lose its fishing communities. Fishermen no longer have the adaptability that makes local fishing both economically and ecologically viable.

A Food System That Supports Community Fishing

For food production, the importance of supporting community-scale fishing is obvious. Local, community-scale fishing, when fishermen fish from their home harbors, catching different species as they are available locally in season, produces a wide variety of products—clams, periwinkles, shrimp, scallop, lobster, fish—at different times of the year. Highly mobile fishing, chasing one species or suite of species over a much larger area, following fish abundance seasonally and over time just as Maine's redfish fleet fished from Penobscot Bay in the 1950s to northern Newfoundland in the 1970s, can produce large amounts of one species or suite of species to fill orders predictably and keep industrial-scale processing plants running.

For years, looking at fish as food meant trying to fit wild harvesting into an industrial production model that can mesh with the food processor and retailer's need to have consistent supply. In the long run, however, we have learned that the ecosystem has not been able to support industrial-scale fishing, and Maine's coast has seen the loss of plants that process redfish, sardine, and groundfish.

Where does Maine stand with the shoreside infrastructure to support a more sustainable, community-based seafood system?

First, the state faces one big challenge: the 93 million pounds of lobster landings, the majority of which are landed in a pulse from July to October. Maine's iconic lobster-based economy is brittle, vulnerable to a highly consolidated lobster-wholesale market, to the cost of money, to the cost of fuel, and to many substitute seafood products from around the world. Much of the state's lobster product goes to Canada for processing.

C O M M E N T A R Y

Furthermore, as the report from the Baldacci administration's lobster task force reported, "Remarkably strong 'Buyer Power' constrains every sector of the industry, as all players struggle to sell the same undifferentiated and commoditized product, seeking to extract value from volume" (The Moseley Group 2009: 2).

This is a familiar story for Maine. In the past, when the state was catching groundfish, much of it went to Canada. Often fresh product bypasses Maine consumers and is processed out of state and shipped back into the state for consumption. Many consumers do not realize that, unless you are in Portland, if you buy fish in the store it is probably not local.

Fish processing is a difficult business, and the state has competed unsuccessfully both with Canada, which provides a variety of supports to its processing sector, and with the large, low-priced labor pool and transportation hub around New York City. Furthermore, mechanized processing requires large volumes of one type of fish, as we had when we had an industrial redfish fishery in the 1960s–1980s. The lesson is that state must look beyond this model to build its seafood food system. Our coastal fishery produces small volumes of a large variety of products, and our food system needs to optimize that situation.

Maine's seafood system has diverse strengths upon which to build. The Portland Fish Exchange provides the structure for a fair market for fish, a consolidation point, and has a cluster of large fish-processing plants around it. Value-added lobster is expanding beyond a few traditional processors in Portland, with Linda Bean's lobster business and Shucks Lobster and numerous smaller efforts to develop value-added products produced in-state. The state also has some

exceptional niche processing upon which to build. Home crab pickers have made the transition to small Department of Agriculture-inspected facilities. Clams are shucked in many towns. Isolated gourmet seafood companies exist.

The state is also home to innovative approaches to connect consumers with fishermen such as Port Clyde Fresh Catch's community-supported fishery (CSF) and the regional support provided by Northwest Atlantic Marine Alliance. Maine's lobster co-ops, many founded in the late 1940s, are now being joined by new ones such as Calendar Island and a scallop co-op being catalyzed by Cobscook Bay Resource Center.

Traceability and other forms of product differentiation are increasingly being understood as key elements of effective marketing of local and sustainably caught seafood. These efforts face challenges: there is no MOFGA-style certification available to Maine seafood, nor is there common agreement on what the standards for "sustainable seafood" should be. Indeed, seafood consumers face a bewildering and contradictory array of "dos" and "don'ts," as Catherine Schmitt describes in this issue. Maine businesses and nonprofits are engaging with this issue, however. Efforts range from Ingrid Bengis Seafood's direct-to-chef business to the Gulf of Maine Research Institute's Gulf of Maine Responsibly Harvested Seafood certification program. A new Maine Seafood Marketing Network has just been launched that aims to link these efforts together in the absence of state action.

In addition, there is growing connection between the farming and agricultural community and fisheries organizations. In 2009–2010 the By Land and By Sea project, facilitated by MOFGA and Penobscot East Resource Center (Penobscot East), hosted conversations

between fishermen, co-ops, and farmers, resulting in a report that identifies areas of common purpose. The Eat Local Foods Coalition, MOFGA, and now Slow Foods Maine all view seafood as part of Maine's foodshed.

