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Options for Managing Maine's Fisheries: Fisheries Management from an Ecological Perspective

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We follow Commissioner Alden's interview with two perspectives on fisheries management prepared by University of Maine faculty, Ralph Townsend and Jim Wilson. Townsend discusses the historic evolution of fisheries management as well as more current trends toward co-management in Maine's groundfisheries. Looking at successful experiences with co-management, he wonders whether current efforts in Maine's lobster industry will be successful without tackling the tough issue of access limitation.

Jim Wilson counters Townsend's concerns. The current policy course set by Commissioner Alden is based on an approach to fisheries management which redefines the sustainability problem as an ecosystem problem. Wilson argues that, within this new paradigm, questions such as "how, when, and where" to fish (or not fish) are much more central than species-specific quota setting, and that these questions not only change the rules under which co-management is implemented but also may improve fisheries management in ways that quota systems have failed, that is the long term conservation of species and habitats.

Fisheries management from an ecological perspective

Jim Wilson

Ralph Townsend worries that the policy course set by Commissioner Alden may be unrealistic in two fundamental respects. First, he notes that successful conservation can only be achieved by limiting access to the resource and that once access is limited, licenses (or whatever is the key to access) will become valuable (a real or quasi property right depending upon how it is implemented). Current policy initiatives intend to accomplish limits on access through the apprenticeship program; however, they are explicit about not intending to create a valuable, tradable right. Townsend's point is that once something is scarce (but legally untradable) there will be a continuing temptation to trade illegally and/or strong tendencies to corrupt the apprenticeship system. Either development might seriously compromise implementation of these new policies as well as the state's ability to conserve the resource.

Second, Townsend worries that democratic decision making, especially under the conditions of uncertainty that are always present in fisheries, will tend to be risk prone. For example, any time the industry has financial difficulties it will tend to minimize those problems by harvesting at the upper limit of the range of uncertainty. Any time the fishery is healthy, little danger will be seen in harvesting at the upper limit as well. This kind of decision making, done consistently, is certain to lead to overfishing and will also compromise the state's ability to conserve the resource.

These concerns are certainly legitimate; they are central to most fisheries management problems--not just those in Maine. But, as I hope to point out, these concerns are derived from a very different view of the biology of the ocean than that currently driving the state's policy. The state's view (i.e., the policies introduced by Commissioner Alden) redefines the sustainability problem as an ecosystem problem; as such, it suggests an array of policy options that have not been used before in fisheries. I think these options are more realistic and tractable than those posed by conventional fisheries management theory.

Conventional fisheries theory views the ocean ecosystem as a collection of more or less independent species (i.e., interactions with other elements of the ecosystem are considered statistical noise that is irrelevant to long-term equilibrium). The problem of sustaining each of these species is defined in terms of achieving a balance between the numbers harvested and the numbers left to spawn, that is, choosing the right number of fish to harvest. This is the classical definition of the sustainable fisheries problem and one that has driven federal policy especially. The theory presumes an ability to manipulate population sizes over the long run (not from year to year). In other words, populations can be raised (or lowered) by lowering (or raising) harvest levels. The generally preferred strategy for determining the amount to be harvested each year is to take a constant percentage of the stock. Usually, depending on the species' growth and fecundity, the preferred percentage is stated as a quota that limits annual harvesting to 20-30% of the standing stock.

As Townsend points out, experience has shown that quotas without simultaneous restrictions on the number of harvesters inevitably leads to ever shorter seasons and increasingly large capital investments as harvesters compete to take the quota as quickly as possible. In order to avoid these inefficiencies economists have argued for restrictions on access to accompany quotas--ITQs or an individual's right to harvest a percent of the quota are the generally preferred arrangement. Restricted access, however, means that the right of access becomes scarce and valuable. Economists have argued that this should be recognized by making the rights tradable. More importantly, they argue that once these rights are in place harvesters will have a strong incentive to conserve the resource. The reason is very simple, with tradable rights the value of the right depends upon the value of the resource. If the resource is overfished the tradable value falls to a very low level; if the resource is healthy the value of the right is high.

