

Abstract

Self-governance in the Maine Lobster fishery

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The Maine lobster fishery has long been described as a classic case of overfishing - both biologically and economically. To the discomfort of standard management theory the fishery continues to produce high sustained yields; in terms of biological performance it may be one of the best managed fisheries in the world. This result occurs without resort to limited entry or individual transferable quotas (ITQ's). This paper argues there are strong biological, social and economic reasons to be skeptical that limited entry will ever solve the fisheries conservation problem. It suggests that the reasons for the lobster fishery's continued success can be found in the institutions of virtual user self-governance that have evolved over the years. Self-governance forces a consensus with regard to the kinds of rules used in the fishery, assures wide-spread perception of their fairness and efficacy and leads to a situation where social sanctions are widely used for their enforcement. Self-governance in this fishery has led to mutual coercion, mutually agreed upon and mutually enforced.

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This paper should be read as a cautionary tale. It is about a fishery without limited entry that is, nevertheless, a very successful conservation story. The basic argument of this paper is that successful conservation requires the alignment of individual and collective interests. To do this requires a complex process involving (1) the negotiation of a set of rules for mutual restraint, (2) the growth of mutual belief in the collective and personal benefits of such restraint (people must believe there is a connection between their individual and collective action and the future state of the resource), and (3) the development of individual assurance of the collective willingness and ability to detect non-compliance and impose (formal and informal) sanctions against individuals who act without the agreed upon restraint. (Runge, 1982,83) In any other context we would recognize this process as the process of self-governance; it is not any different in the fishery.

The major point I'd like to make in this paper is that the solution to the conservation problem in fisheries is principally a governance problem, not a top-down management problem. The first part of this paper suggests reasons for skepticism with regard to the conservation and economic benefits claimed for limited entry. The second part of the paper outlines an alternative - a bottom-up approach - to fisheries governance as it occurs in the Maine lobster fishery.

Limited entry¹ is not a governance process. It is a management approach derived from economic theory. That theory argues that the cause of overfishing is open access² - the unrestrained use of the resource. The absence of resource property rights is deemed to be the sole cause of the lack of restraint. Given this presumption, it argues that restrictions on the numbers of users (or the amounts they are allowed to catch), so as to approximate what might occur if there were property rights, is the solution to the overfishing problem. The approach does not attempt to modify individual or collective incentives or behavior. Users, before and after limited entry, are assumed to be atomistic

¹ For convenience, the term limited entry as used here refers to limitations on the numbers of fishermen and /or boats and also to individual transferable quotas.

² Over the past years a convention has been developed that defines open access as a situation in which there are no restraints on the use of a resource - what many people used to refer to as a common property resource. According to this convention, a common property resource is defined as one in which a limited group of individuals hold collective rights to the resource. (See Ciracy-Wantrup and Bishop). Consequently, following this convention, we should speak of the 'tragedy of open access'.

profit maximizers. The only change is that with limited entry (or individual transferable quotas) the restraints on the number of fishermen (or on the amount that they can individually catch) are assumed to be sufficient to prevent overfishing.

The logic of the argument for limited entry is persuasive to the extent that its assumptions are accepted. There are, however, three major reasons to be skeptical about this logic (even assuming away some very important practical problems³).

The first, and most important, concerns our practical ability to control biological outcomes. The single species theory behind limited entry assumes we can exercise a great deal of control; experience and ecosystem theory suggests our control over individual species (or groups of species) may be very limited.

Second, because limited entry does not attempt to directly resolve the conflict between individual and social incentives, it leaves in place individual incentives that compound the problem of biological control. These incentives cause difficult enforcement problems and continually erode the effect of restraining rules.

Finally, the inability to control biological outcomes raises the problem of creating a privileged class - a publicly sanctioned cartel - without achieving the public benefit of conservation.

