Maine's Lobster Fishery - Managing A Common Property Resource

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Introduction

The subject of this paper is a new approach to management being initiated in the State of Maine, USA. This approach is the result of years of informal discussions among people in industry, government and the university.

The description that follows is my personal interpretation of the rationale and possible directions the approach will take. As in any other fishery, our goal is biological sustainability. From a broad perspective, however, the initiative is based on the premise that fisheries management is a social problem that only can be solved with the development of appropriate institutions and individual incentives. Given the complexity of the ocean environment—especially the sources of sustainability—and given the difficulty of workable private property rights arrangements, this initiative places an emphasis on group or community rights and responsibilities.

This initiative differs from traditional fisheries management approaches in four distinct ways:

- **The Biology of the Fishery**. We depart from the usual single-species approach. Instead, we adopt an ecosystem approach.

  Ecosystem approaches to fisheries are like the weather: "Everyone talks about it, but no one does anything about it." The reason for inaction usually is the fearsome complexities that appear to accompany an ecosystem approach. But we don't think it is all that difficult, as I'll try to explain.

- **The Rules Necessary for the Restraint of Fishing**. In this regard, the Maine approach emphasizes rules that are consistent with an ecosystem approach. These are "when, where and how" fishing takes place, rather than the usual approach, which lays the emphasis on "how much should be caught."

- **The Human Side of the Fishery**. We depart from the conventional top-down, technocratic management approach and adopt a bottom-up, democratic approach. We believe democratic processes and responsibilities—especially at the very local level—are absolutely essential for the development of individual incentives appropriate to a sense of stewardship. Stewardship is an essential (in fact, superior) substitute for always-too-expensive and inadequate state policing. It also creates an atmosphere in which good science is not subverted by myopic political and economic interests.

- **Number of Participants**. We believe there have to be limits on the number of participants in the fishery. Our purpose is not to create an individual property right or to set controls on fishing effort, but rather to create boundaries for the democratic community involved in the management process. We want to identify who has rights to fish and has accepted the responsibilities that go along with those rights.

  To implement this, we are developing an apprenticeship system that will require new entrants to take a number of courses and spend two years working with a senior fisherman before they can be licensed. A secondary and incidental effect of the apprenticeship system will be to slow entry. But we see no reason why it should stop exit, as so often is the case.

This paper begins with an outline of the scientific and economic/social theories or perspectives that are at the root of this approach. It concludes with a description of: (1) the steps we have taken to begin implementing the approach and (2) the strategy we intend to take over the next few years.

Taking an Ecological Approach to Sustainability

Almost every fisheries biologist I know would agree that an ecosystem approach to fisheries management would be desirable, if it were practical. But most believe it is terribly impractical and probably even unnecessary.

The sense of impracticality arises when biologists attempt to envision the kinds of models and knowledge that would be required if we were to extend our typical single-species models in order to incorporate all possible ecological connections. Given the immense number of biotic and abiotic interactions that might have to be incorporated into our models and the enormous resources that would have to be devoted to measurement and monitoring the ocean—to say nothing of our current lack of knowledge of these interactions—the idea of an ecosystem approach seems, although desirable, preposterously impractical.

Besides, most fisheries biologists think it may not be necessary to incorporate all ecological interactions fully in order to manage fish stocks. So long as they can depend on the normal equilibrium tendencies in the population and so long as we fish at a moderate rate, stocks should stay in their normal range, and the kinds of single-species models used all along should be sufficient (Scott).

But our perspective on the logic that extrapolates from a single-species approach is this: There are other views of how an ecosystem is structured (Wilson et al.).

Most ecologists now view ecosystems as more than a collection of species; ecosystems have definite spatial and temporal structure. In nonfisheries ecology—especially recent work on landscape, meta-population and hierarchy theory—questions of extinction and abundance of individual species are a function of the state of the entire ecosystem (Gilpin and Soule; Gilpin 1987; Gilpin 1990; Harrison 1991; O'Neil et al. 1986). The system itself is seen as heterogeneous in space and time, with somewhat independent, patchily distributed subsystems and perhaps even sub-subsystems at various scales. Each of these subsystems may have a relatively distinct assemblage of species and habitat, depending on local conditions. Population sizes within a subsystem are likely to be highly variable over time, depending on environmental and other conditions—including the conditions that govern both the import and export of energy through migration and transport from other subsystems.

