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The Lobster Fiefs: Economic and Ecological Effects of Territoriality in the Maine Lobster Industry

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Lobstermen from each community along the coast of central Maine claim inshore fishing rights in particular areas. Although their claims are unrecognized by the state, they are well established and backed by surreptitious violence. Two kinds of lobstering territories exist, here termed "nucleated" and "perimeter-defended," which differ essentially in the extent to which exclusive fishing rights are maintained. These differences in territorial organization affect the fishing effort of lobstermen, which in turn has a strong biological and economic impact.

KEY WORDS: lobster fishing; territoriality; common property resources; Maine.

INTRODUCTION

Fisheries throughout the world are characterized by a persistent and, in some cases, disastrous tendency toward overexploitation. The most important and widely accepted cause is the common property or "open-access" nature of legal rights in the marine environment (Christy and Scott, 1965; Gordon, 1954; 132). In the absence of ownership, fishermen have no incentives to curtail fishing activities in response to declines in catches or increases in costs, because no property right guarantees that fish not taken today will be available in large quantity or at greater weight in the future. What one fisherman does not catch today simply goes to the other fishermen (Crutchfield, 1973: 116-117).

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Accordingly, the fishing industry of the United States is having serious long-term difficulties, recently exacerbated by intense competition with foreign fishing fleets. In the New England area, cod, haddock, hake, and mackerel are far less plentiful than they were in the past, and the once flourishing sardine industry has been reduced to a shadow of its former self. In Maine, the site of our research and traditionally one of the most productive lobstering regions in the Atlantic, lobster landings have decreased very rapidly in recent years (Maine Sea and Shore Fisheries, 1973).

However, the lobster industry of Maine is an unusual fishery in that informal norms about territoriality and hence ownership do exist. Territorial arrangements have a substantial economic and ecological impact, with implications for the management of the Maine lobster fishing industry and for fisheries management as a whole. While the lobster catch in Maine is lower than in the past, the decrease appears to be highly differential: fishermen in some areas earn higher incomes and have a different effect on the biomass than those in others. Such differences can be explained in terms of variations in lobster fishing rights that exist in various parts of the Maine coast.²

GENERAL FEATURES OF THE MAINE LOBSTER INDUSTRY

The American lobster (*Homarus americanus*) is found in the waters off the Atlantic Coast of North America from Newfoundland to the Carolinas. However, Maine consistently produces far more lobsters than any other state, and our study area along the central Maine coast is one of the most productive areas of all.

Throughout the 1960s, there were approximately 6000 lobstermen in Maine. About 2800 of these men were full-time fishermen; the remainder were "part-timers" who earned most of their income "ashore."

The technology employed by lobstermen along the entire length of the Maine coast is relatively uniform. Lobsters are caught in wooden traps or "pots" about 3 ft long made of oak frames covered with hardwood lathes. Lathes are placed about 1.5 inches apart, allowing free circulation of sea water while retaining the larger, legal-sized lobsters (carapace length³ of over 3 3/16 inches and under 5 inches). The open end of the trap is fitted with a funnel-shaped nylon

² Some biologists would argue that natural factors such as food supply, predation, competition, and water temperature have a more important effect on lobster stocks and landings than the social and economic factors I am here concerned with. Water temperature fluctuations in Maine are highly correlated with landings for the period 1904-1967 (Dow, 1969). However, I hold that property rights are also critical to differentials in lobster landings. It is standard practice in fisheries biology to measure lobsters (in millimeters) on the carapace, from the eye socket to the back of the body, where the carapace ends and the tail begins.

net or "head," which lets lobsters climb in easily but makes it difficult for them to get out. Along the central part of the coast, the study area, one or sometimes two traps are attached to a small styrofoam buoy via a "warp" (nylon or hemp rope).⁴ Distinctive sets of colors, registered with the state, mark the buoys belonging to each lobsterman. Fish remnants obtained from nearby processing plants constitute bait. The traps are usually placed in the water in "strings," or long rows, so that a man can see from one buoy to another in the fog. On a good day (usually the calm morning hours), a lobsterman in this area might pull about 200 traps. Typical lobstermen have about 400-600 traps.

Most lobstermen fish alone from gasoline- or diesel-powered boats 28-32 ft long, equipped with a depth sounder, hydraulic "pot" hauler, ship-to-shore radio, and compass. In the island areas, boats may be somewhat larger, more often diesel-powered, and also equipped with radar, so as to cope with the more violent offshore seas and the fog. Capital investment in boats constructed at present prices ranges from \$13,000 to \$17,000; besides the boat, a lobsterman may have from \$8000 to \$10,000 invested in traps and fishing equipment, a pickup truck, a dock, and some kind of workshop. Replacement values easily run over \$40,000.

A lobsterman's activities vary greatly from season to season. The midwinter months are unquestionably the slowest time of year. During January, February, and March, when lobsters can be caught only in relatively warm, deep water, 3-10 miles offshore, lobstering is generally more dangerous and unprofitable. Bad weather and high winds increase trap losses and make the work more difficult. Some men stay ashore during this period to build lobster traps, while others use their boats for scalloping or shrimping. Those who persist in lobstering during the winter may pull their traps no more than six or seven times a month.

As the water warms in the spring, lobsters are available in shallower water closer to shore. Spring (April 15 to June 15) and fall (August 15 to November 15) are unquestionably the busiest months of the year, when men have a maximum number of traps in the water and pull them every chance they get. During the 3- or 4-week molting season (June 15 to August 15, depending on the area), traps are typically placed very close to shore — literally feet away from breaking surf. During this period, catches are so small that men bring many of their traps ashore and do maintenance work on their boats. In the fall, lobstermen begin to move their equipment into deeper water again.

While all lobstermen move their traps according to this general pattern, they are not all equally effective as fishermen. Skill and willingness to work

⁴ In the more southern part of the state, around Casco Bay, it is customary to attach six to ten traps to one "warp"; this practice is called "fishing trawls," in contrast to "fishing singles." In the Casco Bay area, lobster fishermen have many more traps than in the central region of the Maine coast, and they fish with larger boats and two-man crews. On a good day, a man "fishing trawls" might easily pull 350 traps while a man "fishing singles" could pull about 200 traps.

greatly affect catches and incomes. I know one very experienced man who has 300 traps and had a net income in 1972 of approximately \$21,000. Another man with only 5 years of experience, fishing in the same area with 900 traps, had a net income of only \$12,000. The first carefully places his traps in areas known through experience to be productive; the second scatters them over the bay.

Any sizable harbor has at least one lobster dealer who buys from local lobstermen and sells to tourists or to one of the three or four large wholesale firms distributing lobsters in Maine and the nation. While the prices lobstermen receive do fluctuate seasonally, there is little price competition in the Maine lobster industry. On any given day, all the dealers in the state are paying approximately the same price. Dealers compete for a supply of lobsters by attempting to attach as many lobstermen to themselves as possible. They supply "their" lobstermen with gas, oil, and bait at low margins of profit, allow them to use their wharfs free of charge, and supply them with large amounts of credit. A few fishermen sell to two or more dealers, and periodically a man will change from one dealer to another in rapid succession. But typically a lobster fisherman maintains a longstanding relationship with only one dealer and sells his catch exclusively to that dealer.