Finally, these efforts are just beginning to introduce a new idea: fishing to market. This is a key idea in making community-scale, diversified fishing and good conservation practices pay. It's a new mind-set for a fisherman to leave the harbor to fish to fill market orders, rather than fishing to fill the boat.

WHAT TO DO

*Good Fishery Management**Articulate a vision for state policy.*

This vision should prioritize a decentralized rather than a centralized model: Maine fishermen should fish locally from communities from Kittery to Eastport, and Maine sea products should be local and sustainable food whether they are eaten locally or shipped out of state. The state needs coastal fishermen to harvest the diversity of resources available (seaweed, periwinkles, cod, for example). They are important to the economy of remote communities and to provide a supply of local food. This vision, and the key policies that support it, should be developed through a facilitated, public process in order to build a lasting, broad-based approach that will transcend short-term politics.

Take a page from lobster. Other species should be managed with owner-operator, territoriality, habitat protection, and common-sense rules that protect critical life stages of the creature.

Landscape ecology. Start practicing fishery management the way landscape ecology is done, recognizing the importance

COMMENTARY

of different places in the ocean and the importance of interrelationships between forage and fish.

Involve fishermen. We cannot maximize the benefit of our diverse inshore resources and many different ecological conditions without the local knowledge and constructive participation of fishermen.

Open the rivers. The potential opening of the Penobscot and St. Croix rivers to alewives, smelt, and salmon presents the state with a huge opportunity to potentially reverse the decline not just of river-run fish, but of marine species such as cod, haddock, and hake. Efforts to open the many small coastal dams that restrict habitat are also important.

Support clean watersheds. Fishing interests should link with and support the efforts of MOFGA and local watershed associations to protect the quality of watersheds. Land-based bacterial and chemical pollution runs downstream. We produce more than nine million pounds of softshell clams worth more than \$12 million a year to the 1,700 active clam diggers who work the flats. This could be greatly expanded if runoff after rain events were cleaner. Fishing voices can help those ashore who are working to reduce farm-based runoff.

Support municipal clam management. Public health monitoring and technical assistance should be made available to support clam management. Maintain adequate General Fund support for the Maine Department of Marine Resources (DMR) red tide and bacterial monitoring of clam flats. This service is as much infrastructure for commerce as roads are. It is necessary for public confidence in our shellfish and for public safety. Similarly, technical assistance from the DMR allows municipal management systems to leverage state resources and produce local

stewardship and incentive to clean up watersheds that could not be achieved by state-level policy alone.

Rights to Fish

Maine license workshop. Convene a workshop seeking national and international ideas for a new state licensing system that provides for affordable owner/operator entry to diverse fisheries for fishermen in local communities. It should build upon the lobster fishery's unique two-year apprenticeship program and consider how to incorporate the licensing of multiple fisheries in one system. Access should be based on knowledge and commitment rather than access to capital. The results of the workshop should inform the debate in the 126th Legislature.

Support owner-operator rules for state fisheries. The requirement that the owner be aboard is pivotal to the current business model for the successful, local lobster fishery. Owner-operator should be the foundation of Maine's fishery management for other state fisheries also to preserve its fisheries and its fishing communities. Canada's "Resetting the Table: A People's Food Policy for Canada" also recognizes the importance of owner-operator rules (People's Food Policy Project 2011).

Permit banks. Create permit banks to mitigate the effects of federal permit policies that do not constrain consolidation or the migration of federal fishing rights out of Maine ownership. To work within these current rules, the fishing rights will have to be bought back. It will take between \$10 and \$25 million to buy back enough federal access to groundfish, scallops, and herring for Maine fishermen to be able to build these species into a regular year's work when combined with lobstering. These purchases should be

done with private funds and support permit banks that provide the rights to younger fishermen rooted in coastal communities. This would be appropriate for Russell Libby's "A Fund for Maine."

Fleet diversity. Advocate for change to federal policy to boost fleet diversity by creating a new class of federal permit for coastal fishermen and other measures to restrict consolidation.

Working waterfront. The first challenge in turning the catch into food is getting it off the boat. Working docks are fundamental infrastructure for fishing. There should be continued focus on current use easements to secure working waterfront in perpetuity. Support for the national Working Waterfront Coalition's initiatives may provide additional federal funds for the state's efforts.

Public waterfront access. Without a public wharf to land at, fisherman cannot be independent of the wharf operator where he unloads. As waterfront space becomes scarcer, public fish pier space becomes more critical to a diversified set of market options.

