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Editorial Introduction

Rob van Ginkel & Jojada Verrips

University of Amsterdam

Over the last two decades, more and more anthropologists, ethnologists, and other scholars have studied maritime communities and occupations. Some call their research the 'anthropology of fishing,' and examine the techniques and strategies of fishing, as well as shipboard life. Others work at 'maritime anthropology' or 'maritime ethnology,' doing fieldwork in fishing villages, and examining the complex interrelations between the villagers' exploitation of the maritime environment and their sociopolitical structure and culture. MAST, however, does not make this subtle distinction, but uses 'maritime anthropology' in a broad sense to cover both subfields.

This research in maritime anthropology has produced many publications, including monographs, edited volumes, and special issues of scholarly journals. But most articles on maritime societies and cultures remain scattered in a variety of publication sources, so social scientists interested in fishing, fishermen, and maritime communities face both the problem of retrieving this material and of finding a suitable outlet for their work.

In setting up MAST (*Maritime Anthropological Studies*), the editors aim to provide an international platform for those involved and interested in maritime anthropological research. Though MAST will be mainly an anthropological journal, it welcomes the work of sociologists, historians, folklorists, geographers, ecologists, and biologists who address problems of anthropological concern. And though the core of the journal will be studies of fishing and fishing communities, MAST also welcomes work on other maritime occupational categories, such as seamen, oil-rig crews, dredgers, divers, and bargemen. To encourage debate over theoretical and methodological pitfalls in maritime studies, MAST will invite commentaries on articles that have appeared in its pages, as well as publish reviews of recent literature.

So far, MAST has met with enthusiasm. But its future depends on the support of compatriots in the field of maritime studies. Institutional and individual subscriptions, as well as submission of contributions, therefore, are especially welcome.

This first issue of MAST looks at the strategies, social relationships, world views, and rituals of modern fishermen on the North Atlantic fringe. Reginald Byron points out that status differences among Shetland fishing crews are mitigated by the notion of 'luck,' embodied in the skipper, who plays a key role in decision-making. Luck means gamesmanship, not chance, however, as it does among the Newfoundland seine-netting crews he refers to for compari-

son. This Shetland folk model helps maintain an egalitarian façade, which serves social purposes.

In his study of Icelandic skippers, Gisli Pálsson shows that their folk model also explains differential success. They say successful skippers get into 'fishing moods,' and follow hunches and dreams. Pálsson says the reason for this mode of explanation is social as well, though the Icelandic folk model does not mitigate status differences (as in the Shetland case), but minimizes personal responsibility, misleads competitors, and emphasizes individual qualities.

M. Estellie Smith enumerates the economic, ecological, and political risks to which Massachusetts and other American fishermen are now exposed. Her central question is how fishermen perceive and cope with problems of environmental degradation, legislative restriction, and market forces. Taking sides with the fishermen, she criticizes fisheries managers for protecting stocks but neglecting people.

James Acheson takes up the issue of gear switching in the Maine fishing industry. Fishermen seldom specialize on one species throughout their careers, and this has important implications for fisheries management. Acheson shows which patterns of gear switching are apt to occur, given certain incentives and constraints. Managers should take these patterns into account when they propose conservation measures, which usually concentrate on a single species.

In their joint paper, lastly, John Poggie and Richard Pollnac consider the personal and economic risks faced by New England fishermen, arguing that personal risks explain why these fishermen observe rituals of avoidance: rituals serve to reduce anxiety. The authors also establish a correlation between the duration of fishing voyages and the number of taboos.

Luck and Leadership

The Management of Decisions in Shetland Fishing Crews

Reginald Byron

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Burra Isle, Shetland, is a community of about 800 people. Before the oil economy came to Shetland in the mid-1970s, fishing was the chief source of livelihood of 85% of Burra's adult male residents. Although, as a result of oil, the local economy has now expanded and is more diversified, fishing is still the most important native industry in the island. The boats, of 20 to 25 metres in length, are used to fish the waters just offshore for haddock and whiting with seine nets. The boats are owned in joint partnerships by their crews of four to six men who hold equal shares. Perhaps a little unusually, in comparison with other fishing communities elsewhere, the skipper does not normally own a larger share in the boat than his crewmen. The skipper, then, is not able to claim authority by virtue of his proprietorship of the boat, but rather must seek to validate his position through social means: by negotiation and maintenance of his reputation as a skilful fisherman, and by his ability to manage effectively the processes of decision-making. Yet the smallness of scale of Burra society and the complexity of interdependencies between fishermen militate against open assertions of social hierarchy. This paper describes how the idea of 'luck' may be used as a diplomatic way of expressing distinctions between individuals and groups; how 'luck' plays a pivotal role in the legitimation of leadership, and how it serves as a criterion – and an explanation – of differences in the success of fishing crews.

Leadership and Decisions in the Fishing Crew

Every morning, before the boats go to sea, their crews assemble at the head of the pier in separate groups to discuss the day's prospects. If the weather is unsettled, as it often is, the BBC forecast is always the first matter of speculation. If wind and sea are judged not likely to be bad enough to make fishing unsafe, then the other main item of discussion is where to fish. The decision about where to fish may be influenced by the weather. If it is rough or worsening, the crew may choose to take the boat in close to the shelter of the land; if it is improving or fair, more distant and exposed grounds can be worked. Each crew takes these decisions independently, but a certain amount of information about the intentions of other crews is usually available. Other crews, for example, can be seen to have put to sea already, or be seen to be making preparations for doing so. If another crew passes within conversational distance, a vague indication of where they are going may be given; if not, deductions can be made about their probable intentions by a knowledge of where they fished the previous day and

in what direction their boat was last seen heading. By adding together information from radio contacts about a crew's location on previous days with gossip about the amount, kind and quality of fish that was caught, opinions can be formed about the probable distribution of fish on the grounds offshore. Decisions about where to fish are always based on probabilities, and never certainties. The crew have no way of knowing whether fish will be found in the chosen place until they arrive there, and although there is a good chance that if the fish were 'running' on a certain part of the grounds the day before they will continue to do so the next day, there is no guarantee of this. The fish may vanish just as suddenly as they appeared, leaving no trace of their whereabouts. It then becomes a question of examining carefully every piece of information on the behaviour of other crews for clues about where the fish might have gone.

Every member of the crew is entitled to contribute an opinion on whether, and where they should fish. The skipper usually takes the most active part in the discussion, but his manner is not at all authoritarian; it is understated, almost reticent. The skipper skilfully steers the conversation toward consensus by asking the general feelings of the crew and listening to their comments. He weighs their remarks and then off-handedly puts forward his own proposals, usually prefaced by, 'I don't know,' and rounded off by 'What do you think?' If no one actually objects to the skipper's proposals, the crew is presumed to be in unanimous agreement. In practice, the skipper's position as leader in the decision-making process is reinforced by a much greater access than the other members of the crew to the information upon which these decisions are based, such as echo-sounder, Decca Navigator and radio data, the likely intentions of other Burra skippers, and the complexities of the marketing system. All day long the skipper is in radio contact with the other skippers, and so he has fairly shrewd ideas about how much fish they are catching and what they will do under a given set of circumstances. He also has a much more detailed knowledge of the fishing grounds, simply because it is his job to have this knowledge. The other crewmen are aware of these things, and are unlikely to call into question the skipper's judgement in these matters. Although seemingly consensual, decisions of this kind are little more than *pro forma* ratifications of resolutions the skipper has already made.

Once at sea, a number of decisions have still to be taken. The fishing operation itself, casting and hauling the net, is a routine process that with an experienced crew takes care of itself, but decisions may have to be taken on whether or not to move to another part of the grounds if the first couple of shots are disappointing; or whose turn it is to cook, steer or tend the winch; and when to stop fishing for the day. Also, from day to day the crew must choose when, and possibly where, to land the catch and load up with fuel, ice, empty fish boxes, and groceries. Not all these questions may arise on the same day, and the answers to some may be a matter of standing policy. On their return to port in the evening, before they disperse the crew must agree an hour for departure the next morning, allowing enough steaming time for the boat to reach the chosen grounds ready to make the first shot of the net at the break of day. Indeed, the question of whether

or not to go to sea at all the next morning may need to be considered. The fish might be so scarce as to make it not worth the fuel, or some event ashore, such as a wedding or a funeral, may oblige the crew to stay ashore a day or two. Some of these things will be matters of general discussion around the cabin table at the midday meal, the only time of day when all the crew, including the skipper, are gathered together and conversation is possible. It may be decided, for example, that if a member of the crew needs to be absent for a day because of an appointment ashore, how the work can be redistributed among the remaining members of the crew, or whether an extra man should be taken on for the day. On Fridays, the crew often decide to stop fishing early, so that they will be home in good time to enjoy the evening with their friends and families, but a good run of luck may cause them to reconsider this. In other, purely technical matters, like moving to another part of the grounds, the skipper may act on his own initiative, and the crew would not expect to be consulted unless, perhaps, it makes a substantial difference to the hour of their return to port.

The Role of the Skipper

At sea, the skipper acts as foreman in charge of the fishing operations. While the rest of the crew work on the open deck, the skipper stands at the helm in the enclosed wheelhouse monitoring the radio and electronic equipment and deciding where, when and how to deploy the net. His decisions are based partly upon the wishes of the crew, as expressed in policies agreed by all, but for the most part he is guided by his own experience in finding fish and by the data provided by the echo-sounder and scraps of information picked up by listening to other skippers on the radio. Ultimately, it is the skipper's responsibility to catch the fish, and his alone. The skipper is the hunter. The other men in the crew, however essential their individual contributions, play only supporting roles. The success of the entire joint enterprise, the livelihood of each member of the crew and the welfare of his family is focussed in the skipper's ability to assess probabilities, to make consistently correct estimations of where to find fish, and to capture in the net the fish he finds.

During a typical day's fishing, a Burra boat does not voyage out of sight of land. The skipper takes his bearings to establish his general position on the grounds from landmarks, but the electronic navigation equipment enables him to fix his position over the sea bed within a few metres. Occasionally he may glance at an old notebook containing notes he has made correlating navigational coordinates with data about bottom quality, depth and the location of submarine obstructions such as rocks in the sandy sea bed, or wreckage. Establishing the exact location of these obstructions permits the skipper to lay out a course that will permit him to drag the net round them, for the lee of these obstructions are often gathering places for fish seeking shelter from submarine currents. Similarly, he charts isolated patches of sandy ground on otherwise hard bottom where certain species of fish are likely to congregate.

The echo-sounder shows the depth and bottom contour, and by studying the

density of the trace, the skipper can decide whether the bottom is rock, shell, mud or sand. Given his intimate knowledge of the topography of the sea bed, the fragmentary reports of other skippers, the state of the tide, phase of the moon, the weather, time of day and season, the skipper can compute the probabilities of finding fish in certain places. He steams the boat round the part of the grounds he has chosen to search with an eye on the echo-sounder, looking for evidence of the presence of his quarry. The fish must be at a certain depth, no more than a couple of metres from the bottom, for a shoal that is rising will escape the net. When he sees a promising mark on the echo-sounder, he makes a brief note of the navigational coordinates to fix its location, and then starts to bring the boat into position to shoot the net. Once the net is away, the skipper cannot alter course or in any way pursue the shoal of fish. He has to hope that the shoal stays where it is until the net entraps it. If the shoal of fish is a large one, the skipper will continue to stalk it, renewing his attack with further casts of the net. This may continue for several days. Each morning the skipper will bring the boat back to the same spot, attempt to relocate the shoal, and attack it with the net until the fish disperse. On the other hand, the fish may be less obliging. The shoal may rise just as the skipper is laying out his first shot, and during the two hours it will take to bring the empty net to the surface, the shoal may have vanished from the echo-sounder. The skipper will have to reassess the situation and begin searching all over again. On some days, chance will be against him and he will catch little or nothing; on others his fieldcraft and patient stalking will pay off.

The radio set in the wheelhouse is switched on before the boat leaves port in the morning and is not switched off until the boat returns in the evening. All day long there is a continuous stream of radio messages and the skipper listens, only partly consciously, to all of them. Much of the chatter has little to do with fishing. Lonely skippers who spend much of the day standing in cramped wheelhouses with only the radio for company pass the long hours gossiping disjointedly. Occasionally they compare notes on their luck, but it is thought bad manners to be too inquisitive about what another man is catching. Remarks are laconic, vague, non-committal. When a skipper mentions a place where he is fishing, he gives only a rough indication, such as 'south by Foula.' If he is doing reasonably well, he might offer, 'We're getting a few baskets. Bloody small stuff, though.' If he is catching less fish than he thinks he ought to be, he might say, 'Getting nothing at all' or 'Just a little trash.' On one typical occasion, a skipper told me in the privacy of his wheelhouse that he estimated his last shot at 65 boxes. A few minutes later he replied to another skipper's 'What are you getting?' with 'I don't know. Maybe about forty. I don't know. What are *you* getting?' The other skipper in this case happened to be another Burra man, with whom the skipper was on friendly terms. If he had been asked by an outsider, he would have admitted to no more than twenty boxes, an unattractively marginal catch that would have given the other man no encouragement to relocate. At least, that would have been the skipper's hope. It is a guessing game; for all the skipper might have known, the outsider could have got only ten boxes on his

last shot which he over-estimated by a factor of four or five, a double-bluff so as not to look incompetent when his performance is compared with local fishermen. Skippers listen to the radio and probe others in the hope of learning whether or not fish seem to be running in greater numbers elsewhere. Interpreted and analysed for their true significance, these pieces of intelligence frequently motivate skippers to relocate their boats on another part of the grounds. A skipper who has found a satisfactory shoal of fish deliberately underestimates his catches to keep it for himself for as long as he can, or at least until the end of the day, when the amount of fish he lands will give his secret away to the other Burra skippers. To some extent, these bluffs are a forlorn hope. Skippers who know one another well, as all Burra skippers do, can read a great deal into even the vaguest remarks and assess one another's situations with disquieting accuracy. They may have little to gain by keeping each other guessing, but collectively they have much to gain by keeping outsiders at a disadvantage.

Technological Experimentation

The local fishing grounds are an open and common resource, where anyone is free to hunt for any fish he can catch, and no one can claim ownership over any part of the sea or the fish therein. All fishermen are in competition for the fish which are, in their reckoning, in limited supply. The relations of competition are governed by the zero-sum principle: one man's gain is another's loss. Since no one can claim rights in fish that would be respected by others, the object of fishing strategy is to attempt to secure an advantageous access to resources, to outdo rivals using whatever means are at one's disposal. The way skippers use their radios is one strand of this strategy. Another is technological experimentation.

Burra fishermen are continually tinkering with new equipment: new materials for nets and gear, improved engines, winches and perhaps most importantly electronic gadgets, things that they hope will give them an edge over their rivals. Radar, for example, made it possible for the crews that first adopted it to poach, or fish within the three-mile zone forbidden to boats over 20 metres long. Watching the radar screen, the skipper could 'see' the fishery protection vessel at a distance of 15 nautical miles, giving more than thirty minutes to escape. But without radar, the appearance of the fishery protection vessel on the horizon steaming at 25 knots meant that it was too late to take evasive action. Radar made it possible to work rich but forbidden sea areas and get away with it. Similarly, more sophisticated types of echo-sounders that distinguish more clearly between the sea bed, shoals of fish and inert objects lying on the bottom eliminated some guesswork for the skipper and made the detection of marginal shoals of fish easier and reduced the chances of damaging the net. New electronic navigation equipment enables the skipper to plot the position of a shoal of fish with a high degree of accuracy and allows him to bring the boat back again and again to the same place where good catches were made, and to track the movements of the fish.

Nevertheless, technological experimentation has an inherent limitation. A number of government regulations concerned with ship's equipment, the licencing of ship's officers and qualifications for financial supports have the effect of prescribing an optimum boat size of 20 to 25 metres. Beyond this size, the economic advantages to inshore fishermen begin to decline sharply. Burra boats are therefore approximately equal in size and basic catching-power, and their crews have approximately equal access to government grants and low-interest loans to make improvements to their boats. This means that any innovation offers only short-term advantages. Once an innovation is seen to be successful, it will be taken up by others. The initial advantage of the innovation will be lost, and the others may profit by a wait-and-see attitude, leaving the costs of experimentation to the original innovator and avoiding the risks of failure. Innovations are not always successful, and even when they are, the benefits may be short-lived. No crew is ahead for very long before their rivals catch up. As it appears to the fishermen, the strategy that informs technological experimentation can be compared with a game of Monopoly, in which the players seek to pile gain upon gain, accumulating a corner in the market. But, analytically, innovation more closely resembles a game of leap-frog: after every move, back to square one. While striving to remain technologically competitive is an important part of fishing strategy, it is not really a crucial issue where there are no great differentials in access to investment capital. Crews who are content to avoid unnecessary risk merely by keeping up with their neighbours and no more, will not in the long run lose much against their more experimentally-inclined rivals. Nevertheless, innovation and experimentation are of considerable analytical interest, because they show how fishermen go about solving problems and may provide insights into the organisational processes at work (see, for example, Byron 1980 and 1986).

Luck and Leadership

Although all Burra seine-net crews exploit the same resource with similar boats and equipment, there are many subtle distinctions in the way the crews use their boats. Some have boats that are older and more poorly equipped than others. Some fish longer hours, voyage to distant ports at the weekends to sell their catches, and work on the grounds in weather that keeps others ashore. Out on the fishing grounds, some strike off on their own. Others are content to take a course of minimum risk, following along behind the rest until they find a group to join; at least then they can do no worse than the neighbouring crews. And, at the end of the week, some crews have more boxes of fish stacked on the quay to show for their efforts than others do.

The fishermen explain these differences in terms of 'luck,' a manner of speaking that glosses over the sources of these differences. Luck may indeed be deeply symbolic in the folk consciousness of fishermen, as several maritime writers have argued (e.g. Löfgren 1977). But it is not necessary to give a lengthy treatment of luck as a system of symbols to understand what social goals fishermen use

this concept to serve. This goal is merely a negative one. By characterising differences in terms of impersonal fortune, invidious personal distinctions are diminished. The idea of luck helps to preserve an ethic of commonality in a highly competitive social atmosphere; while competition is potentially antagonistic to cooperation, cooperation is a vital principle in coping with unpredictability. A fisherman never knows when he will need his friends, only that he cannot do without them. Luck keeps in good repair the fences of interpersonal and inter-group relations, and hedges against the unforeseen.

Expressions of luck are used to play down status differences between crews. Crews exist who are said to be luckier, in a general sense, than others, but luck is relative. There are no absolute standards of luck. Luck is the measure, as well as the thing measured. If there are lucky crews, then by inference there are less lucky ones. Burra crews are ranked by their luckiness. All are assessed in terms of the luckiest, and are often seen to follow their lead. The luckiest crews are those who take risks that consistently succeed. Most visibly, in innovations to their boats they contrive to stay a jump or two ahead in the game of technological leap-frog; less visibly, in their fishing tactics at sea they manage to bring home more fish more often. It is true that the movements of the concentrations of fish on the grounds are never absolutely predictable, and there is always a large measure of chance to be reckoned with, but this is not the whole story. Luck is also gamesmanship. And, as in a game of poker, the right combination of chance, nerve and skill raises the ante for all the other players. Except, in fishing, there is no end to the game. No one ever quite wins the pot.

The luck of a crew is difficult to distinguish from the luck of their skipper, so closely is the one identified with the other. Since the skipper is the one member of the crew whose specific function it is to catch fish, the luck of the crew depends very largely upon how good he is at his job, upon his personal luck. Some skippers are acknowledged as being luckier than others. This is the practised poker player's kind of luck, not a mystical variety. Some skippers simply are better at calculating probabilities, have more experience, better memories for detail, and more flair and confidence in their own judgement. They give stronger and more skilfully managed leadership to their crews. In contrast, those least lucky are crews who, in default of effective skippership, are managed collectively. They tend to have the same problems as any organisation run by committee: the need for continual conferences creating a slowness of response to constantly changing conditions and a proneness to disagreements, factional splits and indecision. These constraints can cripple their performance compared with other crews.

In the years before the First World War, open boats were used in the haddock line fishery. A crew of five manned the boat. The skipper's post was at the tiller, facing the four men at the oars. The men worked within easy conversational distance. The man in the sternsheets had no official status as skipper, in the modern sense. Rather, he was a sort of *primus inter pares*, a first fisherman, a man who had acknowledged skills in finding fish. The main attributes of these skills, as today, were his experience and memory, his ability to correlate details and to calculate probabilities. But other than a leadline with which to take soundings and

a cheap compass, he was without technical aids of any kind. The skipper had no sources of information that were not also shared equally and at all times by his crewmates. The skipper sought consultation and consent for his actions by meeting their eyes and perhaps murmuring a few words. All shared in his decisions and, symbolically at least, in his deliberations.

This began to change in the early 1920s, when Burra fishing crews generally adopted motorboats. A common feature of these boats was a small wheelhouse by the mizzenmast, just large enough for the skipper to stand out of the weather while he steered. The boats were decked; no longer did the men sit on the thwarts looking aft toward their skipper, but busied themselves round the deck forward, midships and aft, often with their backs to the wheelhouse and in the wind and distance out of easy earshot of the skipper's voice. The close continuous communion of skipper and crew was lost, and now was possible only intermittently in quiet intervals when the crew crowded the small wheelhouse or sat round the cabin table below deck.