The location of dealerships is not connected to lobster fishing areas. A lobsterman usually sells to a dealer in his own home harbor, but he may sell to any dealer — regardless of location.

The federal government has made no effort to regulate the lobster industry, and the state of Maine has passed only a few conservation laws. To be legally taken, a lobster must have a carapace length of over 3 3/16 inches and under 5 inches. Regardless of size, breeding females are protected by a law requiring any lobsterman who catches an egg-bearing female to cut two notches in her tail flipper and throw her back. "Notched-tail" lobsters may never be taken. In addition, the state has a licensing requirement, and lobstermen must mark their traps and buoys with their license number and assigned colors. Despite the fact that only 37 state Sea and Shore Fisheries wardens patrol some 2500 miles of coast, these laws are now almost universally obeyed. Violations can result in court action and suspension of fishing licenses, which effectively bars lobstermen from the fishery.

There are few data on the relative effectiveness of these formal, statewide measures. However, in other lobstering regions and in other fisheries, such restrictive conservation laws have been found to exacerbate the problem of economic inefficiency and to have questionable effects on fish population levels (Crutchfield and Pontecorvo, 1969; De Wolf, 1974). Certainly the Maine laws do not begin to solve the problems inherent in managing a common property resource. They do not limit entry into the fishery and do little to restrict fishing effort. However, the informal norms concerning territoriality certainly do

operate to limit both. In all lobstering areas there are barriers to entry; and in some areas there are special local rules about the number of traps that may be fished or about local fishing seasons.

TERRITORIALITY IN THE MAINE LOBSTER INDUSTRY

From the legal view, anyone who has a license can go lobster fishing anywhere. In reality, far more is required. To go lobster fishing at all, one needs to be accepted by the men fishing out of one harbor; and once one has gained admission to a "harbor gang,"⁵ one is ordinarily allowed to go fishing only in the traditional territory of that harbor. Interlopers are met with strong sanctions, sometimes merely verbal, but more often involving the destruction of lobstering gear. This entire territorial system is entirely the result of political competition between groups of lobstermen. It contains no "legal" or jural elements.

As a rule, the area fished by any one harbor gang is quite small. In the summer, a man will rarely fish more than 3 or 4 miles from his home harbor, and even in winter, when men are fishing in deeper water, they are rarely more than 10 miles from home. Territories fished by one harbor gang are rarely more than 100 square miles; most are far smaller. This means that a lobsterman spends his working life crossing and recrossing one small body of water.

The dividing lines between most lobstering territories are relatively minor features which would be familiar only to men intimately acquainted with the area (see Fig. 1). Along shore, a rock, ledge, cove, or perhaps a big pine tree may mark a boundary. Offshore, boundaries are usually marked by reference to landmarks onshore or on islands.

To some extent, delineation of boundaries varies with distance from shore. Close to shore, boundaries are known to the yard. Farther offshore, boundaries are less definite. Thus in the middle of the winter, when men are fishing far from shore, there is a good deal of "mixed fishing" between two harbor gangs. In part, this pattern can be explained by the fact that it is simply more difficult to establish exact boundaries far from shore. More important is the relative competition

While the men fishing out of one harbor form very definite social entities, they do not have universally recognized names. One refers to the "Monhegan boys" or the "Friendship fishermen" or the "Pemaquid Harbor gang." I refer to these groups as "harbor gangs," although this term is used only rarely by the fishermen themselves. Usually the fishermen from one community form a harbor gang, but this is not always the case. For example, some of the men who live in the village of New Harbor fish out of Pemaquid Harbor and others out of New Harbor itself. Moreover, the men who fish the areas around some of the unoccupied islands in Penobscot Bay live onshore and commute daily to the islands to fish. Even though they may reside in different towns, they form some of the most cohesive harbor gangs along the entire coast.

fishing bottom. In the winter, lobsters are available over a wider area and fewer men are fishing. In the summer, when more men are fishing shallow areas along shore, there is more competition and more interest in maintaining exact boundaries.

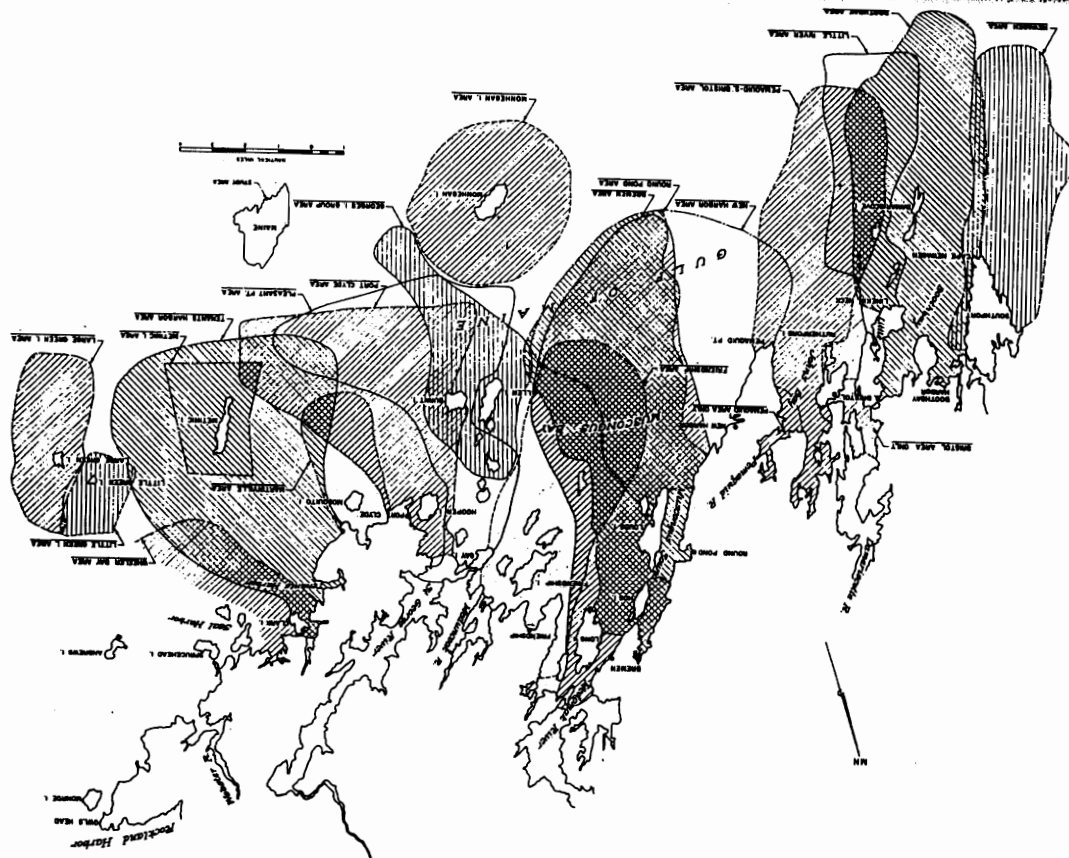
Violation of territorial boundaries meets with no set response. An older, well-established man from a large family might infringe on the territorial rights of others almost indefinitely, whereas a new man or a "part-timer" would almost certainly have trouble very quickly. Sooner or later, however, someone — usually one man acting completely on his own — will decide to sanction the interloper. First, the violator may be warned, usually by having his traps opened or by having two half-hitches tied around the spindle of his buoys. If he persists, some or all of his traps will be "cut off." That is, his traps will be pulled, the buoy, loggins, and warp cut off, and the trap pushed over in deep water where he has little chance of finding it.