A Community-Scale Food System

Expand information exchange between farming and fishing. Fishermen and fish dealers can learn a lot from farmers' efforts at branding, developing local food networks, and establishing direct-to-consumer markets. This should include systematic examination of the priorities set through By Land and By Sea.

Prioritize development of versatile, small-scale processing. The first step is careful business planning to determine a feasible approach. This is essential, given that most marine products are not landed in edible form. The closer to the landing site they can be processed, the more energy efficient the operation is, and the higher the quality of the product.

C O M M E N T A R Y

Rebuild infrastructure. Last summer, when Penobscot East Resource Center in Stonington was running a research fishery and needed ice so that the fish could be caught and sold in a special CSF, the nearest ice-maker was in Port Clyde, 2.5 hours away. Ice and cooler storage are critical factors in handling fish.

Catalyze a distribution network.

Sustainably caught seafood products need a distribution network similar to that which Crown O' Maine has for agricultural products. This is important both for seafood that will be consumed in Maine and for seafood destined to larger markets. Maine's coastal geography with its long peninsulas presents fishermen with a significant hurdle. Furthermore, this will address the critical lack of product quality control in the regular middlemen distribution channels.

Clarify regulatory issues.

A University of Maine Cooperative Extension bulletin that clarified regulatory issues for shared transportation, distribution, storage, and sale of farm and seafood products would greatly facilitate development of on-the-ground collaboration among food producers by making it clear what is, and is not, possible.

Examine the CSF model in Maine.

In Maine, where most fishermen are owner-operators who fish daily, CSFs are more difficult than they are for company boats or trip fishermen. An owner-operator fisherman cannot be ashore interacting with customers without foregoing a full day's fishing income. Alternatives to a CSF for Maine, including fishermen-to-consumer networks and facilitating seafood at farmers' markets, may need to be developed.

Expand information and education. Fishermen need to see their catch as food and need more information and education about quality handling and the nature of the consumer market. As was

identified in the Maine Lobster Industry Strategic Plan, most fishermen are not aware of the developments in the food market related to food quality and values-based issues such as local and sustainable. Even in the lobster business, on-board handling can improve the survival and quality of lobsters in the market chain.

Fishermen's co-ops. Co-ops can provide a locus for both education and action. It's a long way from the buying/wholesaling lobster co-ops founded in the 1940s to vertically integrated co-op businesses such as Ocean Spray, and the transition will require education that it is possible to be more than a price-taker. It will also require multifaceted technical assistance and capital. Efforts such as Calendar Island are starting in this direction.

Publicize and pilot fish-to-market models. Fishermen fishing to fill orders rather than fishing to fill the boat is one way of making lower catches or conservation measures yield a better return. If fishermen are controlling their connection all the way through to the consumer, through vehicles such as CSFs or a distribution network such as Crown O' Maine, this approach has tremendous promise.

Institutional buying. Increasing institutional buying by educational institutions and health care facilities provides the best approach for moving large volumes of locally caught seafood products. This will become possible once the processing issues are addressed

CONCLUSION

Abundant resources, rights to fish the diversity of resources available locally, and a business model that supports community-scale fishermen. These are the three critical elements for a sustainable seafood system in Maine.

If we take care of the Gulf of Maine's marine resources Maine will always have plenty to eat and, indeed, more marine products than we can eat in-state. And if we retain our place-based fishing, providing access for community fishermen to catch and market the diversity of Maine's coastal resources in fishing communities distributed the length of the coast, Maine will gain optimum benefit from those abundant resources.

In the next several years, Maine faces both opportunity and threat. The likely redesign of Maine's fishing-license structure provides an opportunity to reaffirm the state's commitment to community fishing, or alternatively, the chance to make decisions that will doom the state's rural fishing communities to extinction. Maine also has the opportunity, in this business-friendly environment, to develop the seafood infrastructure: co-ops, versatile processing and distribution, which can allow the state to adapt successfully to an ever-changing food market and an ever-changing marine ecosystem. What a recipe for prosperity. 🐟

ENDNOTE

1. More information about aquaculture projects can be found on the following web pages: halibut (www.ccar.um.maine.edu/halibut.html); green sea urchins (www.ccar.um.maine.edu/urchin.html); cod (www.ccar.um.maine.edu/cod%20academy.html); shellfish (www.downeastinstitute.org/research.html).

REFERENCES

- Acheson, James M. 2003. Capturing the Commons: Devising Institutions to Manage the Maine Lobster Industry. University Press of New England, Hanover, NH.

C O M M E N T A R Y

Ames, Edward P. 2004. "Atlantic Cod Stock Structure in the Gulf of Maine." *Fisheries* 29: 10–27.