After the Second World War, the separation of the skipper from his crew was reinforced first by the adoption of the echo-sounder and soon after by the ship-to-ship radio. Physically isolated in the wheelhouse, the skipper now had access, for the first time, to sources of information not shared by the other men. Each increment of electronic technology added further to the specialisation of the skipper's role, and made the possession of fishing knowledge, and therefore the basis of fishing decisions, more one-sided. As the number of gray metal cabinets in the wheelhouse increased with radar, Decca Navigator and sonar, the utility of consultation in matters of fishing tactics between skipper and crew declined. In Burra, this has been a slow process that has extended over sixty years, beginning with the removal of the skipper to an enclosed wheelhouse. Gradually, the gap between a representation of equal participation in fishing decisions among all the members of the crew and the reality of the skipper's leadership has widened as, through increasing technological sophistication, knowledge of the relevant facts has become ever more unequally distributed among the members of the crew. The fishermen maintain this representation of equality nevertheless, to serve social ends. If they attempt to use it to serve the technical ends of catching fish, the result is comparatively inefficient, as the following example demonstrates.

In Island Harbour, Newfoundland (Stiles 1972), seine-net fishing on the modern Scottish pattern was introduced in the 1960s. Until then, fishing was done from open boats with crews of two or three men working stationary cod traps set in the bay. Each boat had an owner, but there was not need for the crew's first fisherman to take the responsibility for hunting the fish on a day-to-day basis because no hunting was done: the work merely consisted of taking the boat out to the trap, hauling aboard the fish that had swum into the net in the preceding day or two, and ferrying the catch ashore. Once the trap had been set in place for the season, catches depended on the behaviour of the fish, not of the fishermen. Luck was identified strongly with chance, and little with gamesmanship. The first fisherman or boat owner had no more ability to influence fishing access

than any other member of the crew. Whether or not the owner gave any leadership had no effect upon the outcome, nor did any unequal distribution of fishing knowledge. The crew's ideology of equivalence and equality was not, therefore, confronted by a divergent reality. To all intents, practice was the same as theory.

The Scottish-type seine-net boats, made available to Island Harbour fishermen by the provincial fisheries agency on generous financial terms, were a technological quantum leap. They were more than twice the size of the trap boats, needing seven or eight men to run them. They were comparatively complicated, because they carried their gear and net aboard, rather than anchoring it in the bay. They were grossly more expensive than trap boats. And they were designed for hunting the fish, not simply transporting the catch from the weir to the shore. However, this technology came to them mainly as hardware. Software was included only to the extent that the fishermen were shown how to perform the technical operations of handling the equipment by the fisheries agency instructors. The rest of the software of seine-netting, such as appropriate forms of social organisation and decision-making, was omitted. Island Harbour fishermen were left to extemporise this for themselves. Having been offered no other model of shipboard social organisation, they applied their familiar open-boat pattern. The state credit schemes made it possible for one man to buy a seine-net boat in its entirety, so preserving the institution of sole ownership. This enabled the purchaser to claim skippership by virtue of his proprietorship. His expertness as a fisherman or his qualities of leadership did not enter into this: in trap fishing, these were relatively minor considerations that affected only trivially, if at all, the luck of the day-to-day catches.

The skipper-owner of a new seine-netter found himself in a highly vulnerable position. He had sole responsibility for the management of the boat, but lacked any socially-accepted basis for exercising authority, however presented or rationalised. He was without the moral support of fellow partners who recognised the legitimacy of his leadership. The skipper had to avoid giving any suggestion of offence to crewmen who, having no financial stake in the boat, were free to leave the crew at any time. Because the skipper's economic position – not least his ability to meet his mortgage payments – very largely depended upon the quality of his crew, he could not afford to alienate them by attempting to assert a degree of authority they were unprepared to accept. In practice, this meant that he has to waive his right to make tactical fishing decisions. Even simple technical decisions, like moving to another part of the grounds, could not be taken without consulting each member of the crew and obtaining his approval. Frequently all crowded into the wheelhouse to look at the echo-sounder or listen to the radio for themselves before giving the skipper their advice. Should the skipper not have taken this precaution, he would have had to accept the blame if the decision in the event proved to have been wrong; but since luck was chance in Island Harbour, and not gamesmanship, there was just no way of doing this without destroying his reputation or risking the loss of his crew, or both. Decisions taken on the basis of specialised knowledge not shared by all the other members of the crew simply were avoided, therefore. A strategy of minimum risk was the

usual outcome, resulting in an extreme emphasis on fishing in places where all the other seine-net boats were fishing. At least then, failure could be blamed on the luck of the draw rather than the way the cards were played.

Although there are so many differences as to make a fair comparison difficult, it seems highly likely that Scottish seine-netting in Island Harbour is less efficient than in Burra, and that its failure to reach its economic potential is to be found in the way that luck is conceptualised. As luck was identified with chance by Island Harbour fishermen, the skipper was not considered to have any greater ability to influence the outcome than any other member of the crew; beyond the fact that he owned the boat, there was no moral basis upon which the skipper's authority could be legitimated. The beliefs of Island Harbour fishermen about the nature of luck, while suited to a passive form of fishing, were inappropriate to a regime that required active hunting techniques.

In Burra, changes in the technology of fishing that have occurred in gradual increments over a long period of time have played a large part in shaping, and re-shaping, the social relations of fishing. As little as possible is left to chance in the organisation of Burra fishing crews. In the long run, a skilful skipper and a cooperative crew who work together smoothly are felt to be the most important asset in fishing, next to the boat itself, and the paramount factor in determining success. Beyond a certain level of technological sufficiency, no matter how new or well-equipped their boat, if the crew cannot agree how to work together to use it to best advantage, they will lose ground to rival crews with fewer domestic problems and even may be forced into eventual bankruptcy.

Each member of the crew occupies a social position within it by virtue of his skills, temperament, kinship status and age. Yet there is no immediately perceptible command-structure in the crew, and the skipper's authority at first sight seems minimal. No one shouts, no one gives orders, no one has to be told what to do, and no one asks what he should be doing. Each man knows what is expected of him, and does it without a word to anyone. Knowing one's place in the crew is a central value in the moral code of teamwork. This code is largely inarticulate and unspoken, given expression only as a sense of wrong when it is broken. A fisherman is not recruited into a crew unless he understands and accepts this code, and his place in the society of the crew. The only way of ensuring this is for the prospective crewman to be known 'in the round' by the others. Most Burra crews are composed of men who have known each other since childhood. Many crewmates are also kinsmen: skippers' sons, younger brothers and brothers' sons. Potential command-rights arising from inequalities of social status within the crew can then be maintained in a muted state, without the necessity to be given voice, so minimising a serious source of potential friction in interpersonal relationships. Burra crews are highly stratified and hierarchical, but the way social relationships are played out gives a superficial appearance of equality. Perhaps misleadingly, crews similar to those formed by Burra fishermen quite commonly have been described as 'egalitarian' (see, for example, Barth 1966, Norr and Norr 1974, Acheson 1981). Analysts of fishing societies, it would appear, have taken the lack of open assertions of status and authority as evidence

that the members of such crews do not recognise differences in status, or expectations of behaviour arising from these differences. In Burra crews, effective leadership and teamwork are coupled with styles of social interaction that minimise the occasion for disputes about relative social rank and the legitimacy of the skipper's leadership. Although I have used the imagery of games in this essay, fishing is not a game. It is a real-life struggle against an inhospitable environment, unstable resources and intense competitive pressures: these things are beyond the control of individual crews. What they *can* control, however, are the choices they make about organising themselves socially to take maximum advantage of their technical means.

Luck and Reputation

The luck of fishing crews is a major subject of public interest in Burra. News about fishing is just as avidly sought by friends, neighbours, parents, wives and children ashore as it is by the fishermen at sea. Most fishermen's wives have radios with ship-to-ship channels in their homes and can hear some of the radio exchanges between the boats while they are fishing. The main staple of everyday village gossip is news about the boats that have made lucky catches. The semantics of this gossip reveal the way crews are conceptualised by the people ashore. A fisherman's immediate family refer to the crew by his name, regardless of his standing in it, as 'Jimmy's having no luck at all this morning,' Jimmy being anything from the most junior crewman to the skipper. Other people refer to crews in either of two ways: by the boat's name, or by the name of its skipper, i.e., 'Have you heard how the *Southern Star* is doing today?' or, 'George Smith's fishing out by the Fair Isle.' Although the same speaker may use both forms interchangeably in reference to the same crew, certain people tend to identify certain crews by the skipper's name more often than by the boat's name. There are three reasons for this. First, there are strong loyalties to family and neighbourhood in Burra. While a speaker may be socially related to several crews that contain kinsmen or neighbours, the crew most closely allied to him through family ties or residential proximity he tends to identify by their skipper's name, as a way of emphasizing his personal attachment. Second, the crew might have a skipper who is especially noted for his personal luck. Third, there is the simple fact that it is the skipper's voice, and his alone, that is heard on the radio. For whatever reason, the use of the skipper's name is a marked feature of island gossip. And, overall, some skippers' names are heard far more often than others. The mention of a skipper's name, as a way of identifying a crew, can be taken as public acknowledgement of his leadership of it. The number of times a skipper's name is mentioned in the general run of gossip can be taken as a measure of his luckiness, for it is the skippers of the luckiest crews who are the most talked about; their luck is the subject of endless speculation. These skippers are, by island standards, public figures. Their reputations are known, and discussed, in every household in the island. Skippers, then, are the public personification of their crews, and embodiment of their luck.

Conclusion

This essay does not seek to deny that luck, or abstract ideas about impersonal fortune are unimportant in an understanding of the world-view of fishermen; rather, it seeks to demonstrate that fishermen's expressions of luck may be considered in a sociological as well as a cosmological sense. In Burra, the concept of luck is used to serve social ends, as an idiom in which evaluations of rank, prestige and success may be made without giving offence to neighbours and kinsmen. Fishermen of different crews and their families ashore interact not only in the context of fishing, but also in other social fields involving a wide range of face-to-face exchanges which are a function of the smallness of scale of Burra society. People who are competitors and rivals in fishing may be helpmates and allies in other social settings. These cross-cutting ties ensure that the relations between crews, and within them, are tempered by a comparatively broad range of mutual interests and interdependencies. The maintenance of these intricate networks of interdependencies requires careful management and diplomacy. Explanations in terms of luck are a tactfully neutral way of speaking about social differences.

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Models for Fishing and Models of Success

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Introduction

The following account is based on fieldwork in Sandgerði in south-west Iceland. According to the dominant Icelandic folk model of fishing, some skippers catch more fish than others because they follow other procedures when making decisions about the locations of prey. Successful skippers are said to follow hunches and get into a particular 'fishing mood'. Durrenberger and I have shown that differences in success are not explained by differences in skipper behavior, since, statistically, the size of the catch is largely determined by boat size and fishing effort (Durrenberger and Pálsson 1983, 1985; Pálsson and Durrenberger 1982, 1983; Pálsson 1982). We argue that the prevailing model of success is a response to the competitive nature of modern fishing. Here I describe the folk model and test its authenticity in the light of information on the actual behavior of skippers. The analysis shows that 'good' and 'bad' skippers are not significantly different in terms of their fishing profiles. This supports earlier analysis based on the same data (Durrenberger and Pálsson 1986). I conclude that hunches and dreams are independent of success, and that the logic of such practices is largely contained within the realm of social relations.

There are many anthropological accounts of folk models of fishing, native theories of production and fishing success. In many instances success is attributed to the personal capabilities or fishing tactics of leaders of fishing operations (see Acheson 1981). Good skippers are said to have a particular expertise (Wadel 1972), independence (Barth 1966), good 'hearing' (Firth 1946:99), or 'good eyes' (Orbach 1978:82). In many other instances, however, success is not regarded as a personality attribute but rather as a matter of luck or supernatural forces. This is the case in Sri Lanka (Alexander 1977:238), Newfoundland (Stiles 1972:41), France (Jorion 1976), the Shetlands (Byron, this issue), and the Cape Verde Islands (Pálsson, in press). Further examples, provided by the *Human Relations Area Files*, are Alaska (Inuit), Bahrain, Brazil (Bahia), Estonia, Jamaica, Java, Korea, Koryak, Marshall, Micmac, Rif, Seri, Trobriand, and Yurok.

While much has been said of models of fishing, there are very few accounts of what skippers actually do while at sea — their models for action (Geertz 1973:93) — and most concern navigation rather than fish finding (see, for example, Gell 1985). Acheson's study of the lobstermen in Maine (1977) is rare in that it attempts to describe both the folk theory of success and the actual behavior of skippers. Acheson observed a group of 33 skippers and argued that his evidence supported the folk claim that success is largely a matter of knowledge of

fishing spots. Some skippers placed their pots at well-defined locations (a practice they referred to as 'pin-point bombing'), while others distributed their pots at random ('saturation bombing'). According to Acheson those of the first group had significantly larger average income. His analysis, however, is based on a small data set and he does not provide adequate information on the main variable on skipper behavior, fishing tactics – how it is defined, operationalized, and observed.

Models of Fishing

Towards the end of the nineteenth century and during the first decades of this century, a number of the constraints associated with peasant fishing in Iceland relaxed. These brought about changes in the nature and organization of fishing and the conceptual models associated with it. Iceland had gained independence from Denmark, the legal obligations of landless workers (*vistarband*) to associate with landowners were lifted, markets for Icelandic fish developed, and access to the sea was increasingly made public rather than private. With these constraints removed, fishing was no longer for subsistence and productive targets became indefinite. Motor boats became available and with them, new offshore fishing grounds were opened up. With the new markets the national economy of Iceland became centered on the extraction, processing and the export of fish and derived products.

With the growth of capitalist production the resources were defined as infinite and 'there for the taking' rather than being given up as 'gifts'. The fish must be actively pursued. The ocean is no longer considered to have some kind of power or force, and its inhabitants are no longer seen to control the fate of humans, except as passive objects of production. The peasant's mythology, and its image of the cosmic order, has been replaced by the notion of infinite natural resources. The uncertainties of production have changed, the relevant contrasts are different, and earlier metaphors have become obsolete (Pálsson 1986).

During earlier centuries someone had to co-ordinate the activities of the crew. He was the 'foreman' (*formaður*). But it was not an honorific role or title. In contrast, the present 'skipper' (*skipstjóri*) is highly respected. As fishing became a full time occupation, the role of skipper evolved. It became a specialized role in an autonomous branch of production. According to modern folk accounts, the skipper is critical for fishing success. Skippers are said to differ in their ability to locate and catch fish, catches are said to vary from one boat to another because skippers are different, and the ability to catch fish is supposed to be 'in the blood'. Some skippers fish 'by cleverness' (*af lagni*) while others fish 'by force' (*af krafti*). Two skippers, then, may be equally successful, but by different means. Those who fish by force are said to make more trips, to use more gear and fuel, and to destroy more gear in the process. Those who are said to fish by dexterity or cleverness, hampered by their limited assets, small boats or engines, are said to develop original fishing strategies to compensate for what they lack in force.

The modern model of success is a model on which people draw to organize their long-term experience. When fishermen talk about their careers, they often count the number of years they have spent with particular skippers rather than the years they have been on particular boats. After each winter season the names of the 'top' skippers (*aflamenn*, literally, catch-men) in the Icelandic fleet are reported in the mass media. In developing accounts for whole seasons, as well as careers, people emphasize the personal characteristics and fishing tactics of the skipper. Accounts of these and speculations about such features are popular topics of discussion throughout Iceland. Top-ranking skippers can select from among the most experienced. And because crew members take current rankings of skippers to be a good indication of future success, they compete for places on the boats of high-ranking skippers. Successful skippers tend to have better and more stable crews, larger boats, more sophisticated equipment and sounder financial backing. When high-ranking skippers change boats, often 'their' crews go with them.

The skipper is not supposed to elaborate on his fishing 'tricks' and skippers who have been at the top of the hierarchy for several seasons are reluctant to comment upon their own performance. If they do, they create the impression that their success is due either to sheer luck or some peculiar capacity which, even though it is beyond their own understanding and control, enables them to find fish. Many of them are able to memorize minute details. Many of them, too, are said to get into a particular 'fishing mood' (*fiskistuð*). Several successful skippers have described how a dilemma regarding fishing locations was solved by a strange message, or some kind of 'whisper' (see, for instance, Ögmundsson 1985:14; Ási í Bæ 1966:82-3). One skipper explains the phenomenon of fishing mood as follows:

There is this mood, as it is called, which no one understands. It's like being possessed. It doesn't matter where one throws the gear, there is always plenty of fish. One comes up with various ideas, which one may regard as ridiculous, but if one takes them seriously one is bound to fish better than ever (Ási í Bæ 1963:57).

Fishing mood is sometimes said to be based on dreams which provide information on a desirable course of action, the timing or location of fishing. Information is thought to be given by a dead person or to be indicated by particular names or symbols in the dream. Some skippers are known to be dreamers and their accounts have been widely published. One local skipper explains:

I remember my dreams, and I must say it makes life a lot easier to know that one may expect a good catch. I recall a case where a dream told me exactly where to go ... I dreamt the direction on the compass, east-north-east of Garðskagi. We fished like crazy (Faxi 1976:9).

In his study of Alaska skippers, Gatewood (1983) distinguishes between rational and reasonable decisions. For him, a rational decision involves a conscious selection among the alternatives open to the skipper, whereas a reasonable one does not. Reasonable decisions are not necessarily irrational, Gatewood argues, but

it is difficult to account for them since they are based on intuition – hunches, dreams, etc. The choice of terms is somewhat unfortunate, since the extent to which a particular decision is ‘rational’ or not is a rather tricky issue. If ‘rational’ decisions refer to what is socially optimal, they will always depend on social context, a point belaboured by Godelier (1972). What really matters though is the tactics of the skipper, his *procedure* of decision making rather than the end result, and the expectations of the folk model. In Alaska a skipper is expected to make rational decisions, especially if he has a good reputation. In Iceland the contrary is the case.

Fishing Tactics

If successful skippers follow intuitive procedures of decision making (‘reasonable’ in Gatewood’s sense), they must be original and innovative in their fishing tactics. Such a notion is central in the accounts of Barth (1966) and Heath (1976) of Norwegian herring fishing (for a critical view, see Durrenberger and Pálsson 1983). Van den Hoonard uses a similar notion in his account (1977:153) of the shrimp fleet of Isafjörður in West Iceland. He says that skippers “tend to congregate in one fishing area . . . rather than striking out on their own to achieve bigger catches”, but he fails to substantiate his conclusion by any body of empirical evidence.

The ethnographic evidence is contradictory. On the one hand fishermen agree that some good skippers do take ‘big chances’. They are said to be prepared to leave a ‘fishing area of so and so many tons’ and go some place else to catch twice as much the next day. Such independence is only reported of those who tend to be successful. On the other hand, the importance attached to catch and prestige may be expected to result in a high concentration of boats. It is clear that line boats have concentrated on few locations, since early this century particular regulations concerning ‘rowing time’ were enacted to prevent overcrowding. Only latecomers on boats with the smallest engines could ‘afford’ to seek high catches with low probabilities. Their catches were not, however, significantly different from those of the others. How independent, then, are skippers in reality? How do they use the fishing space available to them, and how different are successful and unsuccessful skippers in these respects?

The data used here concern the fleet of Sandgerði during the winter season in 1981. By then 46 boats (from 10 to about 200 tons) operated from Sandgerði. Cod is the main species caught during the winter season. Early in the season fishermen use baited long lines (up to 12 miles long) which must be drawn daily, but later in the season the species cod prey on become more plentiful and the bait is thus less attractive. Fishermen therefore begin to use gill nets, stringing together 10 or 15 nets to make a single barrier. Each boat has a number of such barriers (*trossur*), depending on its size and the number of crew men. The nets are revisited after a day or two depending on the weather. During a winter season the fleet uses an extensive area (see Fig. 1). The decision as to which location to visit is affected by a number of factors – fishing gear, weather, bottom fea-

tures, boat size, and available information on the movements of cod and of other boats (see Pálsson 1982a, Durrenberger and Pálsson 1986).

Detailed information on the location of vessels is publicly available. Icelandic law requires that skippers report their locations as a safety measure and the reported locations are recorded at an office in Reykjavík (*Tilkynningaskýldan*). The locations are squares of sea 15 km on a side, 225 square km. One should note that there may be a number of fishing spots in each location. Also, the grid does not reflect the cognitive maps which guide fishing operations (see Fig. 1) – for skippers it is ‘only’ a safety device, a simple coordinate system. Even though skippers refer to it when reporting their locations, to comply with rules made ashore, they normally speak of fishing space in quite different terms (see Pálsson 1982:220-24).