Small-scale trap cutting is a constant problem all along the coast. There are, however, factors keeping trap cutting at a minimum. Most important is the knowledge that the destruction of traps will bring almost certain retaliation. Perhaps once a decade, these small incidents escalate into full "lobster wars," in which dozens of men thrust against each other in widespread forays, destroying large numbers of traps and even boats (Acheson, 1974).

All conflicts, regardless of how many men are involved, are kept very quiet. No matter how justified a man feels in "cutting off" another man's gear, he will rarely advertise his "skill with the knife." Trap cutting is illegal and can lead to loss of license; silence reduces the chances of retaliation by victims. Thus, when trap cutting occurs, people in coastal towns and state officials are apt to hear only vague rumors, but not the details, from the primary actors themselves. Even the victims remain silent because legal prosecution is usually unsuccessful and there is a strong feeling among fishermen that the "law should be kept at a distance." The result is what Bailey (1969: 144-147) calls an "encapsulated system" — one political system operating with its own set of rules within a larger system.

There are two different types of lobster fishing areas along this part of the central Maine coast. I am calling them here "nucleated" and "perimeter-defended" areas.⁶ The lobstermen do not have terms for the different territorial arrangements, although they are aware of the differences, which essentially relate to the amount of mixed fishing allowed. In the western part of the study area (between Cape Newagen and Friendship), territorial arrangements are highly nucleated. That is, men from each harbor gang have a strong sense of territoriality close to the mouth of the harbor where they anchor their boats.

⁶In a previous article (Acheson, 1974), I referred to the differences in these areas in terms of "open" and "closed." I have abandoned this terminology as misleading and have adopted these new terms from Hockett (1973: 69).



But this sense of "ownership" grows progressively weaker the farther from the harbor mouth one goes. On the periphery there is almost no sense of territoriality and a good deal of mixed fishing takes place. In fact, in this area virtually all the deepwater fishing grounds exploited in the winter are fished by men from at least two harbors. (Areas of overlap may be fished jointly by men from particular harbor gangs but are not open to men from any harbor.) A stranger trying to fish in an area close to a harbor nucleus would almost certainly meet with violent opposition from a number of men. However, the reaction would be much less violent if he were to invade an area fished by multiple harbor gangs, where the sense of ownership is weaker.

Farther east on the mainland (see Fig. 1), the territories are still basically nucleated, although lobstermen say that boundaries become "harder," meaning that there is less area where mixed fishing is allowed and that larger areas are fished exclusively by men of a single harbor gang.

The island areas of Penobscot Bay are, however, perimeter-defended territories. Particularly in the cases of Monhegan, Matinicus, Green Island, Little Green Island, and Metinic Island, boundaries are sharply drawn and defended to a yard. Definition of the areas is in terms of their outermost boundaries, and the feeling of ownership does not sharply decrease with distance from the island harbors where the men anchor their boats. There is very little mixed fishing. Even in winter, when fishing offshore in deep water, men from these perimeter-defended territories rarely venture into areas they do not claim for their exclusive use. Periodically, a man may furtively and guiltily put a few traps outside his own area where he thinks no one will notice, but there is a strong feeling that if one is going to keep others on their side of a boundary one should stay on one's own side.

In both types of territories, but most clearly in the perimeter-defended areas, claims over ocean areas are tied up with formal ownership of land. Ownership of land on an island is held to mean ownership of "fishing rights" in nearby waters, despite the fact that legally the ocean areas are part of the public domain. On Matinicus, for example, no one is allowed to fish in the island's territory unless he owns land on the island. A major argument against selling land to "summer people" is that thereby an island family may lose its fishing rights. One man bought a very small island in the Muscle Ridge channel solely to gain fishing rights to adjacent waters. He does not live on the island, and does nothing else with it except to use the surrounding ocean for lobster fishing.

In perimeter-defended areas, ownership rights to the waters are not merely usufructuary. Even if the owner is not using his water territory, his fishing rights remain, and may be rented out. In these areas, ownership rights are so strong that men who own whole islands rent out "water areas" to men from nearby mainland harbors. Most of the lobstermen fishing in the Metinic Island area, for example, rent fishing rights from the two families who are legal owners of the

island. The family members cannot completely exploit the island's water area, and so they outfit several men from the mainland with boats and gear and allow them to go fishing in their preserve. Arrangements vary considerably, but in some cases the families take half the gross income of these renters as return on the capital equipment and as rent on the "water area." These rental rights are traditionally held, and inherited patrilineally, as are land property rights.

A critical difference between nucleated and perimeter-defended territories is the extent to which entry is more severely limited and controlled in the latter. In nucleated areas it is relatively easy to gain acceptance to harbor gangs. If a man is a resident of the community and shows a willingness to abide by local fishing norms, he will eventually be accepted into the local harbor gang.⁷ It is vastly more difficult to gain admission to harbor gangs that maintain perimeter-defended territories. This is to be expected, given the nature of such defensive boundary arrangements. The object of maintaining strict boundaries is to keep down the number of men fishing in an area. There is no sense in maintaining sharply defined boundaries by violence against other harbor gangs if anyone can join one's own gang. Thus, men who strongly defend the perimeters of their territories also limit membership in their own harbor gangs to a much greater extent than do men fishing in nucleated areas. As will be seen below, this results in more fishing area per fisherman than is evident in nucleated areas.

Entry to harbor gangs in perimeter-defended areas is essentially limited to men who belong to families owning the land and adjacent water areas, and to men who are accepted on a rental basis. The unoccupied islands (Green Island, Little Green Island, and Metinic) are each privately owned by one or two families, whose members reserve all fishing rights solely for themselves. It is virtually impossible for a newcomer to enter these harbor gangs, except in some instances as a renter. A few newcomers, however, have been able to establish themselves as fishermen on permanently occupied islands such as Matinicus and Monhegan. Usually such men are already known to the islanders; several come from families who have summered on an island for years, so that they grew up with island children. Normally they begin fishing as helpers, or "stern-men," and eventually

⁷Entry into harbor gangs is, however, by no means "open." Admission depends on a combination of factors. In all nucleated harbors a man will most easily gain admission if his family has long been resident in the town, if he began fishing as a boy and has gradually become a full-time fisherman, and if his father is a fisherman. Such a man inherits a place in his father's harbor gang. A man will have the most difficulty if he is not a long-term resident, if he began fishing as an adult, if he plans to fish part-time, and if his family has no connection with fishing. However, the most critical single factor is a man's willingness to abide by the local norms of the industry. One who gains a reputation for molesting other men's gear will not last long in the industry, regardless of family ties or long residence. The strong prejudice against part-time fishermen can be explained by their relative invulnerability to the effects of transgressing the norms; with little capital investment and with alternative means of employment, the part-time lobsterman may suffer little from trap cutting and other sanctions.

are permitted to purchase land (if their families do not already own land) and to become full-time fishermen. In the process these men are carefully scrutinized, and would be rejected if they made any trouble or showed any unwillingness to abide by local norms.