Collectively (i.e., from the system perspective), the multiplicity of subsystems creates redundancy that translates into resilience for the system and the species within it. If catastrophic local events occur that destroy or degrade one or several subsystems, rebuilding or recolonization can occur with migration from proximate, healthy subsystems. The speed of rebuilding depends on many factors, but probably is much slower than might be expected for any single species, due to the need "to fit the pieces together." So, one would expect subsystems to operate on a different and slower temporal scale than that followed by single populations (O'Neil et al. 1986).

So long as human activity destroys subsystems at a rate or in a spatial pattern that is no greater than the systems' ability to rebuild those subsystems, the system itself is maintained in what might be called a healthy or resilient state. But if a large number of subsystems in a system are destroyed or significantly impaired—say through destruction of critical habitat or removal of one or more important species from a local assemblage—one could expect the system as a whole to retain its basic organization and resilience only up to some point.

That point or threshold would be reached when the remaining functional subsystems are unable to recolonize damaged subsystems, either because they also are stressed and thus unable to export "colonists" or because the basic structure or functioning of damaged subsystems has changed, making them inhospitable to "colonists." Because proximity is important to rebuilding, one also might expect patterns of degradation to emerge, if the destruction itself is spatially selective.

At and beyond the threshold, the resilience stemming from redundant subsystems may be lost and, with that, the ability of the system to maintain its historically observed organization in the face of continuing stress. Healthy subsystems (in the sense of having the original structure) may begin to fail because they lack essential imports from other subsystems.

Individual species may lose their resilience and show abundance and scarcity unlike any observed historical patterns—most probably, an even greater than normal variability, with reduced *average* levels of abundance. System structure (species composition) itself may change dramatically if the stress affects some species more than others. Eventually, newly dominant species may create a systemwide environment that is unfavorable to the originally dominant species. The resulting system is likely to be one with many overfished species—even though total system productivity may remain unchanged. "Overfished" in this sense is simply the forced restructuring of the ecosystem (Hollings 1986; Hollings 1987). So, restoring such a system to its pre-threshold state is not likely to come about by simple reductions in fishing effort, but rather by the rebuilding of subsystems.

To a large extent, this roughly sketched systems approach repeats many major themes of traditional single-species theory, especially the idea that resilience (or surplus production) is a function of very large reproductive capabilities that allow populations to respond to fishing and other disturbances. These are the mechanisms of density dependence—which are the cornerstone of standard theory (Rosenberg et al. 1993).

The principal difference, of course, is that the newer approach sets its theme in the context of a spatially diverse system, taken as a whole. In this setting the health and resilience of individual species is a function of the state of the entire system. The deleterious effects of fishing are accounted for in terms of the accumulated net damage to subsystems.

In a system of this sort, one might expect individual populations to show the kind of resilience posited by traditional theory, so long as a large part of the subsystem structure remains unimpaired. Under these circumstances, a moderate level of fishing, implemented with a constant percentage of the stock harvested each year, might be appropriate—as the usual approach to fisheries argues. The principal management problem would be that of determining an appropriate moderate yield from the fishery.

From our perspective, however, even a policy of moderate levels of fishing is likely to fail in the long term, so long as fishing is able to affect the structure and resilience of the system through removal of subsystems (local populations, habitat, nursery and spawning grounds, and so forth). In fact, even with low or moderate fishing levels, one might expect to see distinct patterns of removal, dictated by the spatial economics of fishing.

This, in turn, could bring an alteration of system parameters. When these removals proceeded to the point that resilience and structure were affected, the problems of fisheries management would take on an entirely different coloration. The principal management question would become one of how subsystems might be restored and, in the longer term, what kinds of rules might be developed to prevent the continual erosion of system structure. If one views the ocean ecosystem from this perspective, then the conceptual basis of management shifts. Instead of trying to incorporate all possible biotic and abiotic interactions in our models, we begin addressing the ways in which the spatial and temporal structure can be maintained.

As a purely practical matter, this conceptual approach minimizes the amount of data, the extent of monitoring and the knowledge of ecosystem functioning that is required to manage the system. What must be monitored and tracked through time is the continuing state of subsystems. We need not know all the many interactions within and between subsystems.

But we do need to be concerned if we observe the loss or degradation of many subsystems. Because we also can expect to see a great deal of resulting variability in subsystems, the pattern of functioning is where we are likely to receive our strongest signals with regard to system health.