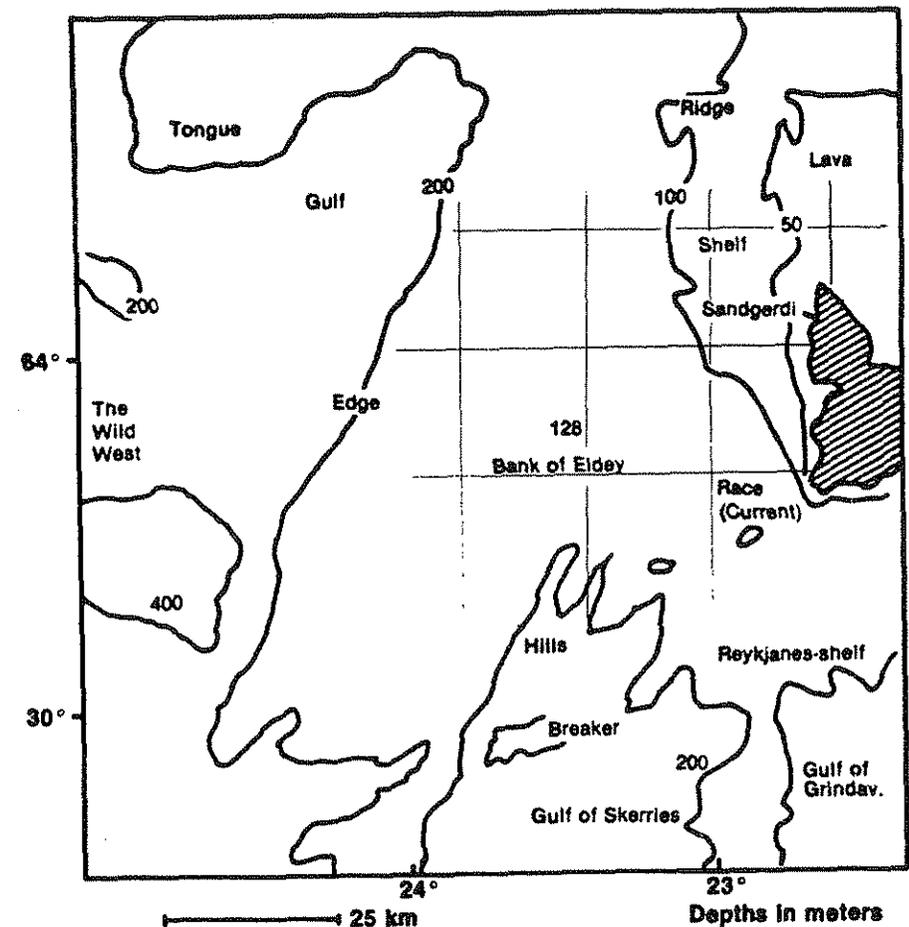


Figure 1. Fishing Grounds and Reporting Grid

Skippers, one should note, do not always report their locations. During the season in 1981 local skippers made 1642 trips and reported their location in 1350 instances, or 93% of all trips. There is a very strong correlation (.96), however, between number of trips and reported number of trips which suggests that the data on locations is representative for the whole fleet. Also, there is no relationship between the degree to which skippers report their locations – i.e. reported number of trips divided by actual number of trips – and the size of their catch according to the Chi-square test (Chi-square is 8.00; 4 degrees of freedom). This suggests the data is equally representative for successful and less successful skippers.

The distribution of boats on local fishing grounds over a whole season is very uneven. Skippers went fishing to 50 locations, or approximately 55% of all locations within the grid used. One location just south of Sandgerði accounts for 39% of all trips, and another location north west of Sandgerði accounts for 7.7%.

Three measures of skipper behavior may be operationalized: (1) the relative number of locations visited, (2) the distribution or number of trips to different locations, and (3) the extent to which the skipper fishes independent of others. If the folk accounts described above are authentic, one would expect successful skippers to visit a greater number of locations than less successful ones, to have less skewed fishing profiles (a more even distribution of trips to the locations used), and to fish more independently.

Figure 2 illustrates the notion of a fishing profile. Skipper A makes most of his trips to one location and very few trips to some locations. In his case the deviation from the mean number of trips to a location is quite high. Skipper B, on the other hand, makes a similar number of trips to all the locations he visited. In his case the deviation from the mean is minimal.

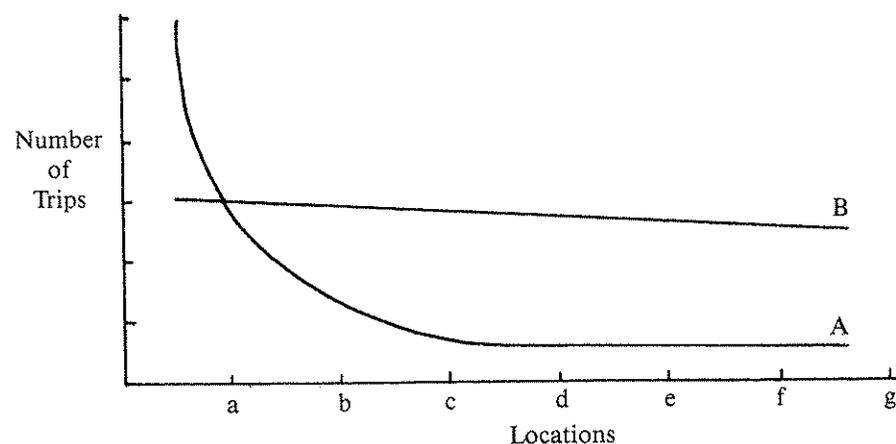


Figure 2. Hypothetical Fishing Profiles

One the average skippers visited 5.7 locations (the standard deviation is 3.48). Since the number of locations visited is (weakly) related to number of trips (the Pearson correlation is .25, $s = .055$), a relative measure should be used. The number of locations a skipper visits, relative to the number of trips he makes, turns out to be related to fishing success (Chi-square is 12.60, 4 degrees of freedom), but contrary to the predictions derived from the folk model there is a negative correlation (-.46, see Table 1). Successful skippers tend to visit relatively fewer locations than less successful ones.

The second measure of skipper behavior, the distribution of trips to the locations visited, may be statistically represented by the coefficient of variation – the standard deviation for the number of trips a skipper makes to different locations divided by the mean number of trips by the same skipper. A large coefficient of variation (a skewed distribution) would be an indication of conservative fishing tactics (profile A on Fig. 2). On the other hand, a small coefficient of variation (less skewed distribution, profile B on Fig. 2) would indicate that the skipper is willing to take risks. There is a relationship between catch and the coefficient of variation (Chi-square is 9.63, 4 degrees of freedom), but again the relationship is not in the direction predicted by the folk model. The Pearson correlation is .38 which shows that the more successful skippers tend to have a more skewed fishing profile than less successful ones.

The third measure, independence or innovative fishing tactics, is a more sophisticated measure than those already mentioned in that it represents skipper behavior relative to how *other* skippers behave (see Durrenberger and Pálsson 1986:221). A skipper may be said to be independent or innovative if he fishes away from other boats. On the other hand, visiting locations also favored by others would be an indication of conservative fishing tactics. Independence may be operationalized, for the data set in question, as *the number of trips a skipper*

Table 1. Pearson Correlations ($N = 45$).

	2	3	4	5	6
(1) Relative independ.	.53 (.000)	-.27 (.043)	.31 (.021)	-.48 (.001)	-.07 (.325)
(2) Rel. no. of locations		-.41 (.003)	-.10 (.273)	-.68 (.000)	-.46 (.001)
(3) Distr. of tr. (co. of. var.)			.20 (.090)	.46 (.001)	.40 (.003)
(4) Boat size				.17 (.135)	.69 (.000)
(5) Trips					.70 (.000)
(6) Catch					

makes to locations in which no one fished the day before. The mean for this variable is 17.60 with a standard deviation of 11.12. Again a more relative measure should be used. Those who fish often are more likely to visit locations where no one fished the previous day, and indeed there is a strong positive correlation (.67; $s = .000$) between absolute independence and number of reported trips. A measure of independence, relative to number of trips, turns out to be unrelated to fishing success. Chi-square is 7.96 (4 degrees of freedom), which is insignificant at the .05 level.

By this evidence successful skippers seem to have rather conservative fishing profiles in that they concentrate their fishing effort on relatively few locations. Also, successful skippers are no more independent than less successful ones. It may be argued that if one makes a gross distinction between 'successful' skippers and 'less successful' skippers one loses sight of some really outstanding skippers (þorlindsson, in press), and it is possible that a very few skippers perform much 'better' on the 'tests' used here than their colleagues despite the statistical conclusions already presented. This seems not to be the case, however. As Table 2 shows, the skipper with the greatest prestige (the one who caught most fish) performs worse than the average skipper on two of the tests used (he visits relatively few locations and his fishing profile is rather skewed) and his score on the independence-tests is about average. One of the skippers with the lowest prestige was fired at mid season by the company which hired him because he did not 'fish enough'. His performance, though, is better than that of the top skipper on all three accounts. The most famous skipper of the whole Icelandic fleet fished from Sandgerði during part of the season in 1981. He performs better than the top skipper, but there is no great difference between his fishing tactics and those of the low prestige skipper.

Table 2. Main Variables: Means and Values for Three Skippers.

Variables	Mean	Std. dev.	High prestige skipper	Low prestige skipper	Famous skipper
Relative independence	.55	.26	.57	.96	.77
Relative no. of locations	.27	.21	.18	.63	.54
Distribution of trips	1.02	.49	1.86	.80	.58

The Logic of Hunches

There is no reason to doubt that some skippers follow hunches and dreams, as the folk model suggests. Indeed statistical evidence indicates that skippers often

make 'reasonable' decisions. Earlier analysis shows that even though objective variables (such as boat size, number of boats fishing, and relative catches at different locations) do account for a portion of the variance in what skippers do, a large portion is left unexplained (see Durrenberger and Pálsson 1986).

What is the rationale, then, of the practices and models of hunches and dreams? Some students of cognition might be tempted to conclude that they serve the purpose of solving problems. Thus, Evans and Newman suggest (1973:372) that dreams function as a 'memory filter', by examining the vast amount of information collected in the course of the day and rejecting 'redundant or inapposite memories or responses'. It is possible that dreams do function as a memory filter in this sense, but an explanation of dreaming in general does not explain why some groups of people are more likely than others to consciously *use* dreams and to *claim* to use dreams to guide their actions. The Icelandic case suggests that it is not necessarily the skipper's memory which is being 'filtered'. A skipper may use the dreams of *others*, some of which have never been to sea. In such instances the skipper's own psychological processes are not at issue, except in the sense that he 'reads' the message of the dream. Dreams are *interpreted* just as astrological signs.

The logic of such models is a well-worn topic in anthropological discussion. Moore suggests that some magical practices "may well be directly efficacious as techniques for attaining the end envisaged by their practitioners" (1957:69). He argues that the Naskapi technique of shoulder-blade divination, the interpretation of cracks in burned animal scapulae, can be seen as an attempt to randomize behavior and "avoid unwitting regularities . . . which can be utilized by adversaries" (Moore 1957:73). Moore's perspective may well be applied to *some* magical practices, but hardly to fishing if the prey is seen as 'adversary', simply because of the difficulty fish have in using evasive strategies.

It seems reasonable to argue that some apparently irrational practices associated with fishing are a result of ecological constraints, the invisibility of aquatic resources and the consequent lack of knowledge and control over them. Some observers have argued (Hewes 1948) that fishing is a special kind of hunting in that aquatic environments represent a strange realm from the point of view of the hunter. Since the prey moves in a different medium, the pursuit demands particular models (Morrill 1967). Malinowski noted (1954:31) that in lagoon fishing magic does not exist, while in deep-sea fishing there is often extensive ritual. It may be argued on similar grounds that hunches and dreams, or any 'reasonable' decisions, are the result of decision-dilemmas where information is scant and the alternatives open to the skipper are equally attractive (Gatewood 1983; Durrenberger and Pálsson 1986).

The importance of dreams and hunches does not, however, seem to lie primarily in any problem-solving capacity directly related to the reality of fishing. There are also important interactional or social constraints. Hunches and dreams, I suggest, can be said to reduce the burden of responsibility on the leader of fishing operations. An element of trust between the skipper and his crew is important for success. Where a decision has to be made and where the various alternative

strategies seem to be equally attractive, the skipper may resort to hunches, dreams, ancestor spirits, etc., in order not to endanger the team spirit aboard and the trust between him and the crew. The idea that individual differences between skippers explain differential success places a high degree of responsibility on skippers, and to minimize personal responsibility for success or failure an additional mechanism may be called for. The skipper's decisions are said to be the result of forces over which he has little or no control. Thus the skipper is sometimes presented as a powerless agent controlled by unconscious thoughts, mysterious powers or psychological states. Even though the qualities of the individual skipper are said to be crucial for his success, the skipper does not really determine his own fate. Such an explanation is similar to that of Henriksen which argues (1973:49) that in critical decision making situations divination techniques may function to 'externalize' decisions of where to go and look for prey. Good hunters can safeguard themselves by blaming the technique for occasional failures. Significantly, Orbach notes (1978:79) in his ethnography of tuna fishing that hunches can be expected "after a long time in the search and more especially after a search without fish."

Secondly, following Moore's suggestion mentioned above, hunches and dreams can be seen as attempts to randomize fishing operations in competitive situations. Skippers may give the *impression* that they avoid a fixed or explicit pattern of operations, not with regard to the evasive capabilities of the prey, but with regard to the observations of other skippers with whom they share the notion of fishing as a zero-sum game.

Finally, conceptions associated with hunches and dreams are one element of skipper's impression management (Pálsson and Durrenberger 1982). Such conceptions provide one type of answer to the question which is central to the notion of the skipper effect, namely 'How is one skipper different from others?' They provide an explanation, even if a mythical one, of differential success. Skippers are fairly undifferentiated in the capacity to fish, but the claims about the importance of hunches and dreams underline the idea that skippers' decisions determine the size of their catch.

Conclusions

In our analyses of the skipper effect, Durrenberger and I showed that success in the winter fishing for cod and similar species is largely determined by boat size (Pálsson and Durrenberger 1982). Gatewood challenged our findings (1984) on the grounds that it is difficult to separate boat size and fishing skills, since the most skillful skippers tend to be in charge of the largest boats. If differential success is a matter of the personal capabilities of the skipper, as the folk model suggests, one would expect a statistical relationship between success and fishing tactics. The present analysis does not provide evidence for such a relationship.

Even though hunches and dreams do not account for differential success, they have their own rationale. I suggest that ecological constraints, the uncertainties of fishing, partly explain why fishermen often *use* intuitive procedures for deci-

sion making. On the other hand, ecology cannot account for the fact that particular groups of fishermen attribute exceptional success to the use of such procedures. The reasons have more to do with the need to 'externalize' decisions and reduce the burden of responsibility in competitive situations.

Some models of fishing, as we have seen, suggest that differential success is due to the personality differences of skippers while others don't. A distinction can also be made between fisheries where personal differences are important for success and where they are not. Thus there are four logical possibilities (Durrenberger and Pálsson 1984:380). First, there are societies where there is no skipper effect but nevertheless an ideology of skipper effect and this seems to be the case in modern Iceland. Secondly, there are societies where there is both a skipper effect and an ideology, the lobster fishery in Maine being one example according to Acheson's analysis (1977). Thirdly, there are societies where there is no skipper effect and no ideology. This is illustrated by Icelandic fishing during the era of 'foremen' and household production. Finally, there are societies where there seems to be a skipper effect but no ideology. Byron argues (this issue), for example, that in the Shetlands differences between boats are minimized by an egalitarian ideology of luck. Clearly, reality and ideology relate to each other in different ways.

To account for such differences presents an interesting comparative problem. Some anthropologists suggest technology and the process of extraction are of crucial importance. Goodlad implies (1972), for instance, that the change from a passive fishing gear to an active one was decisive for ideological changes in Shetland herring fishing. An alternative interpretation gives priority to the social context of production. Ingold suggests (1980:159) that the ideology of respect in hunting societies is adaptive in that it elicits behavior which conforms with the rationality of the economic system. Similarly, I would argue, the rationality of the Icelandic notion of skipperhood is largely located within the realm of social relations.

If models of fishing are motivated by the rationalities of economic systems, we are likely to witness the emergence of a new model in Iceland. The present model – the ideology of skipperhood and the notion of skipper effect – developed in response to the competition between skippers in the expansive market economy of the first decades of this century. Now there is a new ceiling on production. Since the last 'Cod War', capitalist production has been subject to an intricate institutionalized machinery. The annual total catch of cod and the maximum catch of each boat is decided upon in advance. Fishermen often complain that the new system is unfair because the 'best' skippers are allotted the same quota as the 'bad' ones. This institutionalization fosters the notion of homeostatic fisheries and a 'harvesting' orientation, a 'scientific' rationality. Already one hears the argument that it is the boat and its technology which catches fish and not the skipper or the crew. Even though a skipper's prestige is still determined by 'his' catch during a fishing season, its *value* though rather than its size, the element of competition is greatly reduced. After all, the *size* of the catch – the main criterion for success in the folk model of previous de-

acades – is beyond the skippers' sphere of influence as it is determined by government agencies. One may, therefore, predict a decline in the emphasis on human agency. As a result, the notions of skipper effect, independence, and fishing mood are likely to disappear.

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Fisheries Risk in the Modern Context¹

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Introduction

The sea has long been viewed as a threatening environment and the folktales of many peoples list an impressive inventory of the real as well as imaginary dangers that are said to lie just beyond the horizon, out in the deep. Though, for much of history, fishermen were forced (and preferred) to exploit in-shore waters, such fishing still faces risks of sudden storms, capsizing in swells, or being smashed on rocks due to an error in sailing judgment. However, if there were dangers lurking in these waters, how much more fearful were the risks once out of sight of land? Not only the fishery folk but those who studied them could not help but emphasize the natural risks of fishery ventures – and, as well, the exotic defenses such as superstitions, taboos, amulets, prayers and the like, all designed to mitigate such risks.

As fishermen grew more venturesome and their vessels more sophisticated, they ventured further out to sea and the risks increased; in one of the world's great fishing ports, Gloucester, Massachusetts, 1788 men were lost in the period 1861-1881 alone – a figure that continues to be added to annually as the port's boats continue to ply the waters of the North Atlantic (Connolly 1940:322). More recently, Poggie (1980:128) reports that, in the area between Rhode Island and Maine, between September 1971 and October 1978, more than 70 fishing boats sank and an even greater number of men lost their lives off the New England coast. Even the large factory ships that began commercial fishing after World War II, sailing in vast armadas of catch/processing vessels together with supply and repair ships, have presented their crews with their own types of risks.

Poggie (1980:123) emphasizes the high occupational risks in commercial fishing when he reports that:

Official statistics affirm the extreme risk involved in fishing. Indeed, fishing is far more dangerous in terms of loss of life than coal mining – the most dangerous landbased occupation in American society. The Office of Merchant Marine Safety in 1972 reported that in 1965 the commercial fisheries of the United States recorded 21.4 deaths per million man-days in contrast to 8.3 in coal mining (U.S. Bureau of the Census, 1970 as cited by Poggie 1980:123).²

Despite these figures, only too well known to fishermen, informants shrugged away Poggie's suggestion that their work was very dangerous. Rather they tended to trivialize occupational risks as, 'no more dangerous than riding in a car'

– a response Poggie attributes to “repressing their awareness of the dangers of their occupation” (1980:123).

I would like to argue, contra Poggie, that the ‘trivialization of natural risk’ that he noted should not be reduced to a psychological explanation (i.e., a repression of fear) but, rather, can be attributed to sociocultural factors, a change in the expanded environment of risk within which the modern fishery people operate. For most commercial fishermen today, it is not storm, demons of the deep, and/or cosmological views grounded in a primitive folk science that pose the most critical ‘clear and present dangers’. Rather, it is the dynamics generated from the economic, political and technological contexts within which commercial fishing operates today. This has resulted in a new prioritizing of the hierarchy of risks.

Somewhat paradoxically, my position is supported by the most recent research of Poggie and Pollnac (this issue, p.75). Challenged by Mullen (1968) and Lummis (1983) that “economic uncertainty [rather than personal risk] is the primary influence on level of superstitious behavior” (Ibid.:68), Poggie and Pollnac report that their findings, “tend to weaken the economic determinant hypothesis. Since skippers and owners have much more to lose as a result of low catches, one would expect them to have more taboos. They do not . . .” (Ibid.:75). Given the greater risk fund of skippers and vessel owners (not to mention their more extensive opportunities for manipulative profitability) the claim that skippers and owners have much more to lose may be true, at best, only in relative terms. But, assuming for the moment the legitimacy of this argument, let me attempt to show how such findings are consonant with the position taken in this paper.

I do not question that the physical risks of the occupation are still an important concern of those whose livelihood centers around the sea and, to the extent that fishing remains a high risk occupation, to that extent fishermen and shore-side family members cannot rely on purely secular safeguards or after the fact remedies. What fisheries people themselves label ‘superstitions’ are, therefore, still utilized. There are few if any individuals who do not possess some general and/or idiosyncratic safeguards (cf. Poggie and Pollnac, this issue).

However, Poggie (1980), referring to a study that he and Gersuny did in 1972, argued that taboos among New England fishermen are responses to “the perceived risk associated with protection of life and limb, and not with production of fish, *a distinction not made by many theorists*” (1980:124, my emphasis).