The most important reason for skepticism concerns why limited entry, and quantitative controls in general (i.e., controls on the numbers or quantity of boats, fishermen or catch), have not led to conservation of the resource. The standard theory used to justify limited entry is a single species theory. Each species is treated as if it existed in isolation from the rest of the ecosystem, although other factors (i.e., those outside the species itself) are often admitted into the technical analyses as stochastic variation. In this theory, sustainability is seen as the problem of aiming for a balance between harvesting and leaving in the water enough spawning fish to replenish the population. How many spawning fish should remain is determined by the recruitment relationship (i.e., the relationship between the number of spawners today and the numbers of their young recruited to the fishery in the future). The balance is achieved, in principal, by limiting fishing effort either to the number of boats or the amount of catch (i.e., a quota) consistent with maintaining the desired balance. Unfortunately, the history of the fisheries for which we have adequate data shows little

³ There are a number of problems with limited entry which I might term 'administrative' problems which I chose not to explore here. For example, few limited entry programs that attempt to limit the numbers of fishermen or boats actually manage to create limits that are meaningful, e.g., a reduction in the numbers relative to the numbers that obtain in open access.

or no relationship between the numbers of spawners and the numbers of recruits in subsequent years (Hall, 1988). Absent knowledge of this relationship setting an overall quota for an ITQ scheme or determining the appropriate amount of fishing effort necessary to sustain the resource, is more or less like taking a shot in the dark. The course of the biological bullet is no more predictable than the unknown relationship between spawners and recruits⁴.

There is a forming consensus among biologists that the absence of predictable spawner-recruit relationships is most likely the result of the strong interactions of each species with the rest of the ecosystem. Put differently, recruitment to each species is not so much a function of its own condition (current spawning numbers), as it is a function of the state of the entire ecosystem. In particular, recruitment to each species appears to be strongly affected by complex multi-species predation patterns that take place during the post-larval, pre-recruit phase of life. (Sissenwine, 1984,1986; Kerr and Ryder, 1989; Gislason and Heigason, 1985; Wilson, et al, 1991; NOAA, 1992) If this is the case, then the sustainability of individual species fisheries cannot be adequately addressed by species specific quantitative controls - i.e., quotas, as in ITQ schemes, or limits on boats, etc., as in most other limited entry programs. Sustainability, instead, becomes a complex function of the state of the entire ecosystem. Consequently, if we are to continue to attempt the management of individual species through quantitative controls, the implication of an ecosystem approach is that we need vastly more knowledge of the behavior of the entire ecosystem than we currently possess. (Wilson and Kleban, 1992) The alternative is to move away from quantitative controls.

The appropriate way to manage ecosystems, instead of individual species, is a difficult problem which I won't address here (see Wilson and Kleban, 1992), but the nature of this fundamental problem goes a long way to explaining why limited entry has done so little to address the problem of conservation and why users typically see little connection between the rules of such programs and the long term sustainability of the resource. (Smith, 1991) Absent such a perceived connection there is little private or social cost associated with opportunistic (i.e., rule stretching) behavior; it becomes a game that one plays with the authorities. And other users have little heart for the private expression of (costly) social sanctions when there is little confidence in a collective benefit.

The problem of biological control also sheds light on a puzzling attribute of the limited entry discussion. This is the assertion that there are numerous examples of successful limited entry programs in the face of little or no evidence that any of these successful programs has solved the conservation problem (Townsend, 1990). What, then, is meant, by a 'successful program'? Generally, the measure of a 'successful program' is the economic condition of the remaining users when compared with the

⁴The recent collapses of the quota, ITQ, managed cod fisheries in Atlantic Canada, Iceland and Norway illustrate the point.

economic condition of users prior to limited entry. This is at best a dubious measure of success and one that does not stand up even to the test of the narrow economics used to justify limited entry. Economic theory argues that limiting effort will conserve the resource and that this result is worth the social costs of limiting the opportunities that might otherwise be created by access to the resource. This is a reasonable trade-off provided there is a conservation benefit; however, when we create privileged access to a public resource without the public receiving in return a benefit - conservation of the resource - we have simply created a publicly sanctioned cartel. This is the kind of economic favoritism that we tried to abolish in 1776⁵. It is true that limited entry and especially ITQ's have the potential to reduce the costs of fishing, but those same kinds of cost reductions are available to us if we chose to reduce competition in any industry through publicly sanctioned cartels.

Experience with limited entry also has shown that in spite of the economically privileged position granted members of a limited entry program, there is a strong tendency for participants to behave in a highly opportunistic manner - continually stretching and/or breaking the rules of the fishery, thereby creating large enforcement costs and even eroding the dubious private benefits of a public cartel. (Copes, 1986; Townsend, 1985) Additionally, given the public nature of the cartel, participants have strong incentives to seek individual advantage through political action⁶. This should not surprise economists with any knowledge of cartel behavior but it has been a continuing problem with limited entry. The reason for this opportunistic behavior can be found in the fact that limited entry only approximates the result that economic theory would expect with full and enforceable property rights. It does not actually align private and social interests. Consequently, individuals retain strong incentives to stretch, break and even change the rules for their private benefit.