From the point of view of fisheries management, this perspective translates into the need to develop rules that prevent as much loss of subsystems as possible. For most of our fisheries today, this would require development of rules that allow previously well-functioning subsystems to regenerate. By and large, this would mean an emphasis on rules that determine the places and times and methods of fishing, rather than rules that state how much fishing can take place.

In other words, if sustainability actually is a function of the spatial and temporal structure of an ecosystem, rules that preserve (or minimize the damage to) that structure are what is needed. Rules about how many fish to catch do not address that need, except indirectly. Rules about how, when and where to fish can be tailored much more carefully to the requirements of sustainability.

Traditional Fisheries Concerns

As an aside: We realize that a shift away from rules governing how much fishing should take place raises immediate red flags of danger for fisheries biologists and economists trained in the classical single-species approach.

Fisheries biologists tend to argue that a healthy fishery inevitably will attract more effort and, in turn, that the increased effort will tend to destroy the healthy fishery—regardless of the gear, area or time restraints placed upon fishing. Consequently, the only cure is controls on entry or catch.

Economists worry about that, plus the dissipation of rents. In other words, their additional concern is too much investment of capital and labor, relative to what could be used to harvest the fishery.

Our response is that biologists overlook the economic effects of such things as closures, gear restrictions and so on. These kinds of rules tend to raise the costs of fishing—in some cases, dramatically. The result, of course, is to reduce entry to the fishery.

How much this will occur in a system-managed fishery depends on the extent and nature of the restrictive rules. If applied properly, even without controls on entry the approach should lead to a situation in which stocks are maintained, but profits for the marginal fisherman fall to the average level in the economy.

It is this aspect of the approach that concerns economists, because it signals the loss or dissipation of "rents." Economists' argument about loss of "rents" stems from the single-species model's idea of surplus production. The underlying notion is that Mother Nature undertakes the production of this surplus at no cost to humans. The value of this surplus can be wasted if unrestricted entry leads fishermen into a competitive race to capture the surplus; in the process of doing so, they will invest in excessive capital and labor in order to win the competition.

The cure, economists argue, is to restrict entry and/or to find other ways to eliminate the tendency toward overcapitalization. Unstated, but central to the notion of fishery "rents," is the idea that so long as moderate levels of harvest are observed, there is no cost to society from the harvest of the surplus.

In an ecosystem context, it is not exactly clear what or how "surplus production" should be interpreted. In one sense, it simply is energy removed from the system.

But, removing energy from a system cannot be viewed as having no effect. Its consequences have to be shifted to other parts of the system. In other words, the costs of surplus production may simply show up elsewhere in the form of increased (or decreased) populations of other species or in other changes of some sort.

If this is the case—if, from a system point of view, there is no surplus production, as such—then the economists' argument can simply be dismissed as an artifact of single-species theory. What that theory myopically identifies as "rents" may be more directly accounted for in terms of shifts in abundance elsewhere.

From this perspective, harvesting "surplus production" becomes simply another one of the many externalities generated by the fishery. The harvested population can be expected to have reduced competitive capabilities, relative to close competitors. And, over time, it can be expected to have a lower population. Other populations—especially unharvested close competitors—can be expected to accrue an advantage and an increased population.

There are many instances when this effect has occurred in heavily fished systems. Perhaps the most striking shift of this sort is the Georges Bank change from a system dominated by gadoids (cod, haddock, pollock) to one dominated by elasmobranchs (dogfish sharks and skates).

Whatever the case, the concept of "rents" in an ecosystem context certainly needs to be rethought and does not deserve at first glance the centerpiece role it plays in the economic analyses of fisheries and of other wild, renewable resources. Surplus production is one of the few instances in which economists believe in a free lunch. An ecosystem perspective suggests that the "no free lunch" doctrine should be extended to fisheries, too.

In short, therefore, we are aware of the concerns of traditional fisheries economists and biologists. We tend to think those concerns are inappropriate to an ecosystem approach. This is not to say that we do not have concerns about the implementation of an ecosystem approach; rather, those concerns are not the same as the ones that are central to single-species approaches.

Institutions Appropriate to an Ecosystem Approach

By " institutions," I mean laws, informal norms and customs, private contracts, organizational rules—in short, the kinds of purely human constructs that govern interactions among ourselves and between ourselves and the physical environment.