PROCESSES OF BOUNDARY MAINTENANCE AND CHANGE

Before 1920, all lobstering areas along the Maine coast were undoubtedly perimeter-defended areas. While most of the areas are now nucleated, the advent of such territories is a relatively recent phenomenon, and the change from perimeter-defended to nucleated areas is by no means complete.

Fifty years ago, lobstering was done only in the summer in very small territories held by small groups of men who defended them vigorously. In great part, this pattern was connected to the technology in use. Since lobstering was done from a sloop or dory, fishing in stormy winter waters was very difficult. Even in summer, the area that one could fish was very limited, since one could learn the bottom only by hand lead line and the travel radius was small. Since a man's income was dependent on a very small area, he zealously maintained its boundaries. These small territories were typically held by a small group of kinsmen, and were passed down to descendants patrilineally. Fishing areas were usually adjacent to legally owned coastal property, where it was felt the landowner had a right to the lobsters in the waters off his "very own property."

This pattern has persisted to the present day, as we have seen, around the small privately owned islands of Penobscot Bay, around the large permanently occupied islands farther out to sea (i.e., Matinicus and Monhegan), and to some extent near the mainland harbors in the eastern part of the study area. In the western part of the study area, this pattern has completely broken down. The small perimeter-defended territories have been amalgamated into larger nucleated areas where most ocean area is fished by men from at least two harbors.

The breakdown of small, perimeter-defended territories was made possible by technological change. As motors came into common use in the 1930s, the range a lobsterman could fish increased. In the 1950s, the use of depthfinding equipment, which made it relatively easy to learn the characteristics of the bottom, further increased the effective range a lobsterman could fish. While the new technology increased potential fishing area, one cannot explain why the older system of small perimeter-defended areas has persisted in the east and around certain islands but has broken down completely in the western part of the study area.⁸ As we have seen, the technology is the same along the entire coast.

⁸ The major criterion by which the lobstermen of this part of the Maine coast differentiate between what we call nucleated and perimeter-defended areas is a perceived difference in

Several different sets of factors have produced the differential boundary breakdown. While these have been discussed in detail elsewhere (Acheson, 1974), several points bear repeating. First, boundary breakdown or maintenance is the result of conflict and political pressure. Second, the willingness to defend a boundary or invade another area depends on (1) the ability to form what Bailey would call "political teams" (Bailey, 1969: Chap. 3) and (2) the alternate income opportunities open to the men in question.

The technological and political factors, operating in different geographical contexts, have produced the different kinds of areas we have been discussing. In the western part of the study area, where the coast is strongly convoluted and formed into deep bays, the traditional areas of communities on open ocean have been under great pressure from men in towns farther up the rivers and bays. Before the advent of engines, men from bay communities, such as Bremen and Muscongus, had to restrict their fishing to the summer months when they could catch lobsters in the waters close to their home harbors. During the past few years, more and more men from such bay communities have been purchasing larger boats capable of fishing in open ocean. Since one cannot cover the costs of a \$15,000 boat by using it only during the summer, these men must fish on a year-round basis. This means that they must invade what were formerly the exclusive territories of towns such as New Harbor and Friendship on open ocean. Obviously, such men are willing to sacrifice a great deal to get to open water. The alternative is to be bottled up in small traditional territories near their home harbors where they can fish only a few months a year.

Thus, it is not surprising that the traditional perimeter-defended boundaries in areas at the mouths of estuaries have broken down, resulting in nucleated fishing territories. Around Muscongus Bay and the deeply indented bays of Boothbay region, harbors on the ends of peninsulas are apt to have very small areas for exclusive use. The rest are fished jointly with men from harbors farther inland. The amount of mixing is especially great in winter, when men from more inland harbors must come outside. However, perimeter-defended areas have been maintained farther up these rivers and bays.

For the men in the invaded areas, it is not worthwhile to repel the interlopers. It is true that invasion means that men from harbors on open ocean will have more competition in areas which they once held exclusively. This will ultimately mean a smaller yield for them. However, an attempt to stop the men

their defenders' propensity for violence. Their explanations for the difference are usually in cultural terms. Men from areas like Monhegan are believed to have traditional ideas about territoriality, to be very secretive and competitive, to cooperate rarely, and to be prone to use force and violence in defending their territories. Such "traditional" attitudes and behaviors are linked to factors such as older age, less education, and greater isolation from the outside world. None of these characteristics accurately describes the violence-prone men of perimeter-defended areas, who are, in fact, better educated and more sophisticated than most men fishing nucleated territories.

from upriver from their incursions would mean a full-scale "war," resulting in large financial losses. Even though there is some bitterness directed toward the men from bay communities, men from open-ocean harbor gangs feel it is better to mix than fight.

The men from ocean harbors feel this situation is very unfair. They would not mind yielding some of their exclusive areas if they could fish farther upriver during the summer. There is a good deal of hard talk about the "river rats who invade our areas but will not allow us to fish upriver." The invaders have a different point of view. As one of the older fishermen from a bay community phrased it, "If the old boundaries were maintained, we would have no place to fish much of the time. We would all have to be part-time fishermen." They clearly have no intention of reverting to part-time status again.

A combination of factors has allowed the small perimeter-defended areas to be maintained around some of the islands in our study areas.

First, men from mainland harbors have not been aggressive in pushing into these outer islands. Distance alone has had a dampening effect on the offensive ardor of the mainlanders. Islands such as Monhegan and Matinicus are over an hour from the nearest mainland harbor even for the fastest boats. Moreover, mainland harbors in this part of the coast, e.g., Pleasant Point, Tenant's Harbor, and Port Clyde, have both shoal water and deep water so that members of these harbor gangs can go fishing year round without pushing into areas controlled by other men. (In this respect, these areas are unlike upriver ones such as Round Pond and Bremen.) Second, and more important, these mainland harbor gangs are composed of larger numbers of men, who are not organized in ways that allow political effectiveness in the long run. Friendship, for example, has about 95 lobster boats owned by men who live in at least three towns and who have little in common besides occupation. The same is true of other mainland harbors in the area. Periodically, one man or a few men will attempt to put traps in areas controlled by island gangs, but their lack of organization prevents aggressive, long-term efforts which would result in change in boundary lines. In fact, I am aware of no instance where all the men of a nucleated territory have acted in concert to defend their own territory or to invade another.

"Owners" of island areas have long put up a spirited defense of their boundaries. Several factors have made them very effective.