Townsend basically argues that the state's current policy ignores this experience and, as a result, we are likely to have to relearn what is already known--a learning process that could lead to the destruction of our fisheries. However, while ITQ programs appear to work very well as economic devices, there appears to be little evidence that ITQs (or other forms of limited access) contribute to conservation of the resource.[1] Individual incentives for free riding at the expense of the resource are strong. Additionally, as one might expect, ITQs have radically altered the social conditions governing use of the resource and the nature of economic opportunity. There is a tendency towards concentration of ownership; except for the first generation of lucky fishermen who receive their ITQ free from the government, everyone else has to make a large financial investment simply for the right to fish. The traditional approach of starting out in a small skiff and building up sweat equity is obsolete with ITQs. This is very disturbing to most people in the fishing community; they see their children's, and often their own future under ITQs, as the employees of a bank or some other well-endowed rights' owner, rather than as independent fishermen.

What is perhaps most perplexing and frustrating to people in the fishing community and to the state's policy makers, is the fact that these social results are the logical outcome of a biological view of the fishery that they find implausible. If ITQs and other forms of limited access had produced strong evidence that they were a solution to the overfishing problem, there might be grudging acceptance of the need. The fact that ITQs have not produced the conservation result that was expected means that for all practical purposes the recipients of the ITQ right are the beneficiaries of a government organized and enforced cartel--lots of private benefits but little public benefit.

The policies advanced by Commissioner Alden get us out of the trap of only seeing a choice between ITQs and loss of the resource, or, as Townsend implies, a choice between efficiency and some romantic form of 20th century Luddism. The reason is that these policies proceed from a fundamentally different view of what is required for a sustainable fishery.

The biological view of most fishermen and of state policy makers is one that is much closer to recently developed theories of complex ecosystems than to conventional fisheries theory. This view perceives a very complex ecosystem, one that is diverse in terms of species and habitat and in the spatial distribution of species and habitat. The determinants of a healthy ecosystem and of the species within that system are not to be found simply in the species-specific balance between numbers harvested and numbers left for spawning. Rather, the health of the overall system depends upon the maintenance of critical habitat, basic biological processes such as spawning and nursery grounds, and the broad species structure and interactions within the system.

This view does not believe that the numbers of fish in a population can be manipulated by adjustments to harvesting; rather, the sense is that if the "conditions" necessary for a healthy system are maintained (by not fishing in a way that destroys them) the population will remain strong but also highly variable and unpredictable (stability is not part of this world view). The kinds of restrictions that are likely to keep a system healthy are rules that set out "how, when, and where" fishing should (or should not) take place. In a very fundamental way this view takes a much more modest perspective with regard to man's ability to control and manipulate ocean ecosystems. Not surprisingly, it leads to different reasons for limiting access to the resource and different kinds of decision making.

In a complex ecosystem where habitat and other spatially defined factors are important the emphasis of conservation decisions shifts away from the "right number of fish to harvest" to questions about "how, when, and where" to fish (or not fish). The great importance of this shift has to do with the geographical scale over which the problem is defined. When one is concerned principally with the "right number to harvest," the appropriate scale of concern is the entire range of the stock (i.e., the entire Gulf of Maine for some stocks, and the Gulf plus Georges Bank and the mid-Atlantic area for others). When one is concerned principally with the protection of critical habitat, spawning aggregations and so on, the relevant geographical scale shrinks drastically; rather than thousands of square miles, small areas, often less than one square mile, define the appropriate scale.

This shift to smaller scale concerns brings with it the immediate problem of managing a potentially vast amount of biological and human detail. For an agency like the Department of Marine Resources whose resources are already stretched to the limit, the data collection and

analysis costs would appear to be well beyond its capabilities. Importantly, this change of scale also carries with it significant problems about enforcement; one is no longer principally concerned with how many fish show up at the dock but with the behavior of fishermen on the water (i.e., will they avoid critical habitat, nursery areas, and so on?). This is also a difficult resource problem for the department.