In addition, the rules of limited entry programs often generate much stronger incentives for opportunistic behavior than might exist under alternative situations (Copes, 1986). For example, consider an open access fishery with about 100 boats. Under a fleet wide quota an individual who cheats by not reporting catch will share the benefit of his illegal behavior with the 99 other participants in the fishery who collectively will be able to catch that much more fish. In a similar fishery managed with an individual transferable quota scheme, an individual who successfully cheats gamers 100% of the benefit. It is true that a management regime that is willing to impose draconian penalties (and is able to bear the political and social costs of such a policy) can minimize

⁵ Economic structures of this sort are reminiscent of the royal monopolies that established the East India Company, the Hudson's Bay Company and so on.

⁶ The management of the groundfishery in Atlantic Canada, for example, has been marked by intense political maneuvering between in-shore and off-shore interests. Government attempts to satisfy these conflicting interests has led to consistently higher quotas than might otherwise have been the case.

blatant rule breaking. But in the absence of a widespread belief in the individual and collective wisdom of the rules even a draconian policy will be powerless, even with a policeman aboard every boat, to contain the continuous, ambiguous rabbling away at the edge of the rules. (Copes, 1986; Townsend, 1985)

Finally, given the economic and biological problems inherent in limited entry, there are strong social reasons for skepticism. Fisheries, especially small boat fisheries, are typically conducted in the context of a community structure. In spite of the popular (and economic theoretical) picture of fishermen as independent loners, the complexity of the ocean system and the technology of fishing requires a great deal of cooperation, both at sea and ashore. (Wilson, 1990; Gatewood, 1984; Thorlindsson, 1987) Community arises around the need to cooperate. In rural areas especially, but even in large cities such as Boston and Seattle, the fishing community is readily identifiable. One's friends and usually many kinsmen are connected to that community; sons and daughters are active participants. Fishermen place a high value, not only on the 'sense' of community but also on its functionality in their lives. Its networks support the fisherman socially and provide the contacts and access to knowledge that are a necessary ingredient of success in an occupation that requires continuous adaptation to changing natural and market conditions. Seasonally and sometimes over periods of years, there is a continuing process of exit and entry from one fishery to another and into and out of the fishing business as a whole (Acheson and Wilson, 1980; Acheson and Lazarowitz, 1980). This dynamic is driven by the variability of the ocean, the press of economics and the skill of individuals; it depends greatly on the support structures within the community and, importantly, it creates an individual and collective interest in the long term health of the resource.

Effective limited entry programs (i.e., those that actually succeed in limiting effort) interrupt this community process, especially the switching from fishery to fishery, and tend to shift the nexus of opportunity away from the long term dynamics of community and individual skill to the short term, atomistic competition for access to capital markets⁷. The costs of this kind of change may be justified if they are the costs that must be borne to sustain ocean resources. If, however, the major bene-

⁷ There are great fears in the fishing community concerning the potential concentration of ownership in ITQ programs. There are a number of conditions in the fishery that lead to these fears. Imperfect capital markets can lead to differential advantage in the bidding for ITQ's (i.e., if large corporations have more favorable access to capital than the average fisherman) and a tendency towards concentration of ownership. When fish are processed, the ITQ provides an integrated processor with a value - the ability to schedule product flow - not available to the individual fisherman and, consequently, the ability to bid a consistently higher price for quota. This also will lead to a tendency towards concentration of ownership. Also in relatively 'thin' markets with sporadic supplies (due to weather, etc.) processors gain strong competitive advantages if they are assured of supplies. This is another reason why they are willing to bid more for quota than individual fishermen and why there will be a tendency towards concentration.

fits are simply the private gains that accrue to members of a publicly sanctioned cartel, there is no public justification to weaken community structure and narrow economic opportunity (Davis, 1984, 1990-91).