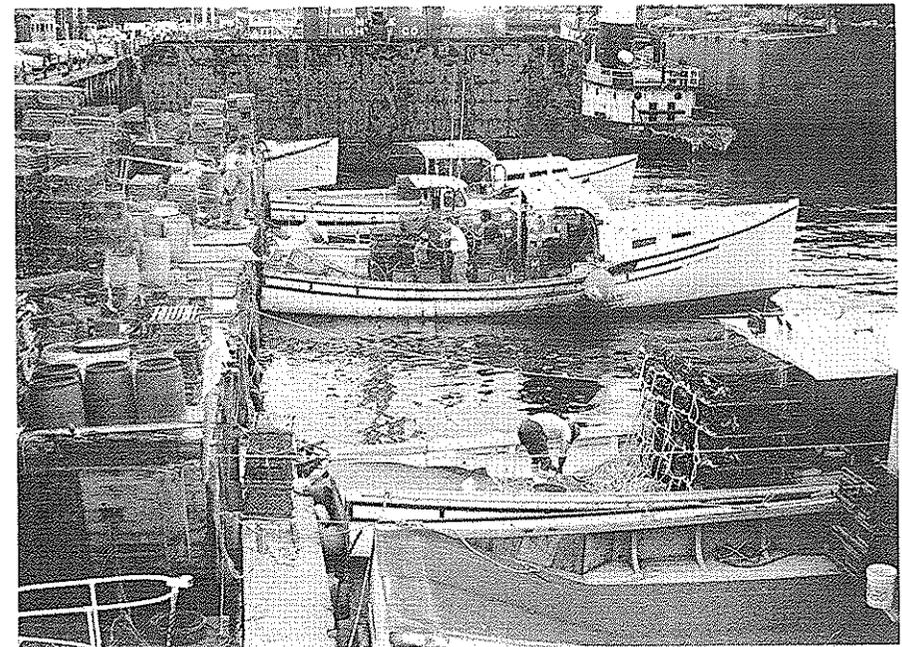
There is no evidence of which I know that indicates a greater degree of personal risk at sea today than, say, 50 or 100 years ago. Economic and political risks *have* increased significantly, however, and secular dangers require secular reasoning – i.e., causally-based strategizing in a rational and scientific mode. It would give one pause indeed if one discovered that skippers and owners (and why not include shore-based industry-members too?) were attempting to cope with the risks of the market or bureaucratically-imposed fishing constraints by reframing old or inventing new taboos and rituals – e.g., ‘Don’t whistle when you pass a Coast Guard vessel.’

If, as I am arguing, such individuals re-prioritize risks and fears – giving

primacy to the secular dangers of the market and management constraints – one would not expect them to enlarge and expand upon those ‘rituals of avoidance,’ ‘taboos,’ and “non-rational and/or non-scientifically based belief[s] concerning cause-effect relationships” (Poggie and Pollnac’s definition of ‘superstition,’ this issue, p.76).

Poggie is correct; the distinction between domains of risk is critical – and not only for the analyst. For the majority in today’s commercial fisheries the economic and political factors intruding into the getting of a livelihood in fishing are the conditions of paramount concern. This is why this paper chooses to address that secular domain.

Given this clear cognitive distinction between the natural (cum supernatural) and the cultural (cum secular) risk arenas, it is in the latter area that fishermen perceive the most omnipresent risks to reside. Yet, in addressing such risks, the people of the fisheries at once feel themselves most helpless – yet most compelled to struggle to plan practical strategies. While the fisherman cannot do much about inclement weather, while he prides himself and evaluates others on the basis of skills and knowledge of the sea developed over the years, and where he relies on a common sense usage of care around machinery, he is aware that much of the business of catching and selling fish is controlled by humans and his success depends on the extent to which he and his have control over and input



Massachusetts Lobstermen

into the workings of that system. On the other hand, he also knows that his world is the world of the sea and his vessel; even his home and the town in which he lives is not as familiar and manageable as the vessel on which he fishes and the maritime setting in which it is sited. In trying to deal with the economic as well as political forces that are, increasingly, having an impact on his earning a livelihood, the fisherman often expresses the belief that, in such matters, he is 'like a fish out of water.' The machinery of the market, and of government (especially, of late, the very special governing sphere of fisheries management) constitute, for the majority, a baffling, hostile, even irrational context.

Still, just as fishing folk designed what, for them, were rational and causal strategies (for all that we would label them taboos and superstitions) for their well being at sea, so the members of the community are attempting to devise techniques to cope with these new socioeconomic risks. Such risks are increasingly seen as the top priorities to be addressed by those whose livelihood depends on the primary exploitation of marine resources.

The physical risks are the dramatic risks — the ones about which we all hear and from which the great novels and oft-repeated songs are spun. But for the modern fishermen and their families the other, less dramatic risks are of more immediate and pressing concern. Though fishery people are reluctant to articulate the consequences of such risks they are aware that these dangers represent a threat to the essential features of what we think of as the traditional mode of production itself, some of the components of which are what attract people to the occupation (and its attendant life style) in the first place. I speak here of such traits as the (1) low entry costs — which make it possible for relatively impoverished and/or undereducated individuals to enter the fishery initially; (2) the strongly held belief that, for someone with luck and/or ambition and daring, there is unlimited entrepreneurial opportunity; (3) certain 'quality of life' components, such as the comradery among the crews and the independence from decision-making by others, that offset the hardships; and, (4) for most still (though, again, they are loathe to speak of it in this way), something called 'the romance of the sea.' But many of these features — to the extent that they ever really existed — cannot be sustained in the face of the growing command being assumed by the market forces of the world economy; by local, regional, national and international political forces; and by the varied forces encapsulated in the term 'fisheries management.' It is to such current risks that this paper addresses itself for it seems time to stop looking at fisheries people as quaint and picturesque village folk whose lives may be summed up in a recitation of primitive albeit colorful beliefs and superstitions. Once we can delineate the primary concerns of the populations whose lives center around and are shaped by the dynamics of 20th century commercial fishing, it should be easier to make sense of the external stress and internal strain that mark relations among such sectors and, say, the ecopolitical sphere of national and international macro-systems (i.e., the sphere where public and private compete *and* consort in order to attain economic and political ends).

A View of Risk from the Perspective of the Fisher People.

A recent conversation with a New England fisherman and his wife encapsulates the issue being addressed here.

Fisherman: You can really worry or fret about things like bad weather, getting caught in a steel cable or things like that — personal risks. But it don't do no good to worry about what you can't do anything about. Nobody plans for that and if it does happen it's either bad luck or something stupid you deserve to get wapped for. You take care of what you can. Hell! Nobody *plans* to get sunk in a storm. Me, I worry more about the amount of fish I'll catch, what the prices will be when I dock, getting cheated, paying the boat insurance and my crew and my mortgage, meeting trip expenses, and whether I should repair what I got or go into hock to buy new. And if I do buy new, what kind? Should I get what everyone else has so I can learn how to use it from them or get help from them when something goes wrong — or should I get something better to get an edge on the others? I do the second, I'm liable to outsmart myself and get something too complicated for me or anybody around to understand.

Most of all, these days, I worry about things like 'Am I going to get slapped with a violation?' Or 'When are they going to change the fishing regulations again?' Things like that.

Fisherman's wife: That's right, that's right. Sure, you think about things and get worried in bad weather — but most of the time we don't think about those things — or, at least, we don't think we think about them.

But every day, no matter what about the weather — and even when Joe's home (or, maybe, especially), we sit and worry about whether we're going to make it this week, or this month, or this year. Just about the time you think things are under control, something new happens. And you worry so much about not being able to go fishing that sometimes I wake up at night and know I've been working on the boat accounts in my sleep. Not make it through no fault of trying — that's the worry you live with all the time.

Fisherman: Yeah. And I'll tell you, a lot of the other risks you were talking about [e.g., accidents at sea], those happen *because* of the economic risks that seem to be getting to be a bigger and bigger part of every day. We might not go out in bad weather if we didn't know that tomorrow the 'fishcrats' [i.e., federal fisheries managers] might close the stocks and not let us go fishing for 2 or 3 weeks — maybe more. So, you fish by the threat of the regs [i.e., regulations], — not by your common sense of the sea the way your daddy did.

Pretty soon there won't be no choice left at all. You'll fish on alternate Tuesdays or whenever they tell you can. You wonder we sometimes take a drink too much? You wonder why some guys go out with the shakes from too much the night before? That's why. Sometimes the worry and the disappointments really get to you.

Fisherman's wife: Look at Pete and Josie. He took out that loan to buy a new Loran — and the government made those new rules about the mesh size of the nets a few days later. So that was more money, just when he could least afford it. Then, the government went and closed fishing for yellowtails [a type of flounder] and that made Pete really hard up for money. Josie got an ulcer and started nagging at him all the time for buying a new unit instead of making do with the old one.

Fisherman: All Pete wanted to do was be better able to find fish. That's all.

Fisherman's wife: Well, he should have known better in times like these. Now, he's on the verge of losing his boat *and* his house. That house has been in his family for 4, maybe 5 generations; it'll be a real sad thing if they lose it to the bank.

Fisherman: I tell you, you worry if you don't take the gamble — 'cause then you'll never

do much more than scrape along – if even that. But, if you do jump in, it's liable to all go sour and leave you in a real mess. You're damned if you do, and damned if you don't. But there's always some new decision, so the tension never lets up. What with one thing and another, you never can rest easy. But the worst of it is, still, that even if you do everything smart, there's going to be some bastard out there waitin' to cheat you, or pay next to nothing for your catch, or gettin' ready to start screwing around with the system because he's worried about 'saving the fish' or helping 'the poor sports fishermen' in their fancy boats. Us fishermen are just the 'bad guys' who are 'raping the stocks to fill their pockets and get rich.' Don't I wish! But it's hard to know this, or stay on top of things until, after the fact – when it's too late to do much about it. Now, *that's* the real risk that all us fishermen face all the time these days.

This lengthy excerpt (from field work last year in a Massachusetts fishing port) is typical of many such conversations. It vividly portrays the various types of risk that confront the fisherman today. Again, I do not wish to minimize the traditional risk factor of the fishery subsistence mode but this paper will try to bring into balance the dimensions and various components that make up the total world of risk faced by fishermen and their families.

The next section will explore these risks – and the strategies that are employed to cope with them – though, as will be seen, some of the most popular tactics actually increase the very risks the fisher people are trying to minimize and/or avoid.

Modern Risks and Protective Strategies

Social Risks

Not the least risk the fishermen face is, of course, the social distancing between themselves and their families. Not uncommonly, wives and children live what might almost be labelled 'separate lives' from the fishermen. Though the wives of fishermen are playing an increasingly active role in shore side matters (e.g., handling the bookkeeping, government paper work requirements, and participating in women's associations that help publicize the importance of fisheries to the larger community), it is still more the exception than the rule for women to play an active role in vessel affairs. Some fishermen are growing increasingly dependent on women to provide them with necessary information about shore side actions by fish buyers, the government, the town governing boards. They are especially dependent on women to monitor the activities of the fishery management councils and, as well, the National Marine Fisheries Service (NMFS), the federal agency that oversees the workings of the 8 quasi-federal regional fisheries management councils mandated to manage fishing in their respective zones.

On the whole, however, there are still many households in which the distance between fisherman and other family members is large. A skipper told me recently that he was shocked to find out that his 16-year old daughter had been dating one particular boy regularly.

I started complaining she was too young for one steady boy. But my wife tells me, 'Well, you aren't here and when you are you don't pay any attention to what I say – and it's too late now to do it different.' And I figured it was, so I just shut up. But you know, I'm out 8-12 days at a time and when I get home I want to just sleep or else have a little fun. What can you do?

Territorial Risks

It is not only risk in the market, however, that threatens the fishermen. They are facing the loss of their space: at sea, there are problems on the fishing grounds, as more fishermen crowd in and compete for the same stocks. Not all fishermen face declining landings due to such crowding; it is usually the smaller, older 'less efficient' vessels that suffer the soonest – though it would seem obvious that, sooner or later, even the best must face declining hauls. Space is also a factor as the search for variable resources increases conflict among different gear users (e.g., the fixed gear of the lobstermen vs. the nets of the draggermen). Competition is heightened by the fact that continental shelf areas are multiple-use zones and the fishermen must compete with commercial shipping, recreational boaters, off-shore waste dumpers, sand-dredging (for construction) and the like. Off-shore waste disposal and oil drilling (which most assume is only temporarily in abeyance) present pollution and stock displacement hazards, and in the traffic lanes the potential grows for collisions between fishing boats, recreational craft, and shipping vessels.

Wharf space grows ever more scarce and fish buyers as well as fishermen find it hard to compete with the recreational vessel marinas or the retirement and leisure time condominiums.

Even living space on land – for housing, for supermarkets, clothing stores, and other establishments that cater to the low or moderate income groups who have traditionally lived in fishing ports (including those who have serviced the port populations such as clerks, barbers, waitresses, appliance or shoe repairers) – is becoming too crowded, too costly, for low-income families to be able to maintain their niche. In the competition among various user groups, the interests of commercial fishermen, indeed, the industry at large, plays an increasingly secondary role in the eyes of the larger population, whether they are regional planners, political decision makers, or private entrepreneurs. Tourists, urban commuters, retirees, all are forcing the fishing families out of towns where they have long time roots. As property appreciates, so do taxes and other costs of living. Today, it is not uncommon for fishermen to have to drive miles to their boats and/or land their fish at a port other than out of which they fish. All of this increases so-called indirect fishing costs.

It is ironic that the very feature that attracted other interests to these locales – the 'quaint, picturesque fishing port ambiance' – is now a source of irritation to the new arrivals. Once deemed 'charming,' the lobster pots piled high on a neighbor's lawn are now classified as 'smelly' and 'an eyesore' to be eliminated – by law if necessary; fishing boats, in need of paint, rusty, reeking of

diesel fuel and noisily disturbing a good night's sleep as vessels leave port at 3 or 4 A.M., are a nuisance; and even the fisher people themselves 'are not really the sort you want as neighbors.' That the massive influx of population and the development that lures as well as responds to such newcomers is itself a major cause of environmental degradation (groundwater contamination due to inadequate sewage facilities, shoreline wastes, the destruction of ecologically valuable salt marshes, etc.), is little considered by these arrivistes. In short, many fisher people see themselves rather than the fish as 'an endangered species.'

Political Economic Risks

As mentioned above, traditional strategies do not protect the fishermen from the growing number of socioeconomic risks grounded in the managerial sector of the political economy. Thus, it would be to their advantage, clearly, to participate more fully in shore side affairs. But the extent to which fishery people do *not* play an active role is almost a truism in fisheries research. My research indicates, however, that there are many barriers to such participation, some of them long-standing, still more of recent derivation. For example, when the fishermen take the time to public meetings — time that must be scheduled according to the shore sector's schedule, not the fishermen's — this is unpaid, non-profitable time away from his job. The most economically marginal and thus the most vulnerable are the most threatened but the least likely to attend meetings since they are the least able to afford such losses. Those in this same category also tend to be the least educated and therefore reluctant to speak in public, to those several label 'the educated big shots.'

One skipper I know was extremely concerned about what he saw as the need to attend the monthly meetings of the New England Regional Fisheries Management Council (one of 8 governing bodies established in 1976 to manage the resources of the U.S. continental shelf and designed, rather paradoxically, simultaneously 'to conserve the stocks and improve the fishing industry'). However, each time that he attended the two- to three-day meetings, or one of the many public hearings designed to elicit public input on projected management rules and regulations, his crew grumbled at the lost fishing days, his wife nagged about decreased household monies, and the buyer to whom he regularly sold, complained about short landings. Contrariwise, however, when he and others like him are absent from meetings or hearings, not a few of the fisheries managers are quick to argue that this indicates not only the disinterest of fishermen in participating in the framing of rules and regulations that govern their livelihood but also indicates the need to have such a governing body in the first place since it indicates fishermen are more concerned with making money than helping to manage the stocks for long term benefits to all. As one council member put it to me: 'The fishermen are too greedy to take a day off from fishing to show up at these meetings. They cry when it's too late — when regulations to save the stocks go into effect or after the fish are all gone.' A fisherman standing nearby overheard and responded angrily,

You get paid for coming here; I lose pay for coming. You get money whether you're right or wrong in your 'guesstimates' about the stocks. You can afford to be high and mighty and say, 'It's better to be safe than sorry — so let's tighten the landing quota.' If you're wrong with your constant under-estimates, you're safe — and I'm sorry. So you don't give a damn if your figures are off. You can sit here and dilly around; I got to get out there and *earn* my day's pay — if you let me.

It's not just here that the enforced absence from shore activities and the different temporal framework of work activities puts the fisherman at risk. They have found it equally difficult to attend tax rate hearings, town meetings on dock fees, and other events in their locales that determine the cost of living or vessel operating expenses. In one town where I've worked, the members of the fleet have tried for years to get better wharf facilities. But even when this is an agenda item and they miss a trip to attend hearings, agendas get reordered and discussions on other items may lead to a postponement of the topic, sometimes for several sessions. After two or three such delays, the fishermen give up and stop attending — only to find that, at the next meeting, the issue was discussed and voted down with no opposition. This is not always accidental and some town boards are well known for the delaying tactics used by key individuals to prevent the fishing community from being heard.

But, with all this, it is still the more explicit category of risks represented by the market and the fisheries managers that looms largest in the everyday concerns of the fishermen and their families. Even in the most closely knit groups (e.g., the group of Italian immigrants who now dominate the Gloucester fishing fleet) there is constant concern among the members about the extent to which they can be treated unfairly by those with whom they economically interact. Bartlett (1977:100) tells how one such fisherman views those others to whom he is inextricably linked:

Thirty years ago the old fishermen led him on the rocks and he learned; don't trust other fishermen. But fishermen belong on the right hand of God compared with fish dealers. You don't choose a dealer by his honesty, but by his degree of dishonesty. The fishermen assume all dealers are thieves; it's just which will rob them the least — or is most willing to share in the thievery.

The American fisherman is caught up in a complex marketing chain that increases the risk of depressed prices because, somewhere in the process, it will be decided there is an over-abundance of fish on hand.

The fish will be briefly held by as many as eight people before it is eaten. [The skipper and crew] have possession first. They sell it to the buyer at the fish dock. He may sell it to the trucker who takes it to New Bedford, and there it is sold to the cutting house. It then goes to another trucker who takes the fish to New York, then to a dealer and perhaps still another trucker, then it goes to the restaurant — or market-owner. Finally, the customer takes possession of the fish, carries it home, and eats it. Of course, each time the fish changes hands, its price goes up (Matteson 1979:81).

Some of the current market risks faced by the fishermen are also touched upon in a development report prepared by a consultancy firm for the city of Gloucester (McPherson 1973). In analyzing the role of the fishing industry in this major world port it was noted that competition from foreign frozen fish – cheaper and more convenient to market around the country, more adaptable to the life styles of modern American families given the ease of table preparation – has cut heavily into the market for Gloucester's fresh fish landings.

In a paper discussing traditional market relations in a California fishing community, Stuster (1980) stresses that the fisherman is at risk primarily because

[Fish] is produced in unpredictable quantities and must be marketed quickly to preserve quality. Because of the unpredictable supply, fishermen are usually forced to continue to fish even when prices drop . . . Furthermore, because fresh fish must be sold immediately (within a day or so of landing) production cannot generally be stored until market conditions improve . . . The urgency to sell one's catch is further compounded by the desire to return to the grounds; unnecessary time spent in port is viewed as money lost (1980:5).

These remarks of Stuster emphasize that the traditional economic risks of fishermen continue to exist – and, for the independent petty commodity producer, even intensify – in today's world. Few fishery people are naive enough to see this category of risks as one that can be guarded against by prayer, amulets, or the respecting of taboos. The limits are cognitively drawn between the dangers of the sea per se and those that emanate from the shore – the latter representing the political economy of the socioculture and the world system in which he and the fishing community to which he belongs are inextricably embedded.

The Political Economy of Fisheries Management

A major change came to the fisheries with the passage of what is now called the Magnuson Act, a bill that the fishing industry worked hard to have passed and applauded when it was implemented in March, 1977. They saw its intent as being the ousting of foreign fishing vessels from traditional American waters. But, as McCay shows in her capsule summation (1980:20), there was a lot more to it.

In 1976, the United States Congress enacted a law which extended national jurisdiction over fisheries out to two hundred nautical miles . . . This "200-mile limit" law, the Fishery Conservation and Management Act of 1976, sharply restricted foreign fishing in the coastal waters of the United States and its territories. It also mandated the development of appropriate plans for the management of fisheries through the aegis of regional management councils and codified that objective of fishermen as "optimum yield" [a concept of stock conservation based on projected biologically-determined landing maximums as modified by what are deemed to be such 'relevant' sociocultural factors as economic and political realities].

The fishermen discovered, as one skipper put it, that the new law meant that, 'the government now owns the fish that used to be free. I guess that means they're going to own us too, pretty soon.'

In New England, currently, the activities of the Fisheries Council and NMFS (plus the Department of Commerce within which NMFS is located) are perceived as the overwhelming source of risk relative to the survival of the industry and, especially, the entrepreneurial dimension of that industry.

The protective strategies employed to counter or at least moderate such dangers are as secular as the risks themselves. Generally such strategies fall into three major categories: (1) shore side social linkages at the formal and informal levels; (2) sea-, dock- and shore side ecopolitical activities – public and secret, formal and informal, legal, quasi-legal and/or ethically questionable circumventions, and outright illegal; (3) technological.

(1) The social linkages are varied and are grounded in kin ties (consanguinal, affinal and fictive) as well as locational and occupational commonalities. There are bonds generated by having a common religion (and belonging to the same congregation), coming from the same village or region in Europe, ethnicity (which may give the added dimension of a common second language), and fleet/port/regional commonality. The latter may be called into play when fishermen from outside of the New England region 'invade' local waters. There are also connections based on membership in associations derived from fishing the same resource or in the same zone (e.g., the Massachusetts Inshore Draggermen's Association). The ties formed can be the basis for aid in a financial crisis; provide valuable information; or lend assistance in some emergency.³

Increasingly important are ties among fishery women, particularly those who have formed political action groups or sodalities to enhance the public image of the fishing industry by, say, sponsoring seafood festivals or working through the mass media to publicize the plight of the fishermen. Such women can also be valuable sources of information concerning matters about which the fishermen would otherwise remain ignorant (e.g., prices paid other fishermen, regulatory avoidance strategies, regulations being considered but yet to be implemented, shady practices by fish buyers, investment or relocation plans by other fishermen). Women, traditionally, have made an important contribution to the maintenance of the fishery mode but, in a world where demands for record keeping and documentation are on the rise, women are playing an increasingly explicit role. Further, in some of the smaller, economically marginal, 'family vessel' operations, the shore side employment of women provides valuable alternative income, whether through actual wages or because seasonal employment makes them eligible for unemployment benefits that helps in lean times.