These islands are owned and controlled by a small number of nuclear households strongly linked by ties of agnatic kinship and their need for mutual self-help. Their activities are customarily coordinated by older, experienced adult men, who rule their sons and nephews with an iron hand, and who have a great deal of influence over non-kin. Their small numbers, kinship ties, and a longstanding tradition of cooperation make it relatively easy to coordinate the defense of their lobstering area.⁹

⁹ The social organization of Maine offshore islands is the topic of a future publication.

The vehemence of this defense is bolstered by the fact that residents of islands do not have the alternative economic opportunities that men from mainland harbors have. Moreover, their long-term ownership of island property gives them special claim to the adjacent ocean areas. At least one family has owned an island since the mid-eighteenth century. In Maine, where virtue is attached to remaining in the same place for a long time, this family's claim to its traditional fishing area has strong moral overtones. Friends and enemies alike see the family as preservers of a valued tradition or admired *status quo*. To a great degree, this is true of all the perimeter-defended areas. The defensive posture of perimeter-defended areas is further enhanced by the fact that some prominent men from these areas have been able to use their wealth and long residence in the area to gain political eminence in the region as a whole. Thus, for the time being, there are several areas along the coast where perimeter-defended areas remain — little fiefs carved out of the public domain.

PERIMETER-DEFENDED VS. NUCLEATED AREAS: DIFFERENTIAL EFFECTS ON THE ECONOMICS AND ECOLOGY OF MAINE LOBSTERING

The remaining perimeter-defended territories are held by men who tend to form highly effective political groupings which serve both to severely restrict entry into the fishery of these areas and to enable to enactment of local conservation measures. Both these factors have produced great differences in fishing effort between nucleated and perimeter-defended areas.

Differences in ease of entry into harbor gangs fishing the two different kinds of areas have produced substantial variation in the number of boats (and fishermen) per square mile. Data comparing three perimeter-defended areas with three adjacent nucleated areas show that men from perimeter-defended areas have far more fishing area per boat than those from nucleated areas (Table I).

In reality, the difference between the nucleated and perimeter-defended areas is far greater than these figures indicate. First, in the nucleated areas, not all of the ocean bottom is productive of lobsters. An estimated 25% of the area fished by Friendship and New Harbor men is mud bottom. This rarely produces lobsters. More important, much of the area fished by men from nucleated harbors consists of zones of mixed fishing. Men from New Harbor, for example, fish over 44.7 square nautical miles of ocean. But only approximately 12.6 square nautical miles of that is fished exclusively by men from New Harbor. The men from Port Clyde fish some 30.4 square nautical miles, but 13.3 square nautical miles of that area they share with men from other harbors. By way of contrast, *all* of the area "owned" by men in perimeter-defended territories produces lobsters at some time in the seasonal cycle; and no part of these territories is fished with men from other harbor gangs. Thus, if the amount of productive

Table I. Square Miles per Boat in Nucleated vs. Perimeter-Defended Areas^a

	Harbor	Number of boats	Total area in square nautical miles	Square nautical miles/boat
Nucleated areas	Port Clyde	39	30.4	0.78
	New Harbor	36	44.7	1.2
	Friendship	95	25.3	0.27
Perimeter-defended areas	Green Island	8	11	1.4
	Metinic	7	10.8	1.5
	(south end only) Monhegan	12	20	1.7

^aOnly the boats of full-time fishermen have been counted. Part-time (skiff) fishermen have been excluded. The number of boats, and not number of men, has been used since many boats carry more than one man.

fishing bottom and the amount of mixed fishing were taken into account, the ratio of square nautical miles per boat would be far lower than indicated in the case of these nucleated areas.

Since there are fewer boats per square mile in perimeter-defended areas, and since men fishing in those areas use no more capital equipment per man than those in nucleated areas, there is a great difference in the amount of fishing effort in these types of territories. Thus, in perimeter-defended areas, a higher proportion of the lobsters reaching the minimum legal size remain uncaught and grow to larger sizes.

Another difference between the two types of areas is that conservation efforts are practiced in the perimeter-defended territories. The men fishing off Matinicus Island, for example, have voluntarily agreed to limit the number of traps they fish. Such trap limits have two benefits. First, they increase a fisherman's profits by lowering his production costs. A man with a small number of traps does not spend as much for trap stock, and usually pays less for bait, fuel, and boat depreciation as well. Second, a man with fewer traps keeps better track of them, pulls them more frequently, and loses fewer. This reduces lobster mortality, since lobsters in lost traps are apt to be permanently incarcerated. Moreover, when traps are pulled frequently, molting lobster which would otherwise have been eaten by their brethren are released and given a better chance of survival.¹⁰

¹⁰State biologists are convinced that a very large number of lobsters are killed by being caught in unintended or lost traps. In the past, bills have been unsuccessfully introduced requiring fishermen to pull their traps every 48 hr. At present, a "venting bill" is being introduced. This would require that one lathe on each trap be made of wood that rots quickly. Such traps, if lost, would automatically release their victims in time to prevent excessive mortality.

Trap limits do not cut down the total catch. When trap limits are imposed, men dispense with the marginal traps—those not fishing well—and put the remainder to better use so that yield per trap is increased. Thus, with a trap limit, it may take men a little longer to catch the same volume of lobsters, but over the course of the annual cycle the same catch is harvested.¹¹

Monhegan Island, another perimeter-defended territory, is attempting to conserve the lobster resource in its area by imposing a closed season. The inhabitants of Monhegan have persuaded the legislature to pass a law forbidding fishing in Monhegan waters from June 25 to January 1. Thus, Monhegan lobstermen are fishing in midwinter when the price for lobster is very high and when they have few other economic options. They put their traps "on the bank" in the summer when they have alternate employment in the tourist industry, leaving the defense of their territory to the state fish wardens. This closed season keeps anyone from setting traps during the critical months of July and August, when fishing for molting lobsters would result in very high mortality.

It is critical to note that one man cannot gain the benefits of a trap limit or closed season by unilaterally reducing the number of traps he fishes or the number of months he fishes. If he reduces his fishing effort (and others do not), he is obviously putting himself at a competitive disadvantage. But if everyone reduces effort simultaneously, then each man will still catch his "fair share" of lobsters. Such conservation measures will work only in areas where everyone agrees to them. So far this has occurred only in perimeter-defended areas, where harbor gangs are organized to enforce strong controls over the actions of their members and defend their area. Such voluntary controls are not characteristic of the relatively loosely organized harbor gangs fishing nucleated areas. These gangs are unable to control their own members, to defend effectively much area for their exclusive use, or to limit drastically the numbers of men they allow to fish in their area.

There is a persistent rumor along the coast that men fishing in areas such as Green Island, Monhegan, Matinicus, and other perimeter-defended areas earn larger incomes and catch larger lobsters than men fishing anywhere else along the coast. The reason, lobstermen explain, is that the "islanders reserve private fishing areas for themselves and keep everyone else out." A preliminary study indicated that these rumors had some substance to them.