In summary, limited entry is a management approach based on single species theory. It tries to approximate through quantitative controls on fishing effort or catch, a hypothetical state that economists believe might exist with full property rights. But there is little or no scientific evidence and very little or no experience that leads one to believe that the biological control assumed by the theory is practically possible. Given what appears to be a flawed view of the biological dynamics of the ocean, it is not surprising that limited entry programs have had little effect on conservation, often amount to little more than publicly sanctioned cartels and are very disruptive of established fishing community structure. If we are to move to sustainable ocean resources it would appear that we have to develop an ecosystem approach to fisheries management. But the complexities of an ecosystem approach place extremely high demands on our knowledge of the ocean, especially if we wish to continue with quantitative controls⁸.

In the next section of the paper I describe an example of an alternative approach to fisheries management - self-governance or as some might prefer to call it, co-management. This fishery is *not* perfect by any means, but it does appear to be as near a state of sustainability as any fishery I know.

A short introduction to the Maine lobster fishery

On the basis of traditional theories of fisheries, the lobster fishery should be an economic and biological basket case. The fishery has been intensively exploited for well over 100 years. Over 90% of the females are caught before they reach maturity. Entry is not restricted and effort measured in trap numbers has probably tripled or quadrupled since the late 1950's. For 25 years biologists have been predicting the imminent demise of the fishery. And for nearly that long economists have pointed to the fishery as an example of an over-capitalized, over-fished fishery (Townsend, 1986; Bell, 1972). In spite of all the dismal predictions (I was one of the predictors, by the way (Wilson, 1976)), the fishery continues to chug along very nicely and in the last few years has shown historically high landings and very strong recruitment⁹.

⁸ An ecosystem approach to fisheries management may require limits on total fishing effort for the entire ecosystem - a very different kind of program than is currently under consideration. (See Wilson and Kleban, 1992).

⁹ The current high landings should not be attributed to self-governance; more likely they are the result of favorable changes in the ecosystem (e.g., the near absence of large predatory cod in in-shore waters).

I have been surprised by this and over the years have been searching for a reason. I've come to believe that what makes this fishery work is the fact that it is, for all practical purposes, a fishery governed by fishermen. The importance of self-governance is that the very process of governance creates the social conditions under which individuals are assured (to the extent possible) that the rules chosen will accomplish the end for which they were adopted and that there will be rule compliance by their colleagues. Under these circumstances it is possible for an individual to subscribe wholeheartedly to the logic of individual and collective restraint

There are two kinds of rules in the lobster fishery - legal and extra-legal. Both are the creation, basically, of fishermen. The extra-legal rules are created at the community level and are mostly associated with the establishment of group territories - a process well documented by my colleague Jim Acheson (1972, 1988). The legal rules of the fishery have evolved over more than a century. Each change in the legal rules is generally the result of a prolonged and muddled discussion, usually of several years duration. The discussion may be initiated in response to suggested changes made by fishermen, or managers, or biologists or even academics; but for action to be taken a consensus must develop among fishermen. Small groups of vocal fishermen can effectively veto a (near) consensus if, for example, they feel it treats them unfairly. When a consensus is there, however, masses of fishermen troop to the State Capitol (there are often false starts) and the legislature applies a rubber stamp. These changes take place infrequently and are, by any measure, marginal. Importantly, the whole process centers around a very acrimonious debate featuring prominently, fairness, workability and individual rights versus the need for conservation. In many ways the consensus, if it forms, fulfills the criteria of 'mutual coercion, mutually agreed upon'.

There are two significant differences between the rules that come out of this process and the rules that are prescribed for limited entry and/or ITQ's —

(1) the rules restraining fishing effort put the emphasis on the conditions under which fishing takes place NOT on the quantity of fishing that takes place. AND

(2) the rules do not attempt to allocate access to the fishery, that is, there are no legal barriers to entry¹⁰.

The reason for this different approach to restraining rules is, first, fishermen have little or no faith in our ability to control the size of (i.e., sustain) natural populations through quantitative adjustments in catch or effort. To a great extent they share, but articulate in very different ways, the

¹⁰ Territoriality is often confused with limited entry. Except in a few instances, the off-shore islands in particular, territoriality places very few or no restrictions on entry. See Wilson, 1976.

view of biologists who feel we need to move to an ecosystem approach. Both groups recognize the importance and unpredictability of events that intervene between spawning and recruitment and realize that our ability to influence the recruitment outcome is very limited. Fishermen generally argue that it is necessary to take steps to assure that the natural processes of replenishment continue to occur in spite of fishing. This means there is a strong need to find restraining rules that govern the conditions under which fishing takes place (when, where, with what kinds of gear, taking what kinds and ages of animals and so on). There is no thought that these kinds of rules will stabilize a fishery; it is assumed the fishery will remain subject to the high variability that seems characteristic of ocean ecosystems. But there is a sense that the fishery will remain viable and sustain itself over the long run.