(2) The largest category of strategies would appear to be those grounded in ecopolitical activities. They usually involve only a few individuals – a wife or professional accountant who 'cooks' the account books so as to avoid paying full taxes on earnings or, at least equally important these days, can keep vessel records so that no regulatory violations occur; a private arrangement between a buyer and fisherman that accomplishes the same ends as above and, as well, may give a skipper extra earnings above those shared with the crew – or allows a vessel to land catches of prohibited types or quantities of fish. There are circumventions of fishery management regulations – e.g., "... under the emer-

agency regulations boat owners realized they could catch three days' allowance of fish in one day of fishing if they left the dock at 11:59 P.M. one day, fished the next day, and returned to port at 12:01 A.M. the third day" (Dewar 1983:159).

There is, so far as I was able to find out, little bribery of officialdom — though there is the occasional private contact between some shoreside industry person and a political or administrative figure that may be the source of advance information or, alternatively, the use of the latter as 'a friend at court.' A far more common illegality is the smuggling of contraband (these days usually drugs) and my data lead me to estimate that as many as 15% of the fishermen have engaged in this at least once or twice. The majority of those involved operate on a small scale — most claiming they do it on an irregular basis and then only to be able to keep on fishing in the face of economic pressure brought about by the volatility and unpredictability of the resource and management process. I have been told that, 'an extra couple of thousand at the end of the month when you need it can make the difference between losing your boat or staying alive.'

Technology and Risk

It is within the category of technology that we may see most clearly how inter-systemic are (a) risk, (b) strategies employed to avoid or at least ameliorate risk, and (c) the increase in or creation of new dangers by the very strategies employed in (b) to offset (a).

Douglas (1966, 1985 and Douglas and Wildavsky 1982) has contributed an especially provocative voice to the debate on risk. One of her most interesting hypotheses stems from the question of "why so many . . . judge everyday hazards to be safe and think themselves able to cope while they cannot." She answers this by setting every individual within a context of mutually interdependent fellows who may offer or withdraw support depending on the extent to which the action which generated the need for such support was deemed reasonable or socially unacceptable. Thus, "If a group of individuals ignore [sic] some manifest risks, it must be because their social network encourages them to do so. Their social interaction presumably does a large part of perceptual coding on risks" (Douglas 1985:66). Carrying this beyond the constraints of Douglas's focus, one could further hypothesize that, lacking adequate interaction (and thus a coding of risks), new dangers would be perceived as risk compounded since there would be neither criteria for appropriate response nor assurance of support. It is just this situation that has been created by the massive intervention of fishery managers and the bureaucratic 'software' technology that is being imposed on the industry in the name of conservation of the stocks.

Such a statement is not meant to minimize the material (rather than organizational) technological changes that have occurred in the fishing industry over the past century (and particularly since World War II). These have affected a qualitative change in both content and context. The latter is of special significance since it has led to dramatic changes not only in the environment per se (e.g., the condition of the stocks as affected by increased predation and other factors such as

pollution), but, as well, in the way we identify the 'environment.' Even the most insular of fishery people are cognizant that their world no longer consists of their immediate niche and the people as well as resources in it. They talk of the 'political climate in Washington' or the strengths/weaknesses of their social networks with significant decision-makers in the same way that older fishermen once limited their concerns to each day's weather or the state of their fishing nets.

Obviously, people of the fisheries are concerned with the ways in which technology can be utilized to help them cope with environmental risks which fall into two major categories, natural and sociocultural.

Technological hardware addresses the concerns in the first sphere. Well-functioning and soundly designed equipment minimizes random accidents as well as (at least in theory) decreases sea-related physical and economic risk. Directly concerned with safety at sea, there is the electronic gear that warns of bad weather and/or helps to get assistance in a crisis; the survival suit, inflatable lifeboat with rescue flares, etc., that, along with air-sea rescue programs decrease at-sea risk.

There is also the hardware such as fish-finding gear that enhances search potential; icing machines and better storage facilities on the vessel that improve chances of getting higher landing prices for better quality fish. Since the primary economic goal of the fisherman is to land a good catch at a good market price, a 'highliner' (the most consistently successful fishing captain(s) in a fleet) usually has the best gear and crew. Such a skipper can take the vessel out in weather that might keep less seaworthy or less well equipped boats in port; he and his crew can earn an income when others do not. Indeed, they increase their earnings in such situations since, because others are not landing fish, this often means higher than usual prices for the fish that is landed. Top of the line fish-finding gear makes it more likely that the vessel will find fish when less 'state of the art' vessels return at best only marginally successful. Further, the captains of such vessels usually have the pick of the crewmen, another factor that enhances both quantity and quality of fish landed. This, of course, feeds back into the physical sector since such crewmen are both more productive and less likely to be a hazard to their mates because of their lack of skill or inefficient performance. Thus, there are fishermen who dispute that, given their cultural perception of and reactions to either type of risk, the technological hardware represents one fundamental variable in differentiating high/low risk contexts.

But the latest technology is expensive. Each vessel owner must weigh investment risks and do a short- and long-term cost/benefit analysis. This is extraordinarily difficult; quantifications are fuzzy and volatile factors, given the constantly changing worlds of both the market and fisheries management — not to mention the maritime context itself. Indeed, it is not always clear as to what are costs and what are benefits. There are new skills to learn and this can require being able to bear a preliminary financial loss due to (a) a resistance to learning unfamiliar techniques, (b) lack of background skills necessary for learning these new techniques, (c) the reduction in income due to the inevitable downturn in

fishing efficiency during the initiatory phase.

Secondly, old skills can be lost surprisingly soon – and younger crew members may never have learned them. If the equipment malfunctions (or, as in the case of certain types of safety gear, is never tested to learn its operations, or periodically checked for operational efficiency) and traditional, non-mechanical or other alternatives are not available to substitute in an emergency, the potential of risk increases *because* of the new technology.

Thirdly, in an ironic twist, the latest equipment can lead to too much faith in the capacity of the hardware 'to take it,' to always respond as needed, as well as too casual an attitude towards fishing risks. For example, the greater the amount of safety gear, the more one relies on technology rather than human attentiveness to the possibility of danger; one assumes 'nothing' can happen – and grows careless. I call this decrease in caution relative to potential risk (a cognitive orientation that can be related to a rise in accidents), 'the Titanic syndrome.'

All these dangers aside, the very success of such vessels has added to the risks faced by industry members and generated by the other risk sphere, that generated within the sociocultural sector and specifically related to fisheries management. Personnel from the latter category are making increasingly vociferous demands for control of the technological capacity of the industry to reduce stocks below a viable reproductive level. Managers claim that, unless the industry is controlled, its increasing potential for predation will destroy the very productive base upon which it rests. The fish managers are calling for both limited entry (e.g., licensing the number of fishermen and/or vessels permitted to fish) and limited effort (constraining the amount of catch). The argument is that it does no good to limit the number of vessels or fishermen alone since constantly improving technology will simply allow an ever shrinking number to catch as much if not more fish – especially given diminished competition in fishing areas.

Industry members respond that there is little point in protecting the stock to such an extent that the industry is ultimately wiped out. Protesting a closure at a public meeting of the New England Management Council, one New Bedford scalloper shouted angrily, 'Sure, save the fish and destroy the fishermen! Then, with no American fleet left, the foreigners come in and fish for us – at twice or three times the price once U.S. consumers have no option but to buy from them.'

It is a poignant dilemma and one for which no country has yet found an adequate resolution. Setting catch limits often requires fishermen to return fish to the sea since they are prohibited from landing them despite having captured them in their nets. The fishermen argue that dead fish do not reproduce and such a ruling creates 'criminal waste.' They cannot determine, they say, what their nets will bring up. The managers respond that (a) the catching of one or another species is not nearly so random as the fishermen (who at other times brag about their ability to know where to go for certain species) would like to have the managers believe; (b) the fish are not always dead when returned and, (c) most in point, without such prohibitions the fishermen would lack any constraints

and continue to overfish until the stocks declined below a viable reproductive level.

In response to this last claim, the fishermen respond that market economies would lead them to stop fishing long before that lower level was reached. Trips, they say, would become too costly relative to rewards and they would switch to another species, go to new grounds, give up fishing voluntarily, or be forced into bankruptcy. Both economists and marine biologists argue against this scenario, claiming that, first, as fish become more scarce, the market price increases so that fewer fish bring as much or greater rewards; second, better technology can increase capture potential despite lower stocks and thus lower costs ultimately; finally, the marginal utility of the biological base and the market are not so interdigital – the lower limits of a stock's reproductive potential (particularly schooling fish such as herring) can be reached long before the stocks become so scarce that trip costs exceed profits.

Macro-Ecopolitical Factors

In a quasi-fictional/documentary study of a New England fishing town, Moorhouse (1979) captures the sense of tension that exists between, on the one hand, the would-be fisheries managers from the political, economic, and scientific sectors, and, on the other hand, the fishery people. He describes a public meeting on the issue of a new ruling dividing a favorite fishing area into two contiguous zones with differing regulations for fishing. At the meeting is a state senator who decides that

the evening had probably been worthwhile after all. It needed to be in weather like this. Some of his colleagues . . . had thought him a fool to venture forth just to hear fishermen let off steam on an issue that had long ago been settled beyond their reach. Fishermen did not figure highly in the calculations of American politicians for there were not enough of them to make much difference to the vote . . . The Commonwealth of Massachusetts itself could not do a damn thing to change the statute, with all its corporate power. Not even Washington was the ultimate arbiter of these fishermen's fate. That had been slowly and tortuously settled over a couple of decades by international politicians and public servants perambulating round the world . . . These people were peanuts, and they knew it: only they didn't know that they'd already been roasted (Moorhouse 1979:163-64).

Though this was written about New England one does not have to strain to hear echos of the bitter disputes that have racked the EEC in recent years. In large measure this is because fisheries management, like most other productive systems today, is a complex tangle of political, economic, environmental and social considerations – that we attempt to unravel in the dark and fog generated by constantly changing alignments based on local, national, and international competition, as well as public and behind-the-scenes negotiation, on the basis (if we could but admit it) of inadequate data.

The ecopolitical ramifications of fisheries management are varied and complex and there is room here to mention only three. Siegel (1980:19, as cited by

Hennessey 1983:77) is concerned with the fishermen's growing sense of being at risk because of the number of decisions that are being removed from his control. He charges that the process of council management "acting through the federal government, has been making many of the basic decisions normally made by fishermen; catch rates, gear seasons, number of trips, and fishing areas."

The myriad of regulations, constantly being added to, reformulated, suspended, withdrawn, elaborated, and reinterpreted, create such essentially economic risks as having to fish whenever and wherever one can — according to the rules. "All these regulations did not occur simultaneously . . . they came about in a fundamentally serial, remedial, and incremental manner . . ." (Hennessey 1983:77). The danger of unwittingly violating the laws and regulations and then suffering penalties and fines that might range from a critically timed confiscation of catch or loss of a fishing permit, to the seizure of a vessel, increases risk annually at an exponential rate.

At first, under the management of the so-called '200 mile limit act,' the New England Council permitted an open access fishery for allocating cod, haddock and flounder to vessel class groups while imposing trip limits. This proved unworkable and so a quarterly quota system was initiated. Then, as the Director of Marine Resources for the State of Maine (and a mandatory member of the New England Council) has described the process

Weekly catch or trip limitations by vessel class were added, in an attempt to spin-out the quarterly allocations as long as possible. Along its path of evolution, the plan accumulated other quotas for certain [recreational] vessels, geographical quotas, and Canadian allocations (Appolonio 1978:29).

Hennessey comments in amazement (1983:78) that, in the New England region alone, "The combination of these quotas, allocations, and trip limitations amounted to more than 100 different quotas of different kinds!" In agreement with Appolonio he states that, "The cumulative impact of this 'architecture' of complex regulations was 'widespread violation of and noncompliance with the law and probably a significant reduction in the reliability of landing data'" (Appolonio 1978:30). Hennessey summarizes the situation by stating that

Each remedial move by the councils . . . required the subsequent issuance of additional regulations in a vain attempt to gain control over a deteriorating situation. The end result was an ineffective and painful management record which was fostering noncompliance to myriad regulations.

It strikes not a few that it is little wonder that the majority of the fishermen constantly complain that their livelihood is at greater risk from the 'fishcrats' than from any dangers posed by the sea, the weather, or the unpredictability of the stocks. The situation increasingly frustrates the fisherman as well as increasingly puts him at risk legally — while, simultaneously, costs of the management proc-

ess spiral upwards and the system itself becomes so dangerously Byzantine that it is incapable of practical implementation.

The final risk to be discussed is one generated by the circumstances just described above. It is touched upon by Appolonio when he decries the quality of the catch data that is obtained from fishermen. Though biologists and other fisheries managers rely heavily on such figures to establish the perimeters of the management effort, Appolonio questions the scientific utility of such data. Even if one could safely assume that industry members could provide the required data within the same statistical framework as that expected by the biologists, there are the added problems that the tracking of such regulations and paper work (1) are foreign to the fishermen and their traditional work modes; (2) violate the usual rules of secrecy about fishing that are widely maintained and have long been an integral part of the fishing mode; (3) are especially to be manipulated if the vessel has intentionally violated any of the existing regulations which the completion of the paper trail is designed to detect. Yet, it is on the basis of what is possibly (or even probably!) faulty, false, and incomplete data that, supposedly, landings are tracked, fish stocks are monitored, and new regulations are mandated. Thus, for example, from the fishermen's perspective, it is a sum-zero game. If (as has been the case since the management council process began) the fishermen near the limits of the quarterly quota for cod only halfway through that period, because 'there are so many fish out there you could walk on water!' minimizing the amount of cod they have landed, is liable to lead biologists to argue for a closure on the grounds that, obviously, the cod are in short supply. If, on the other hand, fishermen give accurate (or even inflated) figures, the managers will impose a closure on the grounds that the stocks are being fished too heavily — an especially likely response if the initial calculation was low.⁴ 'I tell you,' said one skipper to me ruefully, 'sometimes when I think about it, my head just starts pounding from the strain of trying to figure out which way to jump.'

Conclusion

Fishermen in many locales increasingly perceive themselves (rightly or wrongly) at risk from non-fishermen — whether they be fish buyers or processors, economists or politicians, biologists or sports fishermen, environmentalists or bureaucrats, their own nationals or that ubiquitous enemy 'the foreigners.' They are explicitly aware of their vulnerability, particularly since they admit that, as a group, they have little unity and the occupation tends to select for those who place a high value on individual decision-making. Idiosyncratic and competitive, fishermen rarely have any organized, institutionalized linkages that permit *effective* resistance to that which can erode and whittle away — or, as in the case of coastal development or nationally directed industrialization of a fishery, even dramatically and suddenly transform and dislocate — the components of their occupation and life style. Indeed, the authors of one study of the New England fishing industry summed up their perspective of the situation with what they

saw as the futile but sole response of these primary producers: "Frustrated, lost, and without hope of recourse, fishermen turn to complaining amongst themselves and their friends" (Boeri and Gibson 1976:105). These same authors see attempts to organize fishermen as doomed to founder on the rocks of the industry's traditionally atomistic structure. They cite as representative of that fragmented situation, the words of Ralph Norwood, "a politically active Maine fisherman" who announced at a fisheries conference that, to his mind, "... man has not yet advanced far enough so far that Maine fishermen can be organized like auto workers and be directed here and there by government officials telling us where and how to fish" (Boeri and Gibson 1976:105).

The difficulties of managing risk in the larger sociocultural context, one where those more usual dyads, linkages, networks and associations of fishery people discussed earlier lose much of their effectiveness, are vividly apparent to fishery people. In the summer of 1985, while discussing the problems confronting the industry, one of the men commented to me:

You wonder sometimes why you keep fighting to stay alive [i.e., keep on fishing]. The State Department negotiates away our fishing grounds; the various government agencies listen to the oil interests, the sports fishermen, the coastal developers, and the environmentalists. The minute we land our catches the lumpers [i.e., longshoremen who unload the vessels] rob us blind before our catch is weighed in. We're lucky if we meet trip expenses with money left to pay the boat mortgage, insurance, repairs and wharf fees. If we have anything left, the tax man takes it. We have no real influence here or in Washington. And to make matters worse, there's always some other fisherman trying to do you in.

In sum, those whose lives are centered around commercial fishing are still viewed by many as 'folk' on the fringe of modern societies, anachronistic hunters and foragers whose simple lives are dominated by ancient myths, traditional taboos, and irrational superstitions. This essay has attempted to show that the lives of fishermen today (even including many in the 'underdeveloped' artisanal fisheries so long as they are tied into the modern state system) are geared to dealing with the modern risks generated by the regional, national and international arenas with their complex interplay of factors representing conflicting interests of the political, economic, and environmental sectors. To most outside the industry, the details of the lives of the fishery people are irrelevant — given 'the larger issues,' the 'greater good.' To many connected with the industry — especially fishery managers — the dynamics of the stocks are of greater moment than the dynamics of the fishing communities. The occupational perimeters as well as the mode of life of the fisher people are simultaneously determined and permeated by the macro-system in which they are inextricably embedded. Each decision, whether made by the fisher people or external figures, is fraught with the risk of being futile or even counter-productive to achieving its intended results (cf. Smith 1982, 1984). In any case, the fishery communities are at risk as never before. And they know it.

Notes

1. Support for the research in this paper was received from sabbatical funding by the State University of New York — Oswego, and research supported by the J.N. Pew, Jr., Trust and the Woods Hole Oceanographic Institution's Marine Policy and Ocean Management Center.

2. It is interesting to note that study by Poggie, Pollnac and Gersuny found that, "individuals who grew up in fishing families knew fewer taboos than those who grew up in non-fishing families" (1976:261). I would argue that this relates to the argument I make in this paper concerning the emphasis on secular risk and secular strategies to avoid such risks.

3. Fishermen are usually organized, if organized at all, into small, localized groups at best weakly linked to some national association (e.g., the Massachusetts In-Shore Draggermen's Association, the Point Judith Fishery Cooperative). They are divided by differences based on fishing zone, gear type utilized, resource exploited, and home port. In a few ports (e.g., New Bedford) there are even cleavages along ethnic lines. Unlike other countries (e.g., Canada) there are few fishermen's unions in the U.S. — and what few there are exist on the west coast.

4. Contrariwise, if the biologists point out that the landings show that the catches primarily consist of a single year class and one that is just at reproductive age (or even immature) — thus indicating that the fishermen are catching 'next year's stocks' — the fishermen will argue that the very abundance indicates that 'there are still plenty out there left to reproduce for next year.'

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Patterns of Gear Changes in the Maine Fishing Industry

Some Implications for Management

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Introduction

Many fishermen regularly switch the species they fish. Some fishermen regularly fish for different species with different kinds of gear over the annual cycle; it is a rare fisherman who has not had experience fishing for several different species over the course of his career. Indeed, the difference between financial success and failure in many cases is closely connected with the ability to change species fished as prices or the availability of various fish stocks change. Changing target species is perhaps the most important adaptive strategy used by fishermen. Despite the importance of changing gear and species, the phenomenon is not clearly understood. Fisheries managers think in terms of managing single species, as if the men who are being regulated fish for only one kind of fish. Indeed, the fact that fishermen regularly switch gear and species is obscured by the very language used in describing fishermen. One speaks of 'herring fishermen' or 'lobstermen' or 'scallopers' as if the men exploiting these species have done nothing else throughout their lives. Some men have focused on one species throughout their careers and do, in fact, have operations which would make it difficult to do anything else. The vast majority are not, however, in this position.

For those concerned with the management of marine resources, it is critical to understand the factors promoting or inhibiting changes in fishing gear. After all, the object of regulations is to change fishing patterns, with conservation of over-exploited species in mind. In many cases, this involves promoting a change from one species to another or restrictions on the use of certain kinds of gear. In some cases, management means nothing more than shifting fishing effort from one species to another. In other cases, it means putting people out of business, with all that indicates for social and economic dislocation. In all cases, exactly what will happen depends in large measure on the ability and willingness of fishermen to change gear and species sought. For this reason, an understanding of the factors governing shifting between fisheries is essential for effective and equitable regulations to the promulgated.

In this paper, we will first analyze the patterns of gear changes that have occurred in the fisheries of northern New England between 1973 and 1978 and present quantitative data to identify the factors associated with these patterns of permanent change. Second, data on fishermen's experience, their annual round and career patterns will be presented in an attempt to bring out some of the fun-

damental features — the deep structure so to speak — behind all gear changes. Third, we will analyze the implications for management of the patterns of gear changes observed.