Commissioner Alden's strategic response to both these problems is decentralization--giving fishermen more control and responsibility for local matters in the fishery.[2] This is highly appropriate for reasons of administrative and management efficiency and it also is smart because it can build upon strong traditions of conservation and local self-governance that reside principally in the state's lobster fishery.

Whether decentralization is feasible depends, of course, upon the kinds of decisions that have to be made to conserve the resource. From the conventional fisheries management perspective, in which catching the right number of fish is the paramount concern, local control could lead to a disaster. Each locality would logically reason that if they took a few more fish it would likely make little difference. All localities following the same reasoning would lead to over harvesting; we would have nothing more than a community version of the tragedy of the commons.

But, the ecological perspective behind the commissioner's policies puts a very different light on the feasibility of decentralization. When one is concerned with "how, when, and where" fish should or should not be caught there is a clear, positive role for local decision making. This is because the vast majority of decisions about habitat, spawning grounds, and other circum-stances relevant to "how, when, and where" to fish are local in nature. The knowledge about the occurrence of these ecological events is local and, by and large, both the costs and the benefits of proper (or improper) decisions reside locally. In short, from an ecological perspective, local decision making is thoroughly appropriate.

The question Townsend raises is whether democratic local decision making can be relied upon. Basically, the fear is that allocational problems among groups of fishermen are likely to be most easily resolved at the expense of the resource. This is most easily seen in the case of a quota where the interests of different groups are most easily satisfied by increasing the quota.

However, when rule making shifts to questions of "how, when, and where" fishing takes place, a subtle shift in the circumstances of decision making takes place. In the case of a quota, a person's future economic circumstances under the rule are fairly clear; consequently, people have a strong incentive during rule making to try to bias the rules in their favor. The clear connection between the rule and the impact on a person's future economic position is crucial here. Under "how, when, and where" rules, on the other hand, the clear causality between the rule and a person's fortune in the future disappears. The reason for this lack of clear causality is to be found in the nature of the ecosystem. Preserving a herring spawning area may or may not lead to more herring (more cod might be the result); no one can ever be sure what the outcome of the rule will be other than that it is likely to be beneficial to the overall functioning of the system. As a result, even though people might like to use the rules for personal advantage, their uncertainty about the outcome of rule changes makes it difficult to bias the rules in their favor. Under these circumstances, I would expect to see rules changed infrequently, with new rules applying for an indefinite period. Annual adjustments are unlikely. This is not to say that

fishermen will not have a tendency to try to rig the rules in their favor. In fact, the major concern about the lobster councils is that this will be attempted. The point is simply that with “how, when, and where” rules the ability to rig the rules is less possible.

The purpose and effect of limited access also takes on new attributes in a decentralized, democratic approach. There are three basic reasons for limiting access under these circumstances. The first is to generate the equivalent of citizenship in the fishing community. The idea behind the apprenticeship program is to identify the persons who are subject to the rules, to acquaint them with both the formal and informal rules that make the fishery function well, to bring them into the discussion about rule changes, and to subject them to the responsibilities associated with the rules. Put simply, limited access creates an identifiable and, hopefully, coherent community. In this regard the apprenticeship program is likely to fulfill this charge.

The second reason for limited access is to create a long-term interest in the health of the fishery. This, presumably, will arise partly as a result of the citizenship aspects of the program and also simply because people will invest two years of their life and acquire skills and other knowledge. The payback for this investment can only be realized with a healthy resource. Another way of looking at this aspect of the program is this: our fisheries have always been subject to short-term entry for the purpose of “creaming” the resource; that is, people jump in when there is a boom, help greatly to deplete that boom, and then leave the fishery. Most recently, eels and urchins provide good examples of this experience. The apprenticeship program is designed with the idea of requiring a person to make a (two year) commitment to the fishery before being licensed.