Ames, Ted. 2010. "Multispecies Coastal Shelf Recovery Plan: A Collaborative, Ecosystem-Based Approach." *Marine and Coastal Fisheries: Dynamics, Management, and Ecosystem Science* 2: 217–231.

Berkes, F., and T.P. Hughes, R.S. Steneck, J.A. Wilson, D.R. Belwood, B. Crona, C. Folke, H. Leslie, J. Norberg, M. Nyström, P. Olsson, H. Osterblom, M. Scheffer and B. Worm. 2006. "Globalization, Roving Bandits and Marine Resources." *Science* 311: 1557–1558.

Cadrin, Steve, and Dave Martins, Jon Loehrke, Lisa Kerr, Greg DeCelles, Dan Goethel, Crista Bank and Geoff Cowles. 2009. Stock Structure of New England Groundfish: Connectivity and Heterogeneity at Multiple Scales. NOAA/UMass Cooperative Marine Education & Research Program, School for Marine Science & Technology, Amherst. http://www.gmri.org/community/seastate/Cadrin_Steve/Cadrin_Steve.pdf [Accessed May 22, 2011]

Kovach, Adrienne, Timothy Breton, David Berlinsky, Isaac Wirgin and Lorraine Maceda. 2009. Genetic Insights into the Stock Structure of Cod in U.S. Waters. Gulf of Maine Research Institute, Portland. http://www.gmri.org/community/seastate/Kovach_Aдриenne/Kovach_Aдриenne.pdf [Accessed May 22, 2011]

Libby, Russell. 2011. "An Abundant Food System." *Maine Policy Review* 20(1): 61–65.

The Moseley Group. 2009. Maine Lobster Industry Strategic Plan. Governor's Task Force on the Economic Sustainability of the Maine's Lobster Industry, Augusta, ME.

Maine Department of Marine Resources (DMR). 2011a. Preliminary 2010 Maine Landings by Ex-Vessel Value. Data Collected jointly by Maine Department of Marine Resources and National Marine Fisheries Service, Augusta. <http://www.maine.gov/dmr/commercialfishing/MaineLandingsByLivePounds.PieChart.pdf.pdf> [Accessed May 21, 2011]

Maine Department of Marine Resources. 2011b. Preliminary 2010 Maine Landings by Live Pounds. Data Collected jointly by Maine Department of Marine Resources and National Marine Fisheries Service, Augusta. <http://www.maine.gov/dmr/commercialfishing/MaineLandingsByLivePounds.PieChart.pdf.pdf> [Accessed May 21, 2011]

Maine Technology Institute. 2008. An Introduction to Maine's Technology Sectors and Clusters: Status and Strategy. Maine Department of Economic and Community Development, Augusta.

Olson, Mancur. 2000. *Power and Prosperity*. Basic Books, New York.

People's Food Policy Project. 2011. Resetting the Table: A People's Food Policy for Canada. People's Food Policy Project. http://peoples-foodpolicy.ca/files/pfpp-resetting-2011-lowres_1.pdf [Accessed June 6, 2011]

Schmitt, Catherine. 2011. "Adrift in a Sea of Information about Sustainable Seafood: The Maine Consumer Perspective." *Maine Policy Review* 20(1): 96–104.

Steneck, Robert S. and Enric Sala. 2005. "Large Marine Carnivores: Trophic Cascades and Top-Down Controls in Coastal Ecosystems Past and Present" *Large Carnivores and the Conservation of Biodiversity*, ed. Justina Ray, Kent Redford, Robert Steneck and Joel Berger. Island Press, Washington, DC. pp. 110–137.

Steneck, Robert S. and James A. Wilson. 2010. "A Fisheries Play in an Ecosystem Theater: Challenges of Managing Ecological and Social Drivers of Marine Fisheries at Multiple Spatial Scales." *Bulletin of Marine Science*, 86(2): 387–411.

U.S. Commission for Ocean Policy. 2004. *An Ocean Blueprint for the 21st Century*. Final Report. USCOP, Washington, DC.

U.S. Department of Commerce. 2011. *U.S. Department of Commerce Aquaculture Policy*. USDC, Washington, DC.



Robin Alden

is executive director of Penobscot East Resource Center in Stonington, a nonprofit organization whose

mission is to secure a future for fishing communities in eastern Maine. Alden was commissioner of the Maine Department of Marine Resources from 1995 to 1997. She founded and ran *Commercial Fisheries News*, a regional fishing trade newspaper, and was instrumental in starting the annual Maine Fishermen's Forum in the mid-1970s.