In New England, studies of gear changes are inhibited by the lack of economic information. Fishermen fish for money, and the primary reason they change from one gear to another is to increase profits or avoid losses. Unfortunately, it is impossible to obtain accurate information on revenues, costs, and returns to investment on various kinds of boats and gear configurations at present.² However, it was relatively easy to obtain information on the gear changes that were actually made and on the social and cultural characteristics of the fishermen making those changes. From these data we can elucidate not only patterns of gear changes, but also factors explaining those changes. In short, while it was impossible to obtain the cost and revenue figures behind the gear change decisions of individual fishermen, the aggregate patterns are clear enough.

Methodology

In the summer of 1978, information was gathered from captains of 190 fishing boats in Maine concerning the history of their fishing operations. This sample represents approximately 65 percent of all year-round fin-fishing boats in the area, but only a small percentage of the lobster fishermen. Information was obtained on the personal history of each individual in fishing (age, education, experience, kinsmen in fishing, etc.) and information on changes in fishing operations and fishing equipment between 1973 and 1978 and their plans for the future.³

Permanent Gear Changes in the New England Fishing Fleet

In the 1970's total investment in the fishing fleet of northern New England was expanding. First, there was an increase in the number of boats. In 1974, the Maine Department of Marine Resources listed 104 Commercial Trawlers, Purse Seiners, Gill Netters and Sardine Carriers operating from Maine ports. In 1978, our interviewers found 234 such boats. This increase also occurred in New England as a whole. In 1977 there were 1200 Federal groundfish licenses issued for New England; in 1979, the numbers had grown to 2191 (not all of these boats had home ports in New England, however) (Grice 1980).

Not only were there more boats; they were clearly larger, better-equipped, and had more versatile fishing gear. In 1978 there were 60 fishermen in our sample of 190 who had boats more than six feet longer than the boats they owned in 1973. Only 16 fishermen had boats six feet shorter. The information on boats men planned to build indicated that the strong trend to larger vessels would continue into the early 1980's. In our sample there were 61 fishermen who had ordered larger boats or were planning to do so in the near future. Of these, 43 men had ordered a boat at least six feet longer, while none were planning to build a boat six feet shorter than the one they had at present.

Although versatility is more difficult to measure, there is little question that the fishing fleet in northern New England was becoming more versatile as well. In general, a fishing operation was judged to be more versatile if the data indicated there had been changes in the size of the boat, electronic gear, or fishing gear which would allow the owner to exploit different fishing grounds or more species over the annual round. By these criteria, between 1973 and 1978, 56 percent of the men in our sample had increased the versatility of their fishing operations, while only 8 percent had become more specialized and inflexible. The trend toward increased versatility continued. Sixty-two percent of the fishermen in this sample said they would have fishing operations that would be still more versatile than those owned presently (1978); while only five percent planned less versatile operations (Acheson 1984:Table 5).

The shift to bigger and more versatile boats meant that the fishing fleet of northern New England greatly increased fishing capacity. The critical questions are: 1. Why was there such a strong tendency toward increased capacity? 2. How is that increased fishing capacity going to be used? 3. Were some species slated for a great deal more exploitive effort than they usually receive? Answers to these could be obtained only by looking at the kinds of gear that fishermen were adopting and abandoning since gear is selected with certain target species in mind.

In order to understand the kinds of gear changes that took place, some basic technical knowledge is required. Some gear changes were relatively easily made since the new gear type can be put on the same boat, and used in the same area to fish for the same species. Other gear changes required different sized boats, different skills, and different levels of investment. They mean, in short, a whole change in fishing strategy. The situation is complicated by the fact that the same gear can sometimes be used to catch a variety of different species, and can be used on a whole range of different sized boats involving different levels of investment. Thus, an analysis of changes in fishing gear can only take place against a background knowledge of each gear type, the required level of skill, and the other assets congruent with each gear type.

Fishing success is greatly influenced by several kinds of skills. For our purpose, it is important to know how long it takes a person to learn to use a different type of fishing gear, as opposed to skills in maintenance, crew management, and so on. In assessing the time it takes to use various kinds of fishing gear, we will not assume a person coming from a non-fishing occupation. Rather, we will assume a person has had 5 years experience in lobstering. Most men who enter fishing do enter lobstering first then go on to other things. Men with 5 years experience in lobster fishing have a basic knowledge of navigation, seamanship, maintenance, and related skills. We will describe separately each gear type and the assets (skills, investment) necessary to use it.

Lobstering. Lobsters are caught in 3 to 4 foot wooden or wire mesh traps baited with fish remnants. These traps are pulled either by hand or with the aid of a hydraulic trap hauler. Lobster fishing operations vary greatly in size. Many school boys and part-time fishermen go lobstering in the summer with a few

traps which they tend from outboard-powered skiffs. At the other extreme are men who own over 2500 traps which they tend with a large inboard-powered boat over 40 feet long, aided by a three man crew. The average fisherman has between 400 and 500 traps which he tends by himself or with a one man crew in a boat about 34 to 36 feet long. In 1980, such a fisherman might have a total investment of \$60,000 in a boat, traps, pickup truck, and other essential gear. While lobster fishing is not an unskilled occupation, it is relatively easy to enter. Some men have entered lobstering from non-fishing occupations and have done reasonably well in as little as two years.

Bottom Trawling. Bottom trawling or dragging is a major technique used in northern New England to catch all species of groundfish (i.e., cod, haddock, hake, pollock, flat fish, etc.). Bottom trawlers operate by dragging a cone-shaped net (otter trawl) through the water, large end first. The mouth of the net, usually 60 to 100 feet wide, is held open by means of heavy 'doors' attached to the sides of the net. Bottom trawling can only be done with relatively large boats ranging from 45 to 110 feet long. In 1978, a medium-sized bottom trawler was about 65 feet long and cost in the range of \$300,000, new and fully-equipped. Dragging is relatively difficult to learn since one has to learn the tows, or smooth places on the bottom where the net can be used without tearing up, along with learning to use a good deal of electronic gear. A man with five years in lobster fishing needs at least two to three years to learn dragging; some men never learn.

Gillnetting. Gillnetting is generally done in intermediate-sized boats, between 36 and 60 feet long. The average gillnetter would be about 42 feet long and cost about \$150,000 fully equipped, although many smaller lobster boats are also rigged for gillnetting part of the year. Gillnets are a type of fixed gear. They hang vertically in the water with floats on the top and weights on the bottom. They catch groundfish such as haddock, cod and pollock which swim off the bottom, but not true bottom dwellers such as flat fish. Gillnetting is relatively easy to learn. A man with five years in lobstering can put gillnetting gear on his boat and be reasonably proficient with six months experience.

Dredging. Scallops and mussels are caught by dragging a steel dredge along the bottom. The dredge is hauled aboard by steel cable attached to a winch. Dredging is done from a variety of different-sized boats. Many lobstermen rig their boats with boom and winch and go scalloping in the winter inshore with a two man crew. At the other extreme are boats ranging up to 100 feet long carrying 11 to 13 man crews, which take long trips throughout the Gulf of Maine. Such boats can cost more than a million dollars. These large scallop boats are used for off-shore scalloping throughout the year, since scalloping demands permanent changes in the hull (i.e., shucking house), which make it expensive to convert a scallop vessel to any other kind of fishing.

Weirs. Weirs are used in eastern and central Maine to catch herring. They are constructed out of poles driven into the ocean floor, between which are strung netting or brush to make the walls. Weirs are set in coves and bays known to be frequented by schools of herring. In 1982 it cost about \$40,000 to construct a weir. The primary skill in weir fishing is knowing where to build the weir. Once

constructed, weirs are relatively easy to learn to use. An experienced lobster fisherman can learn weir fishing in one season — two to six months.

Stop Seines. These seines are used to trap schools of herring as they enter coves or bays. After the fish have entered, the stop seine net is drawn across the mouth of the bay, using dories. To enter stop seining, one needs a net between 50 and 300 fathoms long, 'twine dories' to hold the net, and a boat equipped with a hydraulic net hauler. The equipment for an average stop seine operation might be obtained for about \$15,000 to \$25,000. Stop seining is a relatively easy technique to learn. A lobsterman with five years experience can become proficient in two to three months.

Purse Seines. A purse seine is a very long, deep net which is set around a school of fish (usually herring) by one or two boats. When the circle is complete, the bottom is drawn up or 'purse' to close the net. Purse seine operations often use small air planes to aid in locating herring schools. In addition, a good deal of electronic gear is increasingly being used to spot fish. The average purse seiner is perhaps 55 feet long and cost in the range of \$350,000 equipped with electronics, net, and seine dory in the early 1980's. Purse seining is one of the most difficult techniques to learn. An experienced lobsterman would require at least two to three years to become reasonably proficient.

Pair Trawling. This technique is used to capture adult herring and other schooling species inshore or offshore by having two large boats tow a big net between them. Since two large boats with a lot of electronic gear (e.g. scanning sonar, Loran C plotters, etc.) are involved, pair trawling is one of the most expensive techniques to utilize. In 1978, one set of Maine pair trawlers was valued at over \$1,500,000 for the two vessels. It is also one of the more difficult techniques to learn, since one must coordinate two boats, as well as learn to maneuver a huge net which sometimes catches up to 200,000 lbs. of fish in one tow. A lobsterman would need at least two to three years to become a proficient pair trawler.

Longlines. Longlines, as the name suggests, are long ropes from which baited hooks are suspended. They are used in two distinct fisheries. Small longlines, called tub trawls, are set along the bottom to catch groundfish. Such lines are only a few hundred feet long and are generally pulled with a small hydraulic winch and baited by hand. Tub trawling is generally done by lobstermen during the spring. Longlines are also used by three large offshore vessels, which dock part of the year in Maine, to catch swordfish far out in the Gulf of Maine. These boats carry crews of five or six men and range from Newfoundland to Florida. Tub trawling is relatively easy to learn and enter; longlining for swordfish requires at least two years to learn and a boat worth at least \$250,000.

Harpoons are used primarily in the summer tuna fishery. Most of the men involved in this fishery go for lobster through most of the year. Thus, it is essentially a small boat, inshore fishery.

Handlining. In eastern Maine, there are a number of men who catch groundfish from very small boats and skiffs with lines on which a few baited hooks are attached. This is a summer fishery engaged in by part-time fishermen. Entry into handlining involves only two or three thousand dollars investment. It is very easily learned as well.

Scottish Seine. These seines are very long nets placed in a circle around a promising piece of groundfish bottom and slowly winched into the boat. In the early 1980's they were an experimental groundfish gear in Maine; only one was in use. Their use necessitates a boat at least 45 feet long and costing over \$120,000 fully equipped.

Herring Carriers are large wooden boats owned by herring processing firms to bring the herring from seines, weirs, etc. to the plant. Some double as purse seiners.

Midwater Trawls are used on very large vessels to catch fish in the water column. The nets in use are essentially the same as those used on pair trawlers, save for the fact they are smaller and towed by one boat. Midwater trawlers are a minimum of 65 feet long and cost in excess of \$300,000 fully rigged.

At present, a great deal of gear change is occurring. There were some general patterns in the changes being made, however. These are summarized in Figure 1.

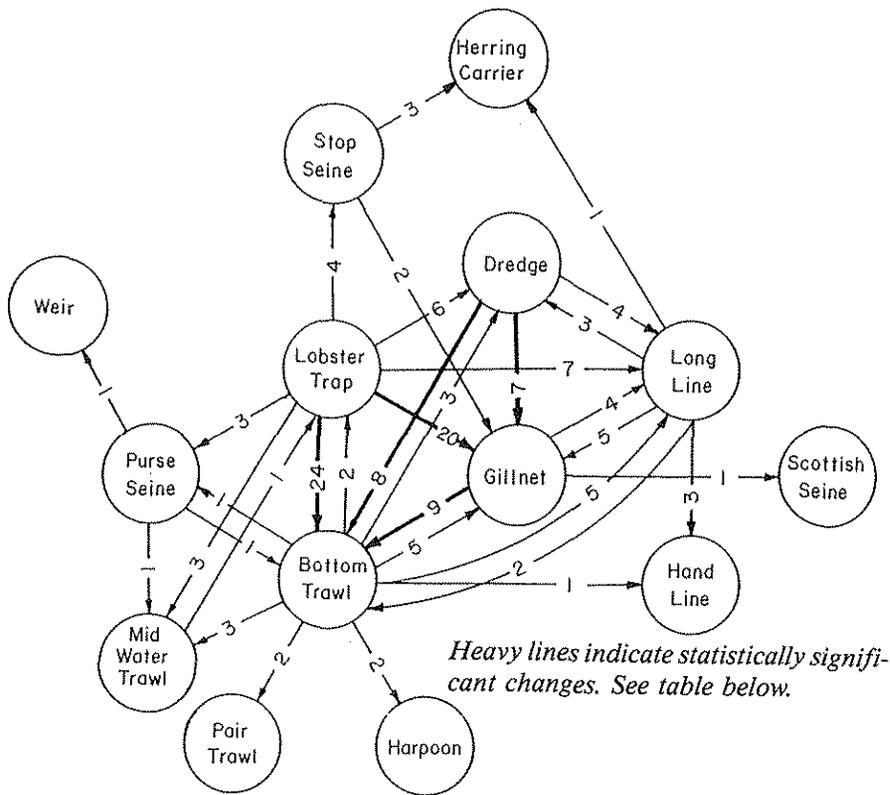


Figure 1. Primary Fishing Gear Changes of 190 Fishermen in Northern New England: 1973-1978

Supplement to Figure 1.

Lobster - - - Bottom Trawl	Bottom Trawls - - - Midwater Trawls
24/2	3/0
.39/.05	.04/-
.00001	
Lobster - - - Gillnets	Bottom Trawls - - - Dredge
20/0	8/3
.30/-	.35/.06
	.01
Lobster - - - Longlines	Bottom Trawls - - - Gillnets
7/0	9/5
.08/-	.30/.08
	.02
Lobster - - - Dredge	Bottom Trawls - - - Longlines
6/0	2/5
.08/-	.10/.08
	.70
Lobster - - - Stop Seine	Dredge - - - Longlines
4/0	3/4
.04/-	.15/.20
	.70
Lobster - - - Purse Seine	Dredge - - - Gillnet
3/0	7/2
.03/-	.35/.01
	.01
Lobster - - - Midwater Trawls	Longline - - - Handline
3/1	3/1
.33/.03	.14/.5
.40	.50

Which of the kinds of changes indicated in Figure 1 are statistically significant, and which might have occurred by accident, given the number of fishing boats represented in our sample? To answer this question, a test of significance was done on the ratio of the people switching between two gear types, and the results are reported in the supplement to Figure 1. In this supplement, three different kinds of figures are listed for every gear change in Figure 1: the numbers of fishing operations which changed between a pair of gear types (in both directions); the proportion of people capable of making the change who actually did so; and the level of significance of these two ratios, indicating the direction of gear change. If we consider, for example, the change from dredge to bottom trawl, there were eight fishing operations in which a change was made from dredges to bottom trawls, and only three cases where men changed from bottom trawls to lobster traps. The figure .35 indicates that 35 percent of all of the men in our sample who could have changed from dredges to bottom trawls did so;

while only 8 percent of those who could have changed the other way actually did so. The level of significance of this ratio (i.e., $8/3$) is .01 so that there is only 1 chance in 100 that these results could have occurred by chance alone. These figures indicate that where these two gears are concerned, there is a strong tendency to change from dredges to bottom trawls.

While there are a good many different kinds of changes recorded in Figure 1, most of them involve so few fishing operations that they are statistically insignificant. In these cases, nothing certain can be said about general trends, given our data base.

However, the data do show several different gear change trends. There is unquestionably a shift from lobster fishing to other fisheries. Some 24 men changed from lobstering to bottom trawling, while only two switched the other way. The results are significant at the .00001 level, so that there is only 1 chance in 10,000 that these results could have occurred by accident. There were 20 men who changed from lobster fishing to gillnetting and none who went the other way. Smaller numbers of lobster fishermen went to longlines, dredges, and stop seines; even smaller numbers changed to purse seiners and midwater trawls. While the numbers involved in these gear switches are very small, it should be noted that in every case the shift was out of lobster fishing; none of the longliners, dredge fishermen, seiners, or midwater trawlers switched into lobstering. There was a significant shift from dredge fishing to bottom trawls and gillnets. And there was a shift from gillnets to bottom trawls that was significant at the .02 level.

Three things do not show in these figures which are important. 1. There was no instance in our sample where men switched from a non-fishing job to become captains of boats whose primary gear was a bottom trawl, pair trawl, midwater trawl, or purse seine. Very few men have entered such fisheries from lobstering either. 2. Very little gear is being dropped completely. When fishermen buy new boats and change gear types, the gear they had on their older boat is retained as a secondary or tertiary type of gear. 3. The gear most commonly dropped was lobster traps. There were 54 fishing operations in which one type of fishing gear or another was dropped. In 27, or 50 percent of the cases, lobster traps were being abandoned.

In this whole data set, there are five critical questions:

1. Why haven't men entered pair trawling, purse seining, or bottom trawling from non-fishing occupations? In a similar vein, why have so few men entered such fisheries from lobstering?
2. What factors have caused switch out of lobstering to virtually every other kind of fishing — especially groundfishing?
3. What is the difference between fishermen who have shifted out of lobstering to bottom trawling as opposed to gillnetting?
4. Why is there a general shift from dredging to bottom trawling?
5. Why are groundfishermen shifting from gillnets to bottom trawling?

The answer to the first question is relatively clear and relates to the investment and amount of experience required. To enter fisheries where bottom trawls, pair

trawls, or similar gear are the primary gear requires a boat worth a minimum of \$100,000 and several years of experience. A person usually enters these fisheries by working on a large fin-fishing boat for a period of years and then buying his own boat or by first entering lobster fishing and then gradually entering other large scale fisheries.

The reasons that men were shifting out of lobstering to gillnetting and bottom trawling (questions 2 and 3) deserve careful consideration, since they involved the most fishermen in our sample and the clearest trends in the whole data set.

The reason fishermen were leaving lobstering in large numbers was related to economic conditions in the fishery. Revenue to lobster fishermen as a whole was fairly stable while their costs had increased dramatically. At the same time, net revenues to groundfishermen had increased, making this a far more attractive option.

The lobster catch remained fairly stable between 1976 and 1979. In 1976 the catch was 19.0 million pounds and in 1979 22.1 million pounds. In the 1980's the catch stayed about the same and in the future it will probably remain constant or drop. The biologists most familiar with the lobster industry are relatively certain that all of the lobsters that can be caught are already being caught. In fact, over 90 percent of the lobsters that molt into the legal size are caught within a year (Thomas 1973:47). There are fears that an increase in fishing effort may result in stock failure. In the late 1970's, the prices paid for lobster rose, but relatively slowly.⁴ Since *both* catches and prices remained relatively stable during this time, the total value of the lobster catch has increased relatively slowly. In 1974 the total value of Maine lobster landings was 23.2 million dollars; in 1978 the value was 33.8 million dollars, an increase of 45 percent. Despite this increase, costs to fishermen for bait, fuel and boats went up so fast that many fishermen stated they were experiencing real financial difficulties. From the little solid financial data we were able to collect, it appeared that many lobster fishermen had no more purchasing power in 1979 than they had in 1974. Some were experiencing a decline in real income.

At the same time, there was a very large substantial increase in the catch and value of groundfish. In 1974, the total landed value of six common groundfish species was 1.3 million dollars; in 1978, it had increased to 7.2 million dollars, a phenomenal 453 percent rise (Anonymous 1980).⁵

The reason that lobster fishermen are switching to groundfishing in large numbers is relatively apparent. However, the factors impelling some of these men to catch groundfish with gillnetting equipment as opposed to bottom trawl are more difficult to ascertain — particularly since fishermen themselves are not able to give any clear consensus about the factors influencing the choice of groundfishing gear. Two interesting facts did emerge on men moving to groundfishing. The men who adopted bottom trawls were younger than the men who adopted gillnets, and they purchased much larger boats than the men who had moved from lobstering to gillnetting. The men who adopted bottom trawls had a mean age of 32.7 years while those men who adopted gillnets had a mean age of 38.3 years. The men who adopted bottom trawls purchased boats which aver-

aged 10.8 feet longer than the boats they had five years previously. The gillnetters had boats which were far smaller. The results of the t-tests indicate both these differences in means are highly significant statistically.

These facts alone tell very little about the reason men adopted gillnets as opposed to bottom trawls. However, we constructed a very elaborate linear model in which information on the adoption of these two kinds of fishing gear was regressed on a subset of 39 independent variables. The results of these regressions in combination with the descriptive statistics reveal some very interesting patterns concerning the choice of gear type.

The adoption of gillnets after having had lobster traps was positively associated with the age variable, with medium-sized firms, and with having a groundfish dealer in one's home port. It was negatively associated with having groundfish as the primary target species and with the western part of the coast. Bottom trawls, by way of contrast, were linked to intermediate-size firms and membership in a fisherman's political lobbying organization. The adoption of this gear was negatively associated with the intermediate skill variable and with having a large number of kinsmen in fishing in one's home port, which means that men were more likely to adopt bottom trawls if they were less experienced in fishing and have few relatives in fishing (Acheson 1980:477).

There is a pattern in these facts but one that only becomes clear against a knowledge of the ethnography of the fishery. Gillnets are an intermediary gear. They can be used on relatively small boats (in the 35 foot range), and in 1985 a person with such a boat could get into gillnetting with as little as \$14,000 additional investment. Many of the men who adopt them wanted to switch out of the failing lobster industry for part or all of the year, but could not or were not willing to switch completely into other fisheries requiring far more capital and skill. These people were primarily lobster fishermen and did not have groundfish as their major species over the annual cycle. They wanted to keep their lobster boats so they could switch into that fishery in the late summer and fall. Many of these men were older fishermen — in their late 40's or 50's — who were past their prime and who wanted to fish inshore so they could be home every night.