We hypothesized that the differences observed were due to the differences in effort and fishing practices discussed above. To verify this set of hypotheses, we set up a project to gather data on the relationships among type of territory (nucleated or perimeter-defended), income, catch size, fishing effort, estimated stock density, and other measures. Two types of information were

¹¹The Canadian government has instituted trap limits in a number of lobster fishing districts in New Brunswick and Nova Scotia with no noticeable decrease in annual total harvest (De Wolf, 1974).

collected. First, between June 1972 and May 1973, 28 lobstermen were persuaded to give detailed information on income and business expenses. Unfortunately, it was early in 1973 that the U.S. Internal Revenue Service began an intensive investigation of the men in the Maine lobster industry. A very high proportion of the fishermen in Maine were "overhauled" by the IRS. Many men were forced to pay additional tax money, and several have been charged with criminal fraud. Late in the spring of 1973, men had become so fearful and suspicious of anyone asking information about income that this part of the project had to be dropped. However, enough data had been collected in the preceding months to allow us to come to tentative conclusions concerning the economic effects of territoriality.

Second, 14 lobstermen from various harbors were asked to record data on their catches twice a month from March 1973 through January 1974. On every string of traps pulled, they recorded the date, location of the string, depth (in fathoms), number of "setover days" (number of days since the trap was last pulled and rebaited), and whether the string was in an area fished exclusively by men of one harbor or in an area of mixed fishing. On every trap pulled, they recorded another set of data: the carapace lengths of the legal-sized lobsters caught in that trap and the length of the proven breeding stock, i.e., female lobsters carrying eggs or with notched tails. To facilitate the recording of these data, the men were provided with metric calipers and data sheets. About a fourth of the total information was obtained by members of the University staff who accompanied the fishermen. Data were obtained on 9089 lobsters, of which 3327 were caught in nucleated areas and 5762 in perimeter-defended areas.

The lobstermen were chosen with a view toward controlling for several important variables. To control for ecological differences, all were picked from the same small study area. Seven men fish in nucleated areas, the other seven in perimeter-defended areas. All areas in this part of the study are adjacent to each other. In some cases, the men from nucleated areas are fishing only yards away from the men from perimeter-defended areas.

Moreover, the amount of capital used by the men studied is comparable. On this part of the coast, lobstermen use between 350 and 600 traps per man. The exact number a particular man uses depends less on the type of area he fishes than on factors such as age, skill, and ambition. More men fishing the offshore islands have larger diesel-powered boats with radar. But not all boats on islands are large, and many men on the mainland have comparable investments in boats. In short, there is no obvious difference in the amount of capital employed by the men in nucleated areas and by those in perimeter-defended areas.

The lobstermen claim that a difference in skills makes an enormous difference in the number and size of lobsters caught. While there has been no research on this point, I have little doubt that they are correct. To control for skills, all the men chosen were full-time fishermen, with a reputation for marked success.

From the information gathered during the carapace-measuring project, there is unmistakable evidence that a reduction in fishing effort in the perimeter-defended areas has resulted in both biological and economic benefits.

Biological Benefits

First, the lobsters caught in the perimeter-defended areas are larger than those caught in nucleated areas. This can be demonstrated by analyzing the frequency distribution of lobsters caught.¹²

From Fig. 2, it can be seen that men catch a much higher percentage of small lobsters in the nucleated areas than in the perimeter-defended areas, and a higher percentage of larger lobsters in the perimeter-defended areas than in nucleated ones. For example, 8% of all lobsters caught in nucleated areas were 83 mm, but only 6.4% of those caught in perimeter-defended areas were. Additionally, 1.9% of the lobsters caught in perimeter-defended areas were 98 mm, whereas only 0.8% of those caught in the nucleated areas were this big. Since a high proportion of the lobsters which molt into the legal size range are immediately caught in nucleated areas, fewer survive to larger sizes compared to those in perimeter-defended areas. This is reflected in the fact that the mean carapace length of lobsters caught in the nucleated areas is shorter (87.8 mm) than that of those caught in the perimeter-defended areas (89.9 mm).

This difference in size undoubtedly has a profound influence on the numbers of eggs released in the water in these two types of areas and ultimately on the long-term prospects for the lobster fishery itself. Only 6% of female lobsters become sexually mature under 90 mm (carapace length), while nearly all females are mature by 105 mm (Krouse, 1973: 170-171). Thus, all but a very small proportion of female lobsters become sexually mature between 90 and 100 mm. (There are no figures available indicating when an *average* female becomes sexually mature.)

The percentage of lobsters in the critical size range (90-100 mm) is higher in the perimeter-defended areas than in the nucleated ones. There can be no question that a higher percentage of female lobsters in the perimeter-defended areas than in the nucleated areas are reaching a size where they can possibly extrude eggs.

This conclusion is further buttressed by the fact that the probability of a female reaching maturity in the perimeter-defended areas is 1.52 or nearly 50% higher than it is in the nucleated areas (Wilson, 1975). In our sample, 2.7% of

¹² The difference in the mean carapace length of lobsters caught in the nucleated vs. perimeter-defended areas is very small. However, since females become mature between 90 and 100 mm, these slight differences in size are very significant for the fishery, since they mean that there is a much higher proportion of mature females in the perimeter-defended areas.

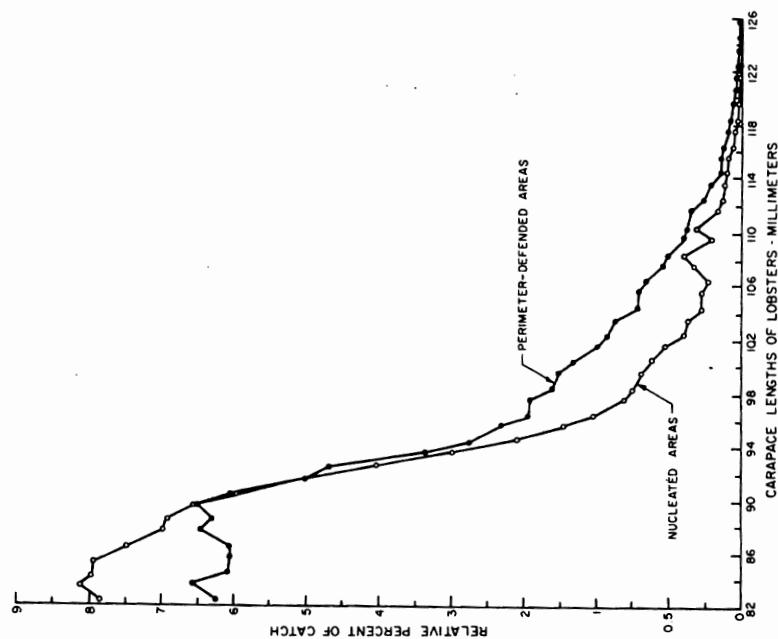


Fig. 2. Distribution of catch by length: nucleated and perimeter-defended areas. Perimeter-defended: mean, 89.98; SD, 7.23; N , 5762. Nucleated areas: mean, 87.89; SD, 5.88; N , 3327. The curves have been smoothed by using a 4-mm moving average. A t test (used to test whether or not there is a significant difference in two means) indicates that there is a less than 0.005 chance of the two samples being drawn from the same population. Calculated value of the t equals 12.55.

the lobsters caught in perimeter-defended areas were berried females as opposed to only 1.2% in the nucleated areas.