Institutions operate to restrain individual behavior. For that reason, they close off some opportunities. But the result of that restraint is the generation of a much larger set of individual and collective opportunities for gain. Economists usually see the principal gains in the form of increased opportunities for exchange. Put differently, institutions generally shift opportunities away from zero or negative sum games to positive sum games.

For example, rules against theft deny thieves certain opportunities. But those same rules create powerful opportunities for exchange, increased production and the accumulation of wealth.

Effective institutions are those that manage to generate individual incentives that are consistent or aligned with social objectives. Adam Smith's "invisible hand" explanation of market incentives in a competitive environment is one example of this kind of alignment.

Restraint also creates opportunities in fisheries. Fisheries institutions restrain certain kinds of behavior. If the restraints are appropriate, however, they create opportunities in the form of sustained fishing.

The attitudes and associated incentives that accompany this particular form of restraint are usually called stewardship. The ultimate goal of the Maine management strategy is to build an atmosphere of stewardship through appropriate institutions.

Institutional Requirements Under Ecosystem Management

The ecosystem view of the causes of overfishing gives rise to three very important problems that cannot be easily addressed by existing management institutions:

1. The approach demands attention be addressed to the many scales—especially small and local scales—at which biological processes and events (subsystems) take place. This contrasts strongly with the prevailing approach, which emphasizes a single large scale: the range of the stock.

2. An ecological approach requires recognition of the systemwide basis

for the sustainability of individual stocks (i.e., that the principal determinants of recruitment lie outside the factors specific to each population). Again, this contrasts strongly with the prevailing approach that assumes future recruitment is principally a function of each species' current population.

3. The complexity of ecosystem interactions means that institutions need to be tailored to a world in which the relationship between cause and effect is likely to be ambiguous and in which surprises are the norm. In contrast to the prevailing approach, which presumes "stochastic certainty" and emphasizes the direct control of fishing mortality, an ecosystem approach presumes little or no ability to exercise direct control over long-term population numbers. As a consequence, it emphasizes the idea of minimizing damage to the basic processes, events and habitat of the system so that natural production can function with as little disturbance as possible.

Criteria for Successful Management Institutions

This is the broad context to which institutions for ecosystem management must be well-adapted. By "well-adapted," we refer generally to institutions with attributes that lead to a sustainable fishery. We refer particularly to circumstances in which the incentives faced by individuals are aligned in the best possible way with the social goal of resource sustainability.

In the last two decades social scientists have made important progress in understanding the role of institutions (Ostrom 1997; Ostrom and Ostrom 1977; Williamson 1985; Eggertsson 1990; Ostrom 1992). Broadly summarized, successful fisheries institutions must have the following attributes (Wilson and Dickie 1995):

1. They must fully encompass the causes of overfishing within their control. The restraining rules must . . .

   - Control total effort at a level consistent with total system productivity,

   - Accommodate ecosystem phenomena at a variety of spatial and temporal scales,

   - Apply to all resource users, and

   - Avoid creating a situation in which control at one scale leads to undesirable results at other scales or sites. (If the causes of overfishing lie outside the institution's control, it fails.)

2. Institutions must be able to tie the application of rules credibly to an intended outcome. This is likely to be especially difficult in a complex environment such as fisheries because cause-and-effect relationships are always ambiguous. It therefore is critical that there be a sense among users that

a rule is reasonable. Participants must be convinced that restraint on their part will likely lead to the intended, positive result.

But, equally, if the intended result apparently will not be forthcoming, it must be clear that a reasonable process of revision and new rule development will take place. Institutions must go through a continuous learning process—a learning process very similar to the scientific process, complete with active feedback about failure or success. To the extent that credibility and an ongoing learning process cannot be established, administrative and enforcement costs rise and the success of the institution declines.

3. Institutions must provide individuals with reasonable assurance that others will follow the rules or face effective punishment. The process of rule development and negotiation—face-to-face discussions—is important to the reduction in uncertainty about the intent of other participants with regard to compliance with rules and agreements (Runge 1982). To the extent these assurances cannot be generated, the effectiveness of the institution declines or its enforcement costs rise.

4. Institutions must create equitable sharing of the costs and benefits of sustaining the resource. To the extent that equitable sharing cannot be arranged, individuals—not all, but some—may rightfully oppose the particular rules that lead to this result. In self-defense, they also may oppose the entire social objective. Thus, when individual interests cannot be harmonized with social interests, enforcement costs rise.