Finally, a limited access program has to make sure that the people who bear the costs of conservation receive an appropriate return for their forbearance. For example, if conservation efforts are successful and it is anticipated that there will be large numbers of new entrants into the fishery, the incentive for conservation among current fishermen is basically killed. Current fishermen have to have some idea that conservation today will lead to personal benefits in the future. The apprenticeship program does not generate absolute assurances that this will be the case, but it does create circumstances that are much more favorable for that kind of outcome. It will allow the numbers of fishermen to rise and fall with economic conditions along the coast and in the fishery, but also it will slow down the rate of entry and stop sudden influxes in response to good years in the fishery.

Townsend’s concern is not so much with these aspects of the apprenticeship program but more with the question of avoiding the marketizing of licenses. The basic question is this: "If these policies succeed will they wind up making a license a valuable commodity?" The answer to that question depends upon whether conservation relies on limiting the number of fishermen or whether rules about “how, when, and where” are sufficient. In the lobster fishery we appear to have created a situation in which rules about “how, when, and where” to fish have succeeded in conservation. Entry is basically limited by individual assessments of the economic opportunities in the fishery. Right now those opportunities are limited by the intense competition that occurs. A person’s skill at fishing--not a limited right of some sort--is the bottom line determinant of the real value of access to the fishery. With an apprenticeship program competition is likely to diminish especially during those short periods of time when a boom fishery appears. The uncertainty around these booms and their lack of persistence is likely to diminish incentives to

develop a black market in licenses or corruption of the apprenticeship program. Over the longer haul, competition will diminish some but the incentives to enter that this creates will be off-set almost precisely by the costs of going through a two year apprenticeship system. Consequently, I don't see the apprenticeship program creating a (black) marketable license nor do I see the potential value of the license leading to corruption of the apprenticeship program itself.

In short, I think Townsend's principal concerns about state fisheries policy are mitigated considerably when one takes into account the different biological perspective from which these policies flow. The real concern, it seems to me, should be around the state's and industry's ability to make rules about "how, when, and where" to fish work. This is a new approach to fisheries management and, as such, it lacks an extensive scientific database--by which I mean that we have not accumulated a great deal of detail about such things as critical habitat areas, spawning grounds, and so on. Much of this information is only resident in the heads of fishermen. Consequently, learning how to manage well with this approach will require a genuine cooperation between scientists (both state and university), state managers, and the industry. The lobster councils are a good first step in setting up the institutions necessary to make a system like this work. But implementation of this approach is, in many ways, an experiment and its success will depend greatly upon the ability to learn and adapt as we go along. Traditional approaches to fisheries management have failed rather miserably; this approach corresponds closely to what we have learned in general about complex ecosystems as well as what we have learned about the need to carefully craft circumstances in which fishermen's incentives correspond with conservation. Incidentally, but very importantly, this approach also is thoroughly consistent with the maintenance and long-term viability of traditional fishing communities. It is certainly a reasonable approach and Commissioner Alden has to be congratulated for having the courage to embark on these policies.

Endnotes:

1. Ralph Townsend, incidentally, was one of the first researchers to point this out.
2. In this regard, Commissioner Alden is responding appropriately to another one of those hard learned lessons in economics; namely, complex organizations or systems are best managed when decision making is devolved to the lowest possible unit. Whether this "hard lesson" or the one's cited by Townsend are the appropriate ones to draw upon depends entirely on one's view of the fishery ecosystem: is it a relatively simple one in which each species is basically an independent entity subject to control or is it a complex, highly interactive system over which we have little ability for manipulative control?

Jim Wilson is a professor of Resource Economics and Policy at the University of Maine. His work ranges from the study of chaos theory and complex ecosystems to practical applications in fisheries management. Most recently, he chaired the committee responsible for setting up the state's lobster councils.

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