The weight of evidence suggests that the fishery can benefit if a larger number of females are allowed to survive to breeding size. For example, Thomas (1973: 43-56) argues that the relationship between recruitment (of lobsters into the fishery) and egg production is positive (as eggs increase, recruits will increase) and will remain so in the foreseeable future. Since the number of eggs is a function of the number of females, it can be argued that lobstermen in perimeter-defended areas are doing more to maintain the biomass than those in nucleated areas. However, the men in the perimeter-defended areas are not gaining

all the benefits of their activities. There is no question that lobster larvae float and travel via currents during one growth stage and then settle down to a sedentary existence. The exact pattern of this movement is not known (Pontecorvo, 1962: 245). Thus, a lobster born by virtue of conservation practices carried out at Monhegan or Metinic may well end up living its entire adult life in an area many miles away.

There is, however, a good deal of evidence to suggest that the stock density of lobsters is much better in the perimeter-defended areas than in the nucleated ones. This means that the number of lobsters on any given unit of bottom in a perimeter-defended area is larger, with all that portends for future catches and the numbers of lobsters which can reproduce.

Stock density must be measured indirectly, since the use of divers has proven to be impractical. In the past, attempts have been made to assess the density of lobster stock by using figures for catch in numbers of pounds, or pounds caught per trap. Neither is a valid index, since neither takes into account the number of times a trap is pulled or the working time of the bait. Two areas producing 1 lb per trap do not have the same stock density if the traps in one are pulled twice as often as in the other. The best estimates of stock density can be obtained by figures on *catch per unit of effort*. Stock density is measured by catch in numbers per trap haul times setover days (TH SOD),¹³ which can be figured by using the following equation (Thomas, 1973: 38):

$$\frac{\text{catch}}{\text{traps hauled} \times \text{setover days}} \quad \text{or} \quad \frac{\text{No.}}{\text{TH SOD}}$$

Thus, if a man caught 180 lobsters in a day out of 200 traps which had been pulled and rebaited 4-days before, the figures for No./TH SOD would be $180/(200 \times 4)$ or 0.225.

Using the concept of numbers per trap hauled times setover days, we see an enormous difference between perimeter-defended and nucleated areas with regard to stock density (Table II). Three aspects of Table II call for comment. First, in seasons II and III there is a great difference in the lb/(TH SOD) between the exclusive territory of perimeter-defended areas and the overlapping areas of nucleated areas (compare lines A and D). Since most of the traps are located in these two categories, these figures indicate a great degree of difference in the stock densities.

Second, stock densities are relatively high in those parts of the perimeter-defended areas fished exclusively (and this would include most of such areas). As one moves toward the boundaries of regions fished with men from other harbor gangs, the stock densities drop (compare A and B regarding lb/(TH SOD) in perimeter-defended areas).

¹³ As already mentioned, "setover days" indicates the number of days the trap has been in the water since it was pulled and rebaited.

Table II. Pounds/(Trap Haul X Setover Days) in Nucleated and Perimeter-Defended Areas^a

	Season I ^b		Season II ^c		Season III ^d	
Perimeter-defended areas	A. Exclusive	0.24409 (662)	0.26478 (2245)	0.47130 (2681)		
	B. Overlapping	—	0.25465 (31)	0.33414 (98)		
Nucleated areas	C. Exclusive	0.05353 (326)	0.11133 (313)	0.26735 (610)		
	D. Overlapping	—	0.13782 (400)	0.27949 (1483)		

^aThe first number in each square is the lb/(TH SOD), where TH SOD = trap haul X setover days; the number in parentheses represents the sample number of lobsters in each category. We did not begin to collect data on setover days until mid-April, so our information on season I is slight.

^bAugust 1 to December 31.

^cJanuary 1 to April 30.

^dMay 1 to July 31.

Third, in the nucleated areas, the lb/(TH SOD) values for the small areas fished exclusively are lower than for those areas fished with men from other harbors (compare lines C and D). Since the small areas fished exclusively by men from nucleated harbors are close to the harbor mouths, they are apt to be the zones fished most heavily. These are areas that part-timers and high school boys can reach with their small skiffs. The low figures probably reflect this greater fishing effort.

Economic Benefits

Men in perimeter-defended areas are catching more and bigger lobsters, and they are catching them with less effort. Both factors translate directly into economic benefits. The evidence that the men from perimeter-defended areas get more lobsters can be seen by comparing mean numbers of lobsters caught per trap in the two types of areas (see Table III).

Table III. Catch Characteristics by Area and Season

	Season I		Season II		Season III	
	Nucleated	Perimeter-defended	Nucleated	Perimeter-defended	Nucleated	Perimeter-defended
Number of lobsters caught	366	767	710	2268	2093	2779
Number of lobsters caught per trap hauled	0.61986	1.294	0.4788	0.9569	0.7609	1.038
Mean pounds of lobster caught per trap hauled	0.72278	1.644	0.5654	1.209	0.9113	1.295
Pounds per lobster	1.1648	1.253	1.181	1.319	1.197	1.238

In every season, the number of lobsters caught per trap is larger in perimeter-defended areas than in nucleated areas. Thus, if a man from one of these areas pulls as many traps as a man from a nucleated area, he obviously catches a larger number of lobsters to market. It is possible for men from nucleated areas to earn more than men from the perimeter-defended areas, but to do so they must pull vastly more traps and greatly increase their effort. There is, of course, evidence that some of the men in perimeter-defended areas are cutting down on numbers of traps hauled (e.g., informal trap limits). However, there is no evidence to suggest that such trap limits have so greatly cut down the number of traps any single man uses that incomes are jeopardized. Rather, such limits have stopped the escalation in numbers of traps.

The fact that men from perimeter-defended areas catch larger lobsters than men in nucleated areas is indicated by Fig. 2. This conclusion is buttressed by the data on pounds of lobster caught per trap (see Table III). At all times of year, the men from perimeter-defended areas catch more pounds per trap than men from nucleated areas.

The fact that lobsters are sold by the pound contributes to giving the men from perimeter-defended areas a higher economic return per trap. Moreover, larger lobsters which can be sold as "dinner lobsters" in high-priced restaurants bring a higher price per pound than the smaller lobsters or "culls." Since men from perimeter-defended areas catch a higher proportion of dinner lobsters, their income is boosted still higher. In this regard, one group of men who fish a perimeter-defended area have made arrangements with a dealer to receive \$0.06/lb above the going price for all lobsters they catch. The dealer is more than happy to give it to them because of the large number of dinner lobsters they bring in.