5. The institution must efficiently carry out the transactions required of management. Maintaining exclusive control (through measurement, monitoring and enforcement), developing credible rules, and maintaining harmonious incentives and assurances require extensive and intensive transactions. More than any other criterion, the ability to minimize the time and the opportunity and financial costs* of these transactions determines a workable institutional structure. To the extent transactions cannot be conducted effectively and efficiently, all institutional functions suffer.

No institution can perfectly meet these criteria. But institutions can be more or less well-adapted to their human and natural environments. In fisheries, what we believe to be the attributes of well-adapted institutions depends very much on our scientific view of the mechanisms that generate sustainability.

It should not be surprising, therefore, that institutions whose foundations

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* The costs of avoiding the higher costs of improperly carried out transactions, such as those based on incomplete or biased information, deceptions and so on.

rest on single-species theory do not appear well-adapted to ecosystem approaches.

Individual transferable quotas (ITQ's), for example, appear to be a near-panacea from the perspective of single-species theory. But from an ecosystem perspective, species-specific ITQ's are not likely to provide meaningful control over the sources of the long-run sustainability of each species. Those sources are found in the broader environment of the fishery.

For example, say flounder recruitment depends crucially on undisturbed benthic habitat, but that habitat is regularly fished with hydraulic clam dredges. An owner of a flounder ITQ would quickly conclude that the future value of his rights to the flounder fishery do not depend on his actions. So, two courses of action are open to him:

- He can attempt to bribe (or sue) the owners of clam dredge ITQ's in order to get them to desist from fishing in areas that are flounder nurseries.

- If that negotiation is unsuccessful or is accompanied by a large number of similar, cost-ineffective negotiations associated with each interaction that involves flounder, he might very well decide the rational way to behave is the same as in an open-access resource.*

The more that is learned about ecological interactions, the more an ITQ system is likely to give rise to newly understood externalities. Basically, the problem with an ITQ from an ecosystem perspective is that the institution is not likely to be able to address the sources of sustainability. As a consequence, credibility and incentive alignments are likely to break down, leading to typical open-access behavior.

Other traditional management approaches based on single-species theory appear equally maladapted to ecosystem management. Unitary control of the sort traditionally exercised by most national fisheries agencies (although rarely complete) is well-designed for the purpose of controlling fishing effort over the entire range of individual stocks. But, from an ecosystem perspective, this traditional approach is poorly adapted to deal with the multiple scales at which ecological events take place. Not only are there problems of dealing with large numbers of localized biological events, but also there are much more numerous and similarly scaled human activities associated with those events. Thus, one could expect the transactions costs of managing the multiple scales of an ecosystem to be very high for a unitary management structure.

In short, the organization of our current management institutions does not

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* One might possibly conceive of a system of species-specific property rights in which ecological externalities were resolved by an extensive web (paralleling all relevant ecological interactions) of private rules or contracts. The costs of negotiating, monitoring and enforcing such rules most probably would be prohibitively expensive. In fact, if there were resource "rents," the transaction costs of such a system might easily absorb those payments.

correspond well with the kinds of problems that can be expected to arise with ecosystem management. New institutional structures tailored to meet this different view of the fisheries management problem are required.

In our search for appropriate institutions, we have concluded that decentralized (layered), democratic institutions are most likely to produce the result of a sustained fisheries ecosystem. Our reasons are simply that democratic institutions appear more likely than any alternative to meet the five criteria cited above, given an ecosystem approach to the biology of the fishery. To be more specific:

1. A decentralized (layered or hierarchical) democratic arrangement can fully encompass the various temporal and spatial scales at which phenomena (biological and human) that are relevant to overfishing take place. Careful partitioning of authority can lead to coordinated policies at the various scales.

2. Democratic institutions, especially at the local level, are most likely to generate credible, enforceable rules because those institutions require consent among local fishermen. Additionally, in situations of uncertainty where learning is important, the relative independence of local units of governance can be expected to lead to a multiplicity of policies (or experiments) that can accelerate the overall management learning process.

3. Assurances that others are following the rules are best developed under circumstances in which a person can verify the behavior of others. Local democratic processes create the networks and conditions to generate such assurances most easily.