Given this approach to restraining fishing, there also is no clear justification for the quantitative controls of a limited access or ITQ system. Fishermen clearly recognize (and often get wistful about) the economic benefits that would accrue to them through the reduction in competition (provided they were one of those who stayed in the fishery), but generally reject limited entry as unfair. Given their perception of the amount of biological control that is possible, it is difficult to argue that some should be given a privileged economic position by denying opportunities to others. Absent a clear conservation benefit, limited entry does not present a reasonable or fair social trade-off.

Major (legal) rules

Over the years an amazingly large number of rules have entered the books. The great bulk of these rules pertain to special local circumstances and to the sale, storage and transportation of lobsters. Only five basic rules set out the major restraints on fishing. They are:

1. landed lobsters must exceed a minimum size of capture, currently 3.25 inches measured along the carapace,
2. landed lobsters must be smaller than a maximum size of capture, currently 5 inches also measured along the carapace,
3. fishing gear is limited to traps (with certain design characteristics); nets, diving, dynamite and other methods of capture are not allowed,
4. egg bearing females may not be retained and landed, and
5. v-notched lobsters may not be retained and landed. (A v-notch is a knife cut in one of the five flippers at the end of the lobsters tail. Egg bearing females may be voluntarily v-

notched, making them illegal for two or three subsequent molts, generally two or three years. According to a recent survey by the Lobster Institute approximately 80% of fishermen voluntarily v-notch egg-bearing females".)

From the perspective of the theory that argues for limited entry these rules would generally be characterized as second best - a poor way to manage a fishery. If one accepts the assumptions of that theory, limits on effort and ITQ's can logically be demonstrated to yield better economic results and the same or better conservation results¹².

But the history of this fishery is that these rules work. The reason is that the long and tedious process of self-governance forces the rules to take into account the broad range and complex interactions among the social, economic and biological attributes of the fishery. Any consensus, by its nature, needs to satisfy almost everyone's sense of fairness and workability. As a result the process of rule creation lays the foundation for the belief that the rules will achieve their desired end, that the rules can and will be enforced, and that restraint on the part of the individual is in the interest of the individual and society. In effect, the process addresses the fundamental problem of an open access fishery in a way that does not occur with limited entry.

Enforcement of rules

The enforcement of both legal and extra-legal rules takes place at the community level and is, by and large, an extra-legal process. The reason for extra-legal enforcement is rather simple - there is almost no way that the rules could be legally enforced short of placing a policeman aboard every boat and at every dock. The physical and geographic conditions of the lobster fishery (almost any fishery for that matter) allow rule breaking to be easily accomplished. Consequently, effective enforcement must place through social sanctions. The effectiveness of social sanctions, in turn, is crucially dependent on the vast majority of fishermen believing the rules. If even a small part of the community feels the rules are not in their individual and collective interest or are unfair or unlikely to accomplish their objectives, the likelihood that other individuals will undertake the high costs often associated with social sanctioning declines dramatically (Acheson).

The manner of enforcement is restrained, but nevertheless might horrify the ACLU. As Acheson (1988) describes there is an elaborate system of escalating warnings. The pattern of warnings dif-

¹¹ Personal communication with David Dow, Executive Director of the Lobster Institute.

¹² It is interesting to note that the Canadian lobster fishery which has been a limited entry fishery since 1968 has basically the same set of rules (except (2) and (5) above) in addition to all those associated with limited entry. The biological performance of the two fisheries has been close to identical.

fers in the various areas of the coast but a person has to be extraordinarily dense not to catch on early in the game. Evidence of wrong doing has to be very strong otherwise the person or group who elects to be the enforcer may find themselves the object of sanctions. This leads to restraint in enforcement and a remarkable lack of violence.