There is an enormous difference between the gross income earned by lobstermen from nucleated areas and that of those from perimeter-defended areas. From October 1972 to March 1973, I interviewed eight lobstermen from perimeter-defended areas who made an average of \$22,929 from the lobster industry during the preceding year.¹⁴ The average gross income of fishermen from nucleated areas was \$16,499.¹⁵

These differences in income are not merely due to the fact that men from perimeter-defended areas catch more lobsters than do men in nucleated areas; price factors play an important role as well. Men on Monhegan, for example, fish

¹⁴These are gross income figures, earned from lobster fishing alone. While net income figures would undoubtedly be more valuable, they are almost impossible to compute accurately since it is difficult to estimate depreciation on boats and equipment, and no records are kept on routine maintenance. In order to protect informants, the income figures were not broken down by variables such as age or harbor gang.

¹⁵While the number of fishermen in the sample was very small, the difference in mean income between nucleated and perimeter-defended areas is a surprising \$6430.

only from January to June, and thus market most of their lobsters in months when the price is at an annual high.¹⁶

Summary of Biological and Economic Effects of Territoriality

Perimeter-defended lobster territories are characterized by more restricted entry than are nucleated ones. This shows up as fewer boats or fishermen per square mile, and implies lower levels of fishing effort in the perimeter-defended areas. Fishing effort has also been controlled by various local conservation measures, such as limits on the number of traps allowed or local closed seasons. These measures do not affect total catch, but do tend to reduce total lobster mortality, as well as increase the proportion of the more valuable large lobsters caught. Greater stock density in the perimeter-defended areas suggests that reduced effort has halted the process of overexploitation. Economic gains from the strategy of maintaining strong defense of traditional boundaries are shown in higher mean numbers of lobsters per trap, more large and hence higher-priced lobsters, and higher gross incomes.

MANAGEMENT IMPLICATIONS OF TERRITORIALITY

The state of Maine does not take advantage of the principle of having perimeter-defended areas, with all of the favorable results they bring. Moreover, the state has yet to institute any of the conservation measures that men from these areas have adopted for themselves, such as trap limits and closed seasons. At present, Maine is considering legislation concerning trap limits and other practices to limit fishing effort. However, the state has no interest in establishing legalized lobstering territories analogous to the traditional perimeter-defended areas. There are two reasons for this. The Commission of Sea and Shore Fisheries argues that the administrative costs involved in establishing and maintaining small fishing areas would be prohibitive (S. Appolonio, personal communication, 1973). This may be correct. In addition, since the existence of the territorial systems is hidden from official eyes, the state's officers have little information on possible beneficial effects.

¹⁶In recent years the price has been highest in February and March and during the height of the summer tourist season. It has been lowest in the fall, when lobsters are plentiful and demand is relatively low. For example, in October 1973 the price paid to lobstermen was \$1.10 per pound; in January 1974 it was \$1.65.

CONCLUSION

One of the themes that run through the literature on fishing communities and fisheries economics is the competitive, predatory behavior of individual fishing firms, their inability and unwillingness to conserve the marine resources on which they depend, and their tendency to overcapitalize. These factors are related to the fact that, by law, oceans are common property resources. Since oceans are owned by no one and may be exploited by everyone, no one has any interest in maintaining the resources. Why should one man cut his fishing effort to conserve? The fish he does not catch today will be caught by someone else tomorrow. Under these conditions, a fisherman is only being rational when he expands the amount of capital equipment he owns and tries to catch all the fish he can as quickly as possible.

The result is what Hardin (1968: 1244) has called the "tragedy of the commons." Common property resources of all kinds — the air, waters, oceans, publicly-owned land — are subject to abuses and overexploitation that do not exist with privately owned resources (Hardin, 1968: 1245-1246). It is not only that common property resources are overexploited by a callous public; they are also subject to a kind of escalating abuse as people vie with each other to strip bare resources owned in common. As Hardin (1968: 1244) explains it, those exploiting a common property resource are locked into a system in which it is only "logical" that they increase their exploitation without limit. As far as fisheries are concerned, the "tragedy" takes the form of overexploitation, depletion of fish stocks, underutilization of capital resources, and, where opportunity costs are low, acceptance of low incomes (Crutchfield, 1964: 212).

At both the national and regional levels, attempts to regulate fisheries usually take the form of manipulating fishing seasons, fishing areas, and the type of fishing gear used. While such regulations may limit fish mortality, economists have pointed out that they are probably ineffective and certainly make fishing more inefficient (Pontecorvo and Vartdal, 1967; Crutchfield and Pontecorvo, 1969; De Wolf, 1974). Fishing quotas and seasons, for example, leave expensive boats tied to the dock much of the time and trained crews in the welfare line. They also increase competition for new equipment and for a "share of the catch" when fishing is allowed. Several economists have strongly argued that a much better management system would involve limiting entry into the fishery either by a licensing system (Pontecorvo, 1967; Christy, 1973) or by taxation (Pontecorvo and Vartdal, 1967), which would cut production by increasing marginal costs.

The lobstermen of Maine have already evolved a system that produces all the benefits these economists have envisioned. Given what we know about the theory of the common property resource, we can only deplore the breakdown of the traditional perimeter-defended areas. In perimeter-defended areas, access to

the resource is highly controlled, and escalation of fishing effort has been prevented by the use of political power to enforce local conservation measures. Moreover, in these areas, fishermen are not caught in a self-defeating "competitive withdrawal" (Crutchfield and Pontecorvo, 1969), but can cooperate to conserve the lobster stock and raise their own income levels. In nucleated fishing areas, the traditional means of controlling escalating fishing effort are breaking down. The data we have on differences in average size of lobsters, size of catch, size of stock, and fishing incomes suggest that men fishing in nucleated areas are bearing the costs of increased participation in an industry that has many characteristics of a "common property" fishery.¹⁷

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¹⁷In two respects, the theory of the common property resource does not quite fit the situation in the Maine lobster industry. First, the economists writing on the common property resource model are assuming that common property is completely accessible to everyone while private property has only one owner (e.g., Scott, 1955: 120, 121). In fact, no lobstering area is accessible to the general public. As we have pointed out, it is vastly more difficult to gain entry into harbor gangs fishing perimeter-defended areas than those fishing nucleated areas. But one must have certain characteristics to become a member of a harbor gang fishing even in a nucleated area. Moreover, there is no area along the coast owned by a single individual. All areas are "owned" by groups. Second, entrepreneurs exploiting "privately owned resources" cut down on the volume of production because of increased marginal costs, whereas those exploiting "common property resources" have no such constraint. In the case of the Maine lobster industry, there is no question that men fishing perimeter-defended areas try harder to cut down fishing effort than men fishing nucleated areas. In part, this reduction in effort is due to self-enforced "trap limits" and closed seasons. Even more important is the fact that they use political pressure to keep the number of fishermen in their areas small. This naturally decreases the number of traps being fished there. In short, decreased fishing effort is not so much due to the sacrifices of the individual men fishing in "perimeter-defended areas" as it is due to the fact that they keep other men out, and enforce the sacrifices on them. The effect is the same. Men fishing perimeter-defended areas restrict fishing effort, which has clear beneficial effects.

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