4. A democracy, like any other management process, inevitably will be forced to make difficult decisions that trade off current and future welfare. We believe democratic decisionmaking at the local level will respond to these problems by attempting to avoid as much as possible any allocative decisions that involve windfall gains or losses to participants. In order to accomplish this, a local democracy will tend to stick to rules that are relatively permanent in nature and are not a function of the current state of the resource.

   For example, a quota decision is very much a function of the current state of the resource. On the other hand, rules about how, when and where to fish are more likely to be tuned to. . .say, the annual occurrence of spawning activity, rather than how many fish are spawning.

   Relatively permanent rules about how, when and where to fish also have the distinct advantage of having no clear allocative outcomes. The complexity of the ecosystem is such that each user cannot easily determine whether a rule might or might not provide a competitive advantage in the long run; after all, the response of the ecosystem is as difficult to predict as the adaptations of human competitors. Consequently, this class of rules tends to have the effect of minimizing the game playing that takes place during the process of rule formation.*

In short, if these local democratic institutions use rules about how, when and where to fish, they can be expected to handle the problem of short- and long-term tradeoffs rather well. Given that expectation—combined with credible rules and processes and with assurances about fisherman compliance—the conditions for alignment of individual incentives and the social objectives of conservation are likely to be met rather well.

5. In addition, transactional efficiency is likely to be well-handled by decentralized institutions. An approach to fisheries management that emphasizes rules about how, when and where to fish requires a great deal of local information as a basis for decisionmaking. Thus, keeping local decisions as local as possible reduces the kinds of transaction/information problems that plague centralized institutions of all kinds.

   One of the "bedrock truths" of modern economics concerns the value of decentralization in complex systems. Corporations, political units or any other kind of complex human organization can be expected to operate more efficiently through reduction of transactions costs. There is no reason to expect complex fisheries management systems to be immune from this requirement.

It is possible to elaborate much more on the reasons why we feel democratic decentralization will prove to be the most workable approach to conservation of fishery resources.

Of course, there are circumstances and fisheries in which conditions seem to conspire to make the approach easily feasible. There are others in which the establishment of appropriate institutions will be more difficult. The Maine strategy for implementation of this approach may serve to illustrate these different circumstances.

Implementing a Democratic Approach

The Maine strategy is to "go slow" in order to keep arrangements as simple as possible and to build on existing customs as much as possible. Further, we intend to let the strategy evolve as part of the process.

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* This is likely to be much more the case at the local level, where spatially related rules cannot be used easily to the advantage or disadvantage of an individual or group. In his *Theory of Justice*, John Rawls points to similar salutory effects of uncertainty and, in fact, claims that the development of fair rules is dependent on uncertainty with regard to each person's expectations about the impact of the rule on his future welfare—what Rawls calls a "veil of ignorance." The complexity of ecosystem processes appears to assure this situation (Rawls 1971).

Consequently, at this time only a broad outline of the intended approach can be given. And this outline may change as participants in the process gain experience and alter the strategy. After all, our broad thrust is to give increasing responsibility for fishery rules to the users.

We have begun the process with our lobster fishery. This is a healthy fishery. It is the principal state fishery, and it has a rule structure consistent with an ecological approach (how, when and where). Perhaps most important, the lobster fishery has a long history of informal, local self-governance. Even at the state level, rule making basically has been the result of consensus among the major regions and associations within the fishery.

This process has not been without its problems. For years, fishermen have argued for trap limits. But, differences in the biological and other circumstances of the fishery have made a uniform limit infeasible—i.e., what is sensible in one region is nonsensical in another.

The need to tailor trap-limit rules to the different local circumstances within the fishery was the proximate initiating factor for the current strategy. In the past, the state might have tried to implement centrally determined rules. This time, however, it was decided the state would set up the institutions that would allow local fishermen to determine what was appropriate for their region.

On July 1, 1996, a system of local zones—each with an elected council—came into law after a long series of hearings and workshops.* The zones divide the state into seven areas that differ according to ecological conditions and manner of fishing. The number of fishermen in each zone varies from about 900 to 1,300.

Zone councils will have authority over rules that are purely local in nature. Initially, this authority will be limited to number of traps, traps on trawl,** and days and times fished. But, as experience is gained with the council process, this authority may be extended to other kinds of (still local) rules. Councils will be able to change fishing-related rules only through a referendum process that requires a two-thirds approval. This is a very conservative process, designed to assure strong consensus. It also is meant to remove any direct power from the council itself and any incentive for a small group to try to dominate the local council for the group's advantage.