Bottom trawling ordinarily requires a larger investment and a much larger boat than gillnetting. One cannot do bottom trawling for groundfish with a boat that was made essentially for lobstering. It requires a boat at least 45 feet long — some 10 feet longer than a typical lobster boat. Thus bottom trawling involves a much higher investment — a minimum of \$150,000 in 1978 — and a far more serious commitment. The men who switched to bottom trawling from lobstering were apt to be younger men in the prime years of their career. If they had a relatively low level of experience and skill in the industry, they had the drive and ambition to make a major change in fishing technique and assume a much larger financial burden, with all that indicates for having to put in much longer hours and spend much more time away from home.

It should be noted that men picking gillnets or combining gillnets and lobstering are essentially placing a relatively low ceiling on the income they can earn. After all, one can only pull some 25 standard gillnets in a long day, and perhaps

some 250 lobster traps. Since the number of nets and traps that can be pulled is strictly limited, the amount of income that can be earned is limited as well. If bottom trawling gear demands larger boats and longer periods of time spent away from home, such businesses are capable of absorbing much more capital, and generating much more revenue.

In answer to question four, there was also a statistically significant shift from dredges to both bottom trawls and gillnets even though only a few boats were involved. Virtually all of the boats using dredges were owned by men from the eastern part of Maine who used to fish primarily for lobster. These men fished for lobster in the late summer and fall and then for scallops from November to April (the legal scallop season) to augment the income they received from the failing lobster fishery. Scallops, however, proved to be a very unstable source of income for these men. In the late 1970's and early 1980's the price for scallops has been very high, but the scallop beds were being depleted. As a result, these men found themselves shifting between the lobster industry, which was not doing very well, to scallops which were becoming scarcer as well. Thus, these men were changing from scallop dredging to groundfishing as a means of entering a more stable and profitable fishery.

Why did some of these ex-scallop fishermen choose gillnets as opposed to bottom trawls? The evidence suggests that the exact same factors impelling men to shift from lobstering to gillnetting as opposed to bottom trawling was influencing the choice of groundfishing gear for those men who left scallop dredging. In this regard, we note that the average age of the men who switched from scallop dredging to bottom trawling was only 34.7, while the average age of the ex-scalloppers who adopted gillnets was 39.7.⁶ Here again, gillnetting, which can easily be combined with inshore lobster fishing, was more appealing to the older men. The younger men preferred to enter dragging (bottom trawling), which clearly is a technique with more potential for a man thinking of getting a much bigger boat and expanding his business. Interesting enough, while the men who entered bottom trawling from scallop dredging all said they planned to purchase much larger boats, there was no statistically significant difference in the length of the boats they purchased as compared with those of men who left scalloping for gillnetting. Both sets of men purchased boats that were between 6 and 6.5 feet longer than the boats they had when scalloping.

The fifth question concerns the men who switched from groundfishing with gillnets to bottom trawls. All nine of the men who made this switch began their careers in lobster fishing and then began to do some gillnetting. By 1973, gillnets had become the major type of gear these men used, although most of them were still involved in lobster fishing at some time in the annual cycle. By 1978, these men had become full-time groundfishermen and had taken on larger boats equipped with bottom trawls. Between 1973 and 1978, when these men changed to bottom trawls, the boats they purchased increased an average of 9.57 feet, and involved much more money invested. Like the men who switched to bottom trawls from other gear types, the men changing to this gear type from gillnetting were relatively young. Their average age was 32.1. Again these are men who want-

ed to increase their incomes from fishing. For them, bottom trawls were the ultimate gear. If they required large boats and an enormous investment, they were capable of catching very large amounts of fish and producing large revenues as well.

Other Factors Influencing Choice of Gear

Permanent changes in fishing gear are related to three sets of factors. The first are economic factors making one fishery more lucrative than another. As we have seen, at the time our study was done, there was a tendency to switch out of lobster fishing, which was troubled economically, into various kinds of fin-fishing, which were much more lucrative. This set of changes were paralleled by an increase in both the size and versatility of the boats – again for economic reasons.

Second, skill and experience play such a critical role in fishing success (Acheson 1975) that men do not suddenly throw over a gear with which they are familiar to take on one with which they have no experience or familiarity. Virtually all of the men who made changes in primary fishing gear have some experience with that gear. In many cases, changes in primary gear occurred as an outcome of changes in the annual round. That is, men first used a new gear for a few weeks or months at some season of the year, and gradually increased the percentage of time that gear was used until it became the primary gear. In the process they might have dropped their old primary gear completely, or they might have continued to use it for part of the annual cycle as a secondary gear. In studying present, past, and future primary fishing gear of the 190 fin-fishermen in our sample, the role of experience is very obvious. These data are summarized in Table 1. Of captains of fishing boats who switched to a new primary gear, only 7, or 7 percent, of the 99 men on whom we have information had no experience with that gear before using it on their present boat. The other 93 percent did. Much the same pattern could be observed among the men who had ordered or had definite plans to order new primary gear in the near future. Forty three of the 53 men (or 81 percent) on whom we had information had had experience with the new primary gear they planned to add. Only two men, or 4 percent, had ordered a new type of primary gear with which they had had no personal experience. It should be noted in Table 1 that most of these fishermen got their experience with a new primary gear type by using it during some part of the annual cycle on their own boat. This underlines the fact that in the fin-fishery of Maine, gear changes over the annual round are often precursors of permanent changes in fishing gear.

There is still a third factor strongly influencing selection of boats and types of fishing gear – namely one's age and total career pattern. The vast majority of fishermen in Maine begin their fishing careers by going lobster fishing in skiffs as teenagers. In their early 20's most of these boys buy inboard-powered fishing boats and begin to build up large 'gangs' of lobster traps. A few of these men decide to enter various kinds of fin-fishing – usually in their twenties or

Table 1. *Fishing Experience and Primary Gear Type on Past, Present, and Future Boat.*

	Source of Experience	No.	Total
Same Gear on Past and Present Boat	–	80	80
New Primary Gear in Past Five Years	Used gear during part of annual cycle on own boat	58	
	Used gear while working on other man's boat	34	110
	No experience	7	
	No information on source of experience	11	
Planned New Primary Gear	Experience with gear during some part of annual round on own boat	27	
	Experience with gear while working on other boat	16	59*
	No information on experience	6	
	No experience with gear	2	

* Of the total 190 men in the sample, only 59 definitely planned to switch primary gear types in the near future.

early thirties. (Very few fishermen change from lobster fishing to fin-fishing late in life.) Whether these men choose fin-fishing or lobster fishing, their operation is at its maximum size when they are in their thirties and early forties. By their late forties and early fifties, these fishermen typically begin to reduce their effort and scale of operations. Older lobster fishermen begin to pull fewer traps. Fin-fishermen tend to reduce the number of days they fish; they might also purchase a smaller boat – one which will allow them to go day-tripping and avoid long stays away from home. Late in life, all of these fishermen might have only a small string of lobster traps which they fish from a skiff as they did when they were boys.

We have already noted the effect of age on the decision to enter various types of groundfishing from lobster fishing or dredging. We have noted that older men wishing to enter fin-fishing chose gillnets which would allow them to avoid heavy investments and a lot of time away from home.

Men who decided to switch from lobstering or a combination of lobster fishing and dredging when they were in their twenties or early thirties ordinarily chose to catch groundfish with bottom trawls. It should be noted that virtually all the men in Figure 1 going back to lobstering from various kinds of fin-fishing

were older men who were essentially retiring.

There is a marked gear hierarchy that is apparent in the kinds of changes the men in our sample made. If fishermen are going to change gears, there are certain paths they must take. Some gear types require little investment or skill, e.g. lobstering, stop seining, etc. Others, such as pair trawling and purse seining, require a great many assets to enter. As a result, men tend to first enter lobstering, and many go no further. Some go on to use intermediate gear types, such as gillnets, stop seines, or scallop dredges. In many cases these are combined with lobster fishing at some time during the annual round. A very few men enter fisheries such as pair trawling and purse seining. Most of those who made this type of move have had experience in using some intermediate type of gear or in bottom trawling. These 'ultimate' gear types require very large boats and a large investment. Very little can be said about the characteristics of the men who entered these high investment fisheries, since there are so few cases that statistical reliability is impossible. However, our case study data indicate that these men have relatively high incomes, and a great deal of prestige in the fishing community.

The problems in the lobster fishery such as relatively low prices had to be faced by all the men in that fishery; and the opportunities in groundfishing were again theoretically available to all who entered that fishery. Yet only some lobster fishermen changed to groundfishing. It is one thing to want to respond to a new opportunity; it is entirely another to have the ability to do so. Two other factors influenced the ability of lobster fishermen to enter groundfishing. The first is access to markets. There are only 17 harbors in Maine which had a groundfish dealer at that time, and the lobster fishermen who switched to groundfishing were located in or near those ports. The second is ability to raise the necessary capital. For a lobsterman to enter groundfishing necessitates a larger vessel and sizable amounts of capital. Much of the money for new boats and equipment came from the Farm Credit Service. Many of the lobstermen who wanted to enter groundfishing did not have the kind of business 'track record' required for large loans and were forced to remain in the lobster industry.

The kinds of factors that motivate men to switch fisheries are probably unique to each time, place, and the fisheries involved. As we have seen, in a shift from lobstering to groundfishing in the late 1970's, experience in using groundfishing gear, the age of the fisherman, and related career-cycle factors, ability to get large amounts of capital and access to groundfish markets were all critical in influencing the decision to switch. If the switch had been in the opposite direction, none of these variables would have been of key importance. The typical groundfisherman could sell his dragger or gillnetter, buy a lobster boat and have money left over; there are lobster dealers and cooperatives in every harbor; almost every fisherman has some experience lobstering; and age is no obstacle to entering the lobster fishery. However, the lobster fishery is highly territorial, whereas no territories exist for groundfishermen. That is, people do not go lobster fishing without becoming members of 'harbor gangs' (i.e., groups of men fishing from each harbor) and once one is admitted to such a group, he only goes lobster fishing in the territory of that 'gang' (Acheson 1979:261-63). Anyone seeking to enter

the lobster fishery would have to take this factor into account.

Management Implications

Fisheries managers attempt to control fishing effort on over-exploited species through regulations controlling fishing effort. Emphasis is placed on controlling the exploitation of single species as if the fishermen exploiting that species can and will do nothing else. This, of course, is not true. Changing fisheries is one of the most common adaptive strategies fishermen employ. This means that regulations to reduce effort on a given species often means nothing more than shifting that effort to other fisheries which can cause problems in those fisheries in the future. In the recent past, managers have come to understand that stocks cannot be managed separately. What has not been fully appreciated is the role of fisheries switching in multi species management. In contemplating restrictions on effort, managers must ask where the displaced boats and fishermen will go. Will they remain in the same industry and accept lower incomes? Will they go out of fishing altogether? Are there other fishing opportunities they are in position to take advantage of? If such opportunities exist, one can expect a substantial number of the men and boats to respond to them. The situation in the Maine fishing industry in the late 1970's points out that even when there are clear economic advantages to be gained by changing fisheries, such a large number of factors is required for successful business, that only a certain percentage of all the fishermen who could benefit from a given switch in fisheries are in a position to make it. The need for capital restricted some lobster fishermen who wanted to switch to groundfishing. Others were not near the 17 groundfish dealers and thus were deprived of markets. Still others did not have the requisite skills. In 1978, only 25 percent of all the fulltime lobster fishermen in Maine switched to some other species over the annual round (Acheson et al. 1980:Table 13); and only 156 of the approximately 2200 full time fishermen had experience with groundfishing over the annual round. Even though groundfishing was a desirable switch for many lobster fishermen, the ground fishery was in no danger of being overwhelmed by lobster fishermen we can see in retrospect.

The number of people in a fishery who can switch gears and species (and thus shift effort from one species to another) can be calculated by figuring out the economically advantageous switches; ascertaining the things one needs to control for a viable business; and then calculating the numbers of fishermen who could possibly make the switch. This might be a very useful exercise for those who wish to manage one fishery and avoid damaging others.

Notes

1. James Acheson is Professor of Anthropology at the University of Maine, Orono, Maine. The data on which this paper is based was collected as part of a project entitled "University of Rhode Island, University of Maine Study of Social and Cultural Aspects of Fisheries Management in New England Under Extended Jurisdiction." (N.S.F. Project Number: AER77006018.) The author is

much indebted to the 190 fishermen interviewed for this project. Special thanks are due to Robert Reidman who did all the data processing and computer work necessary to construct the tables in this article; and to Josephine Church, Bert Witham, Doug Anderson, and Phil Davis who provided information on costs, gear, and seasonal cycles. In addition, the author would like to thank Frank Grice of the National Marine Fisheries Service and David Dow of the Sea Grant Extension Service for providing information on aspects of the groundfish and scallop fisheries, respectively.

2. From 1973 to 1975, the Internal Revenue Service audited the income tax returns of a very large number of fishermen – particularly in Maine and New Hampshire. Many were fined, and some brought to court on criminal charges. From that time, anyone asking questions on economic matters has been very suspect.

3. The data from this study were coded by the interviewers who collected the information, and keypunched and analyzed at the University of Maine computer center. Several different statistical techniques were used. In studying changes in boat length, versatility, and patterns of changes in gear, simple cross tabulations were used primarily. In order to explain certain relationships between social and economic characteristics and adoption of certain kinds of fishing gear, primary reliance was placed on regression analysis.

4. The reasons the ex-vessel price of lobster has not risen as fast as the general level of prices is clearly due to income elasticity. The income elasticity of demand for lobster is a very high .86 (Acheson and Reidman 1980). What this means is that if real income falls, lobster prices will fall also. Of course, given the general level of inflation in the past few years, real income of most American families has fallen. Under these conditions, it is not surprising that the price of lobster has not kept pace. Exactly what underlies this phenomenon is not completely clear. Many people connected with the lobster industry and restaurant business guess that lobster is treated as a luxury item – one that consumers can do without in periods when they feel their budgets tightening.

5. It is clear in retrospect that these increases in catches were due more to an increase in the stock of fish rather than to increase in total fishing effort. The increase in the supply of fish did not bring a corresponding decline in price. Quite the contrary. The price of fish remained very high throughout this period, due primarily to the fact that prices of beef, pork and other substitutable goods were at an all time high. As a result of good catches and high prices, gross revenues to fishermen were very high as well.

6. These differences in mean ages are highly significant statistically. The value of the t was 4.77, which is significant above the .001 level.

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Danger and Rituals of Avoidance Among New England Fishermen¹

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Introduction

Situations of high uncertainty, especially if they are in some way threatening to the individual, induce relatively high levels of anxiety. Any activity on the part of the individual which provides a sense of involvement with hope for control can serve to reduce the anxiety (Pervin 1963). A number of theorists have suggested that superstition and/or religion is a type of activity which can fulfill the function of reducing this type of anxiety (e.g., Jahoda 1969, Malinowski 1948, Kluckhohn 1942, Homans 1941).² Research published by Wilson and Miller (1968) indicating that both fearfulness and anxiety are significantly correlated with degree of religiousness provides some support for this relationship. Hence, religion and/or superstition, by providing a subjective feeling of predictability and control, can reduce anxiety. Since anxiety can reduce many individuals' ability to function effectively in dangerous and/or difficult but highly unpredictable situations, religion and/or superstition may have adaptive value for the individual. Jahoda (1969) suggests that it may have survival value in dangerous situations and may explain why individuals in risky occupations tend to be more superstitious. For example, Stouffer et al. (1949) report a large number of superstitious activities practised by combat soldiers in the Second World War. These activities included ritual avoidance of certain objects or behaviors as well as the wearing of lucky charms.

Rituals related to uncertainty frequently become part of the sub-cultural or cultural patterns of populations dealing with sustained uncertainty. Socio-cultural groupings such as occupational sub-cultures, military units, sports teams, bands, tribes, villages, and even large segments of nations may display patterned rituals which are passed from generation to generation. The occupation of ocean fishing exposes participants to a relatively high degree of uncertainty, both with respect to the amount of fish they will capture on a given trip and personal safety. The purpose of this paper is to examine the relationship between culturally patterned ritual proscription and uncertainty among commercial fishermen in Southern New England.

Numerous authors have documented the extent of ocean fishermen's taboos in a number of cultural traditions around the world (e.g., Anson 1965, Dorson 1964, Creighton 1950, Frazer 1890, Goode 1887), and some researchers have related the incidence of these ritual proscriptions to uncertainty of the catch or the dangers presented by the sea. For example, Malinowski (1948) notes that

among the Trobriand Islanders there is no magic associated with safe and sure lagoon fishing, but extensive magical ritual is practised to insure safety and good results in the less predictable, more dangerous open sea. On the Pacific island of Ifaluk, Burrows and Spiro (1953) found no ritual associated with farming, in contrast to the extensive amount of magic associated with ocean voyages and canoe construction. Lessa (1966) reports long sea voyages from the Micronesian Island of Ulithi are associated with extensive magic, while short ones have none. Additionally, he notes that there is no ritual associated with shellfish collecting in contrast to the elaborate magic used to aid fishing on the open sea. Firth (1967) notes that spear and bow and arrow fishing on Tikopia in Polynesia have no ritual, possibly due to the limited uncertainty associated with the immediate relation between visible fish, the fishing action, and the result. Visibility is particularly important in reducing uncertainty for humans in that our species relies so heavily on visual input. Conversely, we find that ritual is heavily associated with techniques where the fish are not continually visible (e.g., net or hook and line fishing). In Kenya, the most uncertain ways of ocean fishing require services of the highest level of ritual specialists (Prins 1965). Similarly, Ainu fishermen become particularly concerned with ritual when swordfish are sought in the open sea (Watanabe 1972). Oto (1963) writes that Japanese fishermen bolster their luck through adherence to a large number of taboos and the practice of ritual magic. Price (1964) finds a relationship between degree of risk and extent of ritual among Martinique fishermen, and Poggie, Pollnac, and Gersuny (1976) report that day fishermen report fewer taboos than fishermen whose trips are longer than one day in length. Even on the large, modern tuna seiners sailing from California, rituals to protect the fishermen from poor catches and the dangers of the sea are practised (Orbach 1977). Knipe (1984) found that tabooed words and practices among fishermen in North Scotland reflected concern with the catch, boat, weather, and personal safety. Spanish deep-sea trawler fishermen in the North Atlantic also observe a number of verbal taboos, although they say they do not believe in them (Zulaika 1981). Lummis (1985) presents findings which lead him to conclude that economic anxiety is the major cause of fishermen's superstitions. Finally, in this issue, Smith suggests that risks other than personal ones have become more important in the context of modern fishing.

Several interesting questions arise from the literature reviewed above. There is the question concerning the relative importance of various types of uncertainty in producing the anxiety which results in superstitious behavior. The occupation of fishing confronts its practitioners with two major classes of anxiety: 1) uncertainty with respect to production, or how much fish will be caught, and 2) uncertainty with respect to personal safety resulting from the hazards of marine fishing. Poggie and his colleagues have tended to emphasize the risk to personal safety as being the important factor. In one case they compared fishermen with millworkers from the same community in Southern New England and reported that the greater level of superstition among fishermen resulted from the more hazardous nature of their occupation (Poggie and Gersuny 1972). Lummis (1983) provides a cogent criticism of their conclusion by noting that the

differences could have resulted from other differences between the occupations, including economic ones. In a follow-up study, Poggie, Pollnac, and Gersuny (1976) conducted a more sophisticated analysis of the data comparing fishermen who go out for one day with those who go out for two or more days. The assumption was that fishermen with longer trips are exposed to more storms, illness, injury, and disaster due to the nature of the ecological niche exploited and removal from shoreside aid. The 'trip' fishermen fish farther from shore in more dangerous conditions than the 'day' fishermen. They found a statistically significant correlation between 'trip' fishing and number of taboos. In addition, they found a statistically significant negative correlation between coming from a fishing family and number of taboos. This they interpreted as indicating that fishermen from a fishing family are more effectively preadapted to the psychological stresses of fishing through extensive familial involvement and exposure to successful role models.

In contrast, Mullen (1969) and Lummis (1983,1985) present findings which they interpret as providing support for the hypothesis that economic uncertainty is the primary influence on level of superstitious behavior. Mullen compared Texas 'sea fishermen' and 'bay fishermen,' and Lummis analyzed historical data concerning British fishermen from East Anglia during the late 19th and early 20th centuries. Lummis reports that the 'inshoremen' who have the least economic and personal risk manifest the least amount of superstition. Trawler fishermen, who are exposed to the most personal risk but are intermediate with respect to economic risk, practise an intermediate level of superstitions. Finally, 'drifters' with an intermediate level of personal risk but the highest level of economic risk are the most superstitious. Lummis interprets these findings as supporting economic uncertainty as the prime determinant of level of superstition. He finds further support for this interpretation in the fact that East Anglian skippers, who have a greater economic interest in the success of a trip than the crew, are more superstitious. He reports that crew are more willing to scoff at ritual.