Biological results

From a conservation perspective these five basic rules and their method of enforcement have led to excellent results. Landings are relatively stable, and have been sustained at the level of 17-30 million pounds annually since the early 1950's. The nature of the gear requirements (i.e., traps only) leads to what is called knife edge selectivity - mortality from fishing is almost completely restricted to only those lobsters that meet the legal size requirements. And v-notching and the maximum size limit appear to reduce the fishery's dependence on a single year class for spawning - a source of high recruitment risk in most heavily fished fisheries - and maintain a more than adequate spawning stock (Botsford, 1986). Overall the effect of the rules is to make the biological part of the fishery relatively immune to increases in effort.

Social and economic results

Socially and economically the fishery also produces very good results. In Maine there are about 7000 people (full time equivalents) employed directly and indirectly. A large part of the traps, boats and other equipment used in the fishery is produced locally (Briggs, et al., 1982). The lobster fishery is also a major source of economic opportunity, especially in the more rural areas of the coast. It is in many ways the 'port of entry' and 'port of exit' from other fisheries. It is very common for high schoolers to earn summer money by fishing out of a skiff with traps and gear cobbled together from older friend's and relative's left-overs. Many people enter the fishery; many fail and move on to other less desirable occupations. Those that succeed do so on the basis of the skills and knowledge they have acquired. The criteria for success is eminently straightforward - do you know how to catch lobsters. For those who learn quickly, who understand and practice the (sometimes subtle) cooperation required for success, and who are willing to adapt continually to the changing conditions of the fishery, it provides an often very good income. Most of those who successfully enter the fishery use it as a base from which they pursue other fisheries (scallops, shrimp, groundfish, sea urchins, etc.) and on-shore occupations (carpentry, boat building, etc.) on a seasonal basis. Many also leave the fishery to move into the off-shore groundfishery. And when the off-shore fishery becomes physically too taxing or when their fortunes there decline, they return to lobstering. In short, the ease of entry and exit from the fishery makes it the economic backbone of coastal fishing communities.

For purposes of conservation this social and economic structure is important because it is the basis for a long term commitment to the health of the resource. Few people in the fishery have equivalent opportunities elsewhere. The economic value of individual skills, assets, networks and opportunities are all bound up in the long term sustainability of the resource. Individuals, unlike a shareholder in a corporation, are not in a position to leave the fishery, except at great cost. Consequently, there is a strong interest in the long term viability of the fishery and a willingness to undertake short-term costs for long term benefits.

Governmental costs

With regard to governmental costs the fishery is a tremendous public bargain. The rules do not place heavy research, administrative or enforcement demands on the State. It is not necessary to annually assess the population of lobsters for the purpose of setting a quota. The administrative costs of the non-restrictive licensing system are minimal. Perhaps the greatest administrative cost is the time of the commissioner and one or two deputies who are continually caught up in the argument and debate surrounding self-governance. Although a strict accounting is difficult, the State¹³ estimates it employs the equivalent of six to ten full time employees for research and administrative purposes related to the fishery. For enforcement the State relies on 33 wardens to enforce the rules of all other fisheries, environmental regulations and safety rules, as well as the rules of the lobster fishery, along 3500 miles of coast¹⁴. There is no doubt that if fishermen did not self-enforce the rules of the fishery, a small army of wardens would be required.

There are other costs to this kind of management. Entry is relatively easy; consequently, competition is fierce and average incomes are definitely below what they might be if limits on entry reduced competition. With entry limits, fishermen feel they could negotiate a trap limit as well and reduce their costs substantially¹⁵. Strong competition increases the seasonality of the fishery and the problem of supplying a year around market - but pounding (a method of live inventorying of lobsters) and counter seasonal closures in the Canadian lobster fishery compensate. At times the extra-legal enforcement of legal and extra-legal rules has its ugly side. In extreme cases, especially in the very rare cases when there is violence to people or property, there is an absence of due process

13 Personal communication with Penn Estabrooke, Deputy Commissioner, Maine Department of Marine Resources.

14 In a straight line the Maine Coast extends about 250 miles. But the many long peninsulas, extensive estuaries and the large number of islands create a jagged and very difficult to patrol coastline that is estimated at 3500 miles.

15 "Extra" traps are used as a form of competition in the fishery; they are used to hold ground or to 'camp out' in order to deny other fishermen access to a particular part of the ocean bottom or to mark the boundaries of territories. (See Wilson, 1976 and Acheson, 1988)

that has disturbing implications. Generally, at such times, the wardens step in and cool tempers or they transform the situation into a fully legal one. Perhaps the most costly aspect of self-governance is the large amount of time and energy that goes into the discussion of the problems of the fishery.