If and when the lobster councils appear to be working, there are two logical next developments. We fully expect the creation of a new council of councils, designed to handle problems that extend beyond the local level. Other fisheries—urchins, scallops,

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* See the pages following this paper for the proposed zone/council system description used in the last round of hearings.

** "Traps on trawl" refers to a method of fishing in which a number of traps are strung along a line that is bouyed to the surface, usually at both ends.

eels, shrimp—are likely to be brought into the local council system. Exactly how this will unfold after July 1996 will depend greatly on what role the councils choose to play and what they choose to initiate. Still, to a great extent the state has begun to relegate itself to the role of supporting and facilitating these local governance processes. For example, we also are developing a system of scientific liaisons, with state and university scientists and the councils.

Conclusions

Whether this approach to fisheries management succeeds depends principally upon: (1) fishermen's willingness to accept collective responsibility for conservation of the resource and (2) the existence of institutions that provide a workable atmosphere in which collective decisions can be debated and made. Good science is important, but cannot drive the process. What must drive it is the incentives of individuals and groups. Provided there are the institutions to form and articulate those incentives, the demand for good science will come forth. If this approach is compared with usual fisheries management, its most fundamental distinguishing feature is that it puts the creation of appropriate individual incentives first and science second.

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SUMMARY*

Lobster Zone and Council Proposal from the Lobster Zones Working Group

Revised in response to public hearings

In June 1995 the legislature passed a law requiring the Commissioner of Marine Resources to establish lobster zones and councils. She appointed a working group of industry and industry-related professionals to fill in the rules for the operation of the zones and councils. These pages summarize the working group's efforts. In response to comments at public meetings held in January and February 1996, the role of the councils has been significantly simplified. The following is a description of the proposed council/zone system, when fully operational (i.e., on or before July 1, 1997):

1. Seven zones, each with an elected council.

2. Class I, II and III license holders ages 18 years or older will be eligible to vote in the zone in which they predominantly fish. Annual elections will occur at the time set by each council.

3. The role of the council is to develop proposals for changes in fishing rules that will be decided by referendum vote by mail of all zone fishermen. Council members in each

* Public document used to describe new zone/council arrangements for Maine lobster fishery.

zone will be elected for three-year staggered terms by district or harbor, in order to achieve broad and equitable representation. The election districts or harbors in each zone and the number of council members will be determined by each zone. In general, council members should represent 100 or fewer license holders. A provision for recall will be included in the Zone Council operating procedures developed by the Commissioner.

4. All changes must be made by referendum vote. A minimum of 2/3 of those voting is required for any change in fishing rules. The following rules are subject to zone decisions: (a) number of traps fished, including time allowed for compliance; (b) number of traps on a trawl; and (c) time or days of fishing.

5. All fishing laws will remain in place until or unless the zones vote to make changes within their power.

6. Zone jurisdiction will extend to the Area 3 line (approximately 30 miles offshore). Beyond that line, harvesters must abide by State rules.

7. Councils may apply rules differently in parts of the zone; for example, rules concerning traps on a trawl may vary from area to area.

8. A license holder may fish in more than one zone (or subzone), but must abide by the most restrictive of the zone (or subzone) trap limits and times or days of fishing throughout all his fishing activity. The more restrictive limit does not apply to traps on a trawl; rules regarding the number of traps on a trawl are considered place-specific.

9. In order to assure a smooth transition and follow the law, special procedures will be required during the first year of the zone and council system.

Transition Procedures:

Appointment of council members in the first year: The law requires the Commissioner to appoint the initial group of council members. During March and April of this year meetings will be held in each zone for the purpose of changing nominees.

First official election: The initial council members will serve no more than one year. Within that year they must hold an official election under the procedures set up for the council system. These initial appointed councils will not be able to initiate referendums regarding fishing rule changes.

Zone lines: Workable zone lines depend upon knowledge about local fishing practices. Consequently, the working group suggests that the lines established on July 1, 1996, be recognized as temporary until such time as the adjacent councils agree upon a final line.

Setting up council operating procedures: During the first year the councils must:

(1) establish final zone lines. The initial councils may recommend additional zones;

(2) establish the rules under which they operate; and

(3) define election districts that provide fair and equitable representation among fishermen and harbors.

Professional advice and resources have been identified to assist the councils in the initial setup work. A prototype of council operating procedures and bylaws will be provided to the council.