Lummis' findings have important implications with respect to those reported by Poggie, Pollnac, and Gersuny (1976). If Lummis had dichotomized his fishermen into inshore (somewhat equivalent to 'day' fishermen) versus all others and simply tested the personal risk hypothesis, his results would have been the same as Poggie, Pollnac, and Gersuny's. Drifters and trawlermen together are exposed to more personal risk and have a higher level of superstition than inshoremen (see Lummis 1985:153). This type of analysis, however, would not have been as complete as the analysis presented by Lummis. Lummis' research suggests that we need to look at the data more precisely than can be done with a simple 'day' versus 'trip' dichotomy. In the present paper we look at the relationship between ritual avoidance and average trip length in days. Additionally, following Lummis (1985), we examine the relationship between superstition and fishing type to determine if variance in economic certainty influences superstitions. Finally, we look at the fishermen's explanations of the functions of the taboos to see how they relate to protection or production.

We also agree with Lummis' proposition that skippers, who are predominantly the owners of vessels in our sample, have a greater economic interest in the venture than crew; hence, the hypothesis that skippers are more superstitious than crew will be tested. It is important to note, however, that skippers also feel considerable responsibility for the personal safety of the crew. Thus, the two types of risk may influence their anxiety levels resulting in an inconclusive test for determining whether economic risk or danger is the prime factor.

Methods

Data for this study were collected from three Southern New England ports. The emphasis on fishing in the three ports varies from predominantly trawler fishing in New Bedford, Massachusetts, where fishermen spend from a week to eleven days at sea on each trip, to a mixture of day trawler and longer trip operations in Point Judith, Rhode Island and Stonington, Connecticut.

Data for the study are derived from an interview schedule administered to a random sample of 108 fishermen from the three ports.³ The dependent variable, number of taboos, was measured by asking the fishermen to describe all superstitions related to fishing they could remember. They were also requested to give the meaning of each superstition. Although this is not a direct measure of ritual behavior, it has been shown empirically that a person's knowledge of a topic is related to interest in the topic (Cattell 1965). Fishermen often expressed a degree of embarrassment when talking about their ritual beliefs and practices. They would often state that they did not believe in them but, on the other hand, admitted that they would not break the taboo while fishing. Zulaika (1981) similarly reports that Spanish trawlermen express lack of belief in verbal taboos, but they too observe them onboard. Knipe (1984) reports that when he mentioned the word 'pig' onboard a Scottish seine-netter, the crew stopped what they were doing, looked at one another, and then laughed. They then seriously told him that the skipper would put him off the boat for breaking a taboo. Hence, although some fishermen claim that they do not believe in the taboos, the number they report probably reflects both their interest and strength of belief. Independent variables (e.g., average trip length, crew status, etc.) were measured by responses to direct questions on the interview schedule.

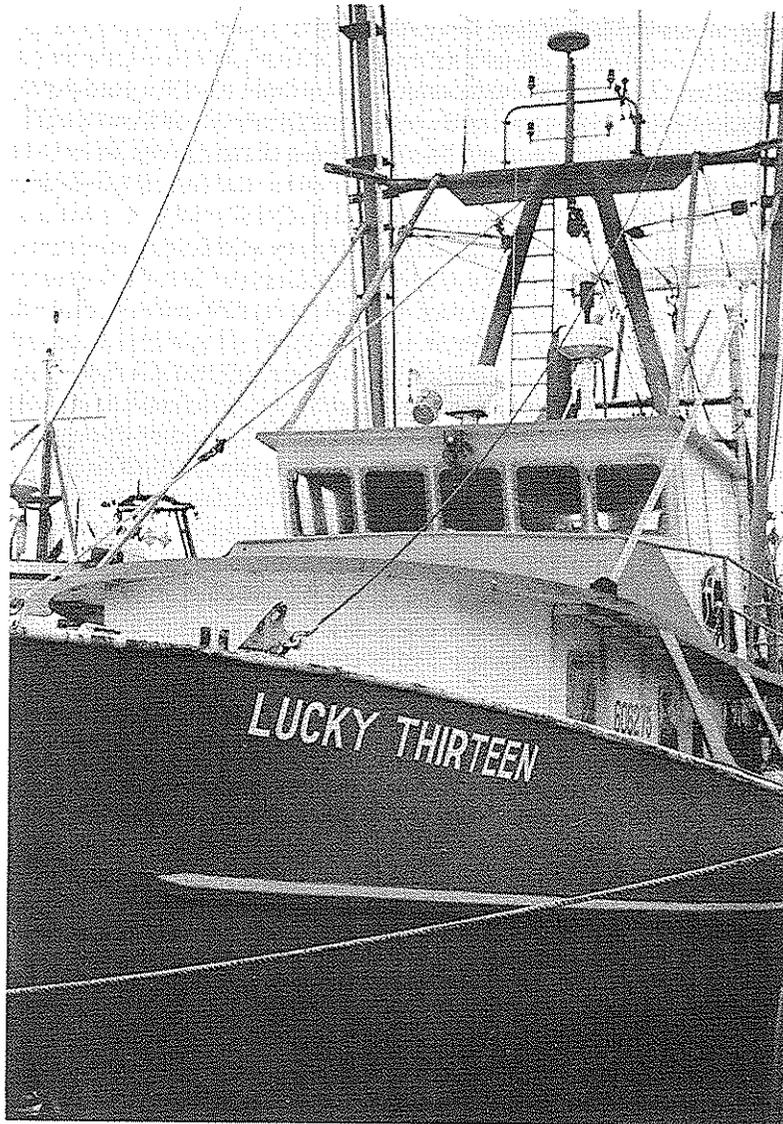
Analysis and Results

Taboos and Their Content

A total of 87 different taboos were reported by the fishermen in our sample. For the most part, these taboos are proscriptive sayings; e.g., do not say a certain thing or something bad will happen. Of the 87 taboos, nine were shared by more than ten percent of the sample. The nine most frequently mentioned taboos along with percent distribution are: 1) don't turn a hatch cover upside down (78%); 2) don't whistle on a boat (47%); 3) don't mention the word 'pig' on-

board (41%); 4) never turn against the sun (23%); 5) don't allow a man with a black bag onboard (22%); 6) don't wear a yellow sou'wester (13%); 7) never make pea soup on a trip (11%); 8) don't open a milk can upside down (11%); and 9) never start a trip on Friday the 13th (10%).

Analysis of the meaning of the taboos suggests that considerations of personal safety play a larger role than production. Responses concerning meaning vary



The 'Lucky Thirteen', Galilee, R.I.

from fisherman to fisherman, and some are more explicit than others. For example, 77 percent of the total meaning responses are simply expressions of undifferentiated 'bad luck.' Where responses are more specific and can be classified according to the uncertainty factors, 74 percent of the specific responses refer to personal safety in contrast to only 17 percent which involve production.

Although most responses refer to undifferentiated 'bad luck,' perhaps an examination of more explicit responses concerning the meaning of the most frequently mentioned taboos can add additional support to our argument. All of the explicit responses with respect to 'don't whistle on a boat,' 'don't wear a yellow sou'wester,' 'don't open a milk can upside down,' and 'never make pea soup on a trip' refer to aspects of personal safety; for example, death or injury onboard, dangerous weather, or the boat sinking. In contrast, only one taboo, 'never turn against the sun' has 100 percent of its explicit meanings which can be interpreted as production related (e.g., little or no fish for the trip, the nets will get torn, etc.). The rest of the high frequency taboos elicit mixed explicit responses. For example, 'never turn a hatch upside down' has 64 percent of its explicit meanings refer to personal safety in contrast to 36 percent for production. 'Don't mention the word 'pig' onboard' and 'don't allow a man with a black bag aboard' have equal numbers of production and personal safety responses. Finally, none of the responses to 'never start a trip on Friday the 13th' are explicit beyond the statement 'bad luck.' It appears, then, that where the taboo's meaning is made explicit by the fishermen, it tends to be for personal safety. In many fishermen's minds, however, the functions of the taboos are general, to prevent 'bad luck' which can refer to either personal or economic disaster.

Taboos and Trip Length

We next turn to the relationship between number of taboos and trip length. It is clear that the longer the trip, the greater the exposure to the dangers present in the North Atlantic. Storms or mechanical difficulties can mean sudden capsizing and almost certain death, especially in the winter when even brief exposure in the water can lead to death due to hypothermia. Within the past several years we have had boats sink so rapidly that survivors noted that they hardly had time to don survival suits before the vessel went under. There is not only the danger of capsizing, but non-fatal injuries that occur onboard the boat become more life threatening as the steaming time to shore becomes greater. Hence, the longer the trip the more exposure to danger, and the greater the uncertainty and concomitant ritual avoidances. Therefore, we expect that there is a positive relationship between trip length and number of taboos.⁴ Since there is a limit to the number of taboos known by individual fishermen, we do not expect that the relationship will be linear. It is expected that the number of taboos will increase and then increase more slowly or level off as trip length increases. This is referred to as a log-linear relationship. This expectation is borne out in the analysis of the data. A linear regression analysis of the relationship between trip length and

number of taboos results in a smaller coefficient ($R=0.29$, $p=0.003$) than a log-linear analysis ($R=0.35$, $p<0.001$).

An examination of the scatter-plot of the two variables, however, suggests that the number of taboos increases, then decreases and levels off as trip length increases. This suggests that a polynomial regression would provide the best model to fit the data. The analysis indicates that while a second-degree polynomial equation (a curve increasing and then decreasing) increases the degree of fit ($R=0.37$), a third-degree polynomial provides an even better fit ($R=0.42$, $p<0.01$). The shape of the relationship between trip length and number of taboos as described by the third-degree polynomial can be found in Figure 1.

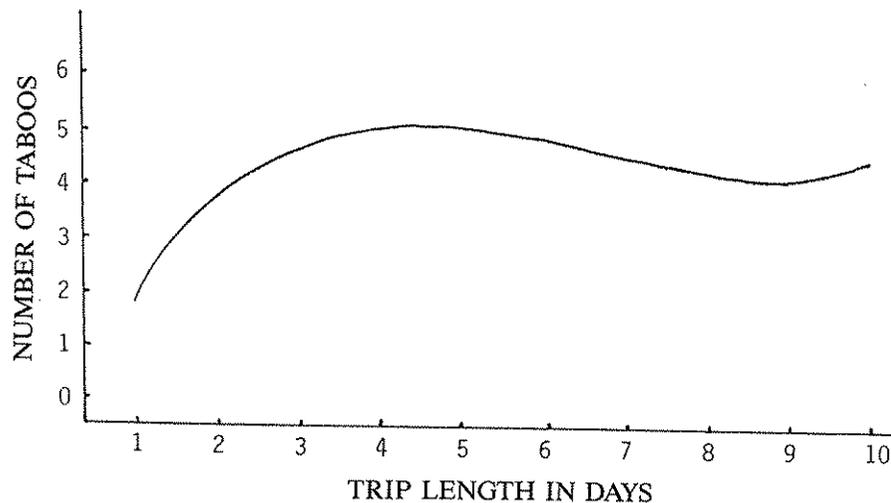


Figure 1. Plot of Relationship Between Trip Length and Number of Taboos

Taboos and Economic Interests

As a means of testing the hypothesis that skippers practise more superstitions than the crew because of their greater economic interest in the venture, an analysis of variance was conducted. In our sample, we have skippers who are also owners, non-owner skippers, and crew. Comparing owner-skippers with others (crew and non-owner skippers), the mean number of taboos reported are 3.35 and 4.11 respectively ($F=2.87$, $df=1$, 105 ; $p=0.09$). Comparing owners with others, the mean number of taboos reported are 3.26 and 4.01 respectively ($F=2.61$, $df=1$, 105 ; $p=0.11$). Finally, comparing the three categories, owner, skipper, and crew, the mean number of taboos reported are 3.26, 3.62, and 4.11 respectively ($F=1.54$, $df=2$, 104 ; $p=0.22$). All of these differences are opposite to the direction dictated by the 'economic interest' hypothesis and are not statistically significant.

Taboos and Fishing Types

Finally, we examine the major categories of fishermen in our sample to determine if they differ significantly with respect to number of taboos. There are three major categories of fishermen in the sample: 1) inshore shellfishermen (lobsters and quahaugs), 2) trawler fishermen, and 3) offshore shellfishermen (scallops and lobsters). An analysis of variance across these three groups reveals that inshore shellfishermen have the fewest number of taboos (mean=1.6), offshore shellfishermen have the most (mean=4.6), and trawler fishermen are intermediate (mean=3.9). The overall analysis of variance is statistically significant ($F=10.84$, $df=2$, 104 ; $p=.0001$) but is primarily the result of the exceptionally low number of taboos among the inshore shellfishermen. The difference between the offshore shellfishermen and trawler fishermen is not statistically significant.

Discussion

The results of our analysis support the claim that the principal function of ritual avoidances among fishermen in Southern New England is to reduce anxiety resulting from uncertainty with respect to personal safety. Where the meaning of the taboo was specified by the fishermen, it was more than four times as likely to deal with protection from danger to self than production. Of the nine high frequency taboos, which represent 69 percent of the total responses, four were concerned only with personal safety in contrast to only one concerned exclusively with production. The rest had mixed functions, but it is important to note that the highest frequency taboo, 'never turn a hatch cover upside down,' was almost twice as likely to be interpreted as affecting personal safety than as affecting production. Hence, the subjective meaning attached to the taboos by the fishermen themselves tends to support the hypothesis that they function primarily to 'protect' the fishermen from physical harm. Insuring a good catch seems to be secondary to safety. This is like the 'hierarchy of life.' We must satisfy our safety needs before we do anything further!

There is also a clear relationship between trip length and number of taboos. We predicted that number of taboos would increase along with trip length up to a certain point and then level off or increase more slowly. Analysis of the data, however, indicated that the relationship is more complex than a simple curve which increases, then increases more slowly. The number of taboos increases rapidly as trip length increases to two and three days, then begins to level off and drop gradually after trip length increases to more than five days. There is a gradual drop in the curve between five and nine days, and it begins to climb again on the tenth day. Unfortunately, none of the vessels in the sample had average trip lengths greater than ten days, so we cannot determine if the increasing trend would continue. This curve has a plausible interpretation in terms of our hypothesis which stresses the primacy of uncertainty with respect to personal safety.

We interpret the curve as follows. Day fishermen fish relatively close to the shore. Many of them are inshore lobstermen who fish within relatively easy reach of land or land-based help if some mishap occurs. Shoreside landmarks are usually visible and if a storm warning is posted, the day fishermen can reach safe waters and port in a relatively short period of time. Additionally, the Coast Guard can respond quickly and with minimal searching for an inshore boat. Hence, the perceived danger for fishermen is much less in vessels with average trip lengths of one day.

Trips longer than one day result in staying overnight on the water and usually involve trips much farther from shore. We would argue that the overnight factor – sleeping on the vessel and the visual sensory deprivation associated with darkness – result in a substantial increase in perceived danger. Darkness has always been the primary source of unknown perils for highly visually dependent humankind, a time when we are less rational about what is 'out there' because we cannot see it. Add to this the fatigue of a day of fishing, and taboos will seem ever more efficacious. Additionally, the real danger is increased. Boats that go out overnight are farther from help if needed, more distant from safe waters if a storm comes up, more subject to being hit by large ships, and more difficult to locate by Coast Guard rescue vehicles – especially at night if there is a power failure or if the emergency lights are lost when a boat capsizes. Hence, the sharp increase in taboos between one and two days. The increase slows between two to four days probably reflecting that the first night is a threshold factor which triggers a level of anxiety that is maintained, and then added to, not so drastically, as increased time reflects increased removal from safety.

Why, however, does the curve level off and then drop slightly? Speculation is involved in this interpretation that can only be resolved by future research. Perhaps least speculative is the observation that although the vessels on these longer trips are farther from their home ports, they are closer to alternative ports farther north and south along the coast. Hence, their degree of removal is not as great as five or more days out would suggest. It is not five or more days straight out to sea, but out and northeastward somewhat paralleling the coastline to the fishing grounds known as the Georges Banks or the Grand Banks, or southwestward to the fishing grounds along the Middle Atlantic States of the United States.

A more speculative interpretation of the levelling and slight drop-off of taboos after the fourth day involves the hypothesis that there is some threshold in terms of length of exposure to the anxiety generating situation that results in the fishermen becoming habituated to the risk. If average trip lengths are less than this threshold, the individual returns to the relatively security of land before becoming habituated. His anxiety level is reduced only to be raised again by the next trip which is not long enough to pass the habituation threshold. This threshold will, of course, vary from individual to individual, but in our data the threshold appears to be about four days for the 'average' fisherman.

Why the curve begins to turn upward again at ten days at sea is difficult to interpret. The amount of variance explained by the third-degree of the poly-

nomial is statistically significant ($p=0.03$), but the final upward shift may be an anomaly that would disappear if the sample contained fishermen with greater trip lengths. The third-degree of the polynomial may simply reflect the cessation of the downward curve and its subsequent levelling out. Unfortunately, our data will not resolve this question.

The comparison of fishing types does little to untangle the separate effects of economic and personal safety uncertainty. Inshore shellfishermen have both the shortest trips and the least variation in catch. Trawler fishermen have the highest variation in catch, and offshore shellfishermen are intermediate in catch variation. Offshore shellfishermen spend the greatest amount of time out (mean=7.2 days versus 6.3 days for trawlers) and have the largest number of taboos (mean=4.6 versus 3.9 for trawlers), but neither of these differences are statistically significant ($F=1.47$ and 1.70 respectively, $df=1, 89$, $p>0.10$). If the differences were statistically significant they would have provided limited evidence against the primacy of the economic hypothesis. Hence, the results of this part of the analysis are inconclusive.

Finally, turning to our finding that owners, skippers, and crew manifest no differences with respect to number of ritual avoidances, the results tend to weaken the economic determinant hypothesis. Since skippers and owners have much more to lose as a result of low catches, one would expect them to have more taboos. They do not, however, thus strengthening the claim that personal safety is the prime determinant of the anxiety reduced by ritual behavior.

The perception of danger discussed here has its basis in reality. The occupation of fishing is far more dangerous in terms of loss of life than coal mining, which is the most dangerous land-based occupation in the United States. Fishermen frequently refer to near or actual mishaps of their own and others. Despite the advanced technology of modern vessels and survival gear, lives are lost in the most frightening of circumstances. A recent example is typical.

In January 1987, a fishing vessel with five crewmen out of Point Judith, Rhode Island was on its way home from a three day trip with a load of fish. It was located in the waters off Cape Cod, Massachusetts when it suddenly began to capsize. The waters were freezing cold, and the sole survivor said he saw three crew members trying to don survival suits as he dove overboard without his. He and another crew member managed to grab the lifeboat, but it inflated so violently it threw the two men back into the water. The surviving crew member managed to climb back onto the raft, but the other crew member never reappeared. The lone survivor wrapped his feet with gauze from the first aid kit for warmth. He was rescued by the Coast Guard some 20 hours later. The search went on for the other crew members for several days, but none was found. Throughout this time coordinates of the wreck were transmitted over the weather band and other emergency channels, and other fishermen joined in the search, fully realizing that it could be them the next time. Memorial services at Point Judith ended with a ritual – a wreath was thrown to the sea.

The circumstances of this disaster are not atypical. The speed with which boats sometimes capsize and sink is phenomenal. Although adequate survival

gear is carried by many vessels, there is little time to put it on when the boat is listing in heavy weather. Anyone involved in a search and rescue mission in the North Atlantic in rough weather and during the short days of winter (and many fishermen have searched for lost vessels) knows the difficulty of seeing and finding a speck of humanity in the vast, dark, heaving ocean, and chances of survival are slim during cold weather when hypothermia results in death if the fisherman is not found quickly.

In conclusion, the material analyzed here provides relatively strong evidence that anxiety about personal danger while fishing is the principal stimulus for the taboo behavior observed among commercial fishermen in Southern New England. Although shoreside-induced rationality results in their disavowing belief in the efficacy of the taboos, they are well known and usually observed at sea where the salience of danger raises anxiety levels and discourages testing the strength of their 'disbelief.' It won't hurt to not break the taboo, but it might hurt to break it.

Notes

1. This research is part of a larger sociocultural study of fishermen supported, in part, by the Sea Grant Program of the University of Rhode Island.

2. As used here, ritual refers to a prescribed form of religious behavior. The concept of religion used is broad, encompassing magic and other superstitious beliefs. There is justification for this broadened concept in the literature. For example, Hammond (1970) writes that magic is a form of ritual behavior and thus an element of religion. Douglas (1973) attributes the apparent contrast between sacraments and magic on the one hand, and taboos and sin on the other, to our vocabulary rather than real differences in content. Finally, it is suggested that the dichotomization of magic and religion is a result of their being conceptualized in the Western Christian tradition (Saliba 1974). Rituals of avoidance are prescribed behaviors which have as a defining characteristic the avoidance of some activity, object, or word which if not avoided can result in undesirable change. A taboo is a basic type of ritual of avoidance — one is ritually proscribed from performing certain behaviors. These types of beliefs are frequently referred to as superstitions; in fact, the fishermen of Southern New England refer to their taboos as 'superstitions.' For our purposes, a superstition is a non-rational and/or non-scientifically based belief concerning cause-effect relationships.

3. The formal religion of fishermen in our sample was evenly divided between Catholics and Protestants. Although not the topic of this paper, we found no relationship between type of formal religion (Catholic vs. Protestant; $\chi^2=1.14$, $p>.05$) and our dependent variable.

4. Some critics have suggested that this relationship may be confounded by vessel size. In an earlier analysis (Poggie, Pollnac and Gersuny 1976) we have shown that the relationship between vessel size and number of taboos reduced to close to zero when trip length is controlled.

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