Why does self-management work in this fishery?

The rule structure in the lobster fishery has evolved over nearly a century. The major constraining rules are unambiguous and simple. The rules are credible, well understood and fishermen believe the rules serve their best individual and collective interests. The rules are perceived as fair - in the sense that they do not provide an advantage to any group or class of individuals - and the conditions of the fishery make the rules enforceable (or maybe because the rules were chosen by fishermen, the ones actually implemented are enforceable).

The biology of the lobster also has made the evolution of the rules easier than it might be in other fisheries. Lobsters are relatively sedentary; this makes territoriality possible. (When the very same fishermen are engaged in the groundfishery, for example, they observe no territorial rules.) Undersized lobsters and egg bearing females are easily identified and can be caught and returned to the water without inflicting high mortality. The process of v-notching is possible with lobsters (unlike fish). As a result, fishing effort can be and is very effectively targeted at only a selected part of the population.

The localized nature of fishery is especially important to its workability. Fishing takes place, by and large, in inshore waters where fishermen easily observe one another actually fishing. Because the gear remains in the water and is identified by individual color schemes¹⁶, warnings about territorial intrusions and other violations of the rules, can be carried out without a face to face confrontation¹⁷. The buying and selling of product takes place within relatively small communities where anonymity is nearly impossible. Those same communities form the basis for a continuing discussion (or argument) about the problems of the fishery and their possible solutions, and, perhaps most important, the community through its networks of cooperation and exchange provides the economic basis for individuals long term interest in the health of the resource.

In short, the historical, biological, physical and social conditions of the fishery have all made the unplanned evolution of a virtually self-governing fishery possible. The question for fisheries management is whether these conditions are unique and not subject to replication elsewhere or whether

¹⁶ Required by the rules.

¹⁷ See Acheson, *Lobster Gangs*, 1988, for a description of the enforcement process.

they form an imperfect model which, with conscious intent, can be modified for use in other fisheries.

Broader lessons with respect to addressing the open access problem

The process of self-governance creates the circumstances in which users can and do identify conservation as in their individual and collective long term interest; this is the basic requirement for solving the 'problem of the open access'. The experience of the lobster fishery provides some idea about what is required to solve this problem:

Rules must make biological sense to the users; there has to be a credible connection between actions taken and expected results.

The process of rule making must proceed at a very low level - at the grassroots - because rule compliance and enforcement are critically dependent upon the individual understanding that self-interest is intimately tied with collective compliance. Absent this understanding on the part of the large majority, sanctions against rule breaking will not take place.

In a complex social, economic and biological environment rule making should proceed at a grassroots level in order to bring into the rule making discussion the relevant information/knowledge about individual and biological diversity.

Users have to have the institutional mechanisms that provide the forum and the resources that allow them to act upon their collective self interest, i.e., to engage in self-governance - rule making and enforcement¹⁸.

Rules must be fair and to be so must not arbitrarily disadvantage some people, including people not currently engaged in the fishery. A grassroots political process almost guarantees this.

Finally, self-governance and community are hard to separate. The networks of cooperation and exchange generated by community provide long term economic opportunities of substantial value to fishermen. Once established, these substantive benefits of community make it

¹⁸ It is worth noting that most developed countries have agricultural legislation that provides for the formal establishment of industry-wide governance. Called variously, market order, market boards, and so on, this legislation allows a large group of small, otherwise fragmented producers to join together to address their collective problems. In agriculture this is most often a marketing problem; but overfishing is clearly the kind of collective problem that could benefit from this kind of governance legislation.

costly for fishermen to leave the fishery (or to see it leave them) and create, consequently, an individual and collective interest in the long term health of the resource.

Summary

Maine fishermen are not a special breed. By chance, the conditions of the fishery and the politics of the State have led to the evolution of a system of governance that works. Imaginative management can create similar institutions in other fisheries. In many ways the operation of this fishery has strong parallels with the successful third world efforts to involve indigenous peoples directly in the conservation of parks, forests and other resources. There, as in the lobster fishery, the key to resolving the 'problem of open access' is to bring decision making down to as low a level as possible - to the people who have the most tangible long term interest in resource conservation. To do this we have to pay particular attention to the conditions and circumstances that make self-governance workable.

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