A PROFILE OF THE MICHIGAN COMMERCIAL FISHERMAN

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INTRODUCTION

In 1975, the Michigan Department of Natural Resources was debating whether or not to ban gill nets in the commercial fishery. To better understand the commercial fishing industry and the effects the gill net ban might have on it, a statistical study of licenseholding fishermen was undertaken. In most instances, the licenseholder was one fisherman or two partners. In several cases it was a corporation owned by a fisherman and his partner, or son, or wife. Occasionally there were two partners, but the license was in the name of one partner only. Because all of the licenseholders interviewed were men, the word fishermen and male gender pronouns are used throughout this report.

During the summer and fall of 1975, 111 commercial fishermen licensed by the State of Michigan for Lakes Michigan and Superior and northern Lake Huron were interviewed at their homes or docks. These interviews represent 96 percent of the population of licenseholders in those areas. Of these, 101 interview transcripts were usable. The responses from this sample of 101 commercial licenseholders form the basis for the results presented here. The complete list of questions asked respondents is included at the end of this report (Appendix A). Additional details of the research process are reported in Harris (1978).

In addition to creating a statistical profile of the commercial fisherman, comparisons were made between Michigan fishermen and fishermen in other areas and between fishermen and men with other occupations in Michigan.

Although gill nets have now been banned and many fishermen have changed their gear or left the industry, the basic statistics assembled are still valid. It is hoped that anyone interested in studying the history of commercial fishermen in Michigan, or in drawing comparisons between 1975 and the present, will find this report interesting and informative.

DEMOGRAPHIC BACKGROUND OF THE MICHIGAN FISHERMAN

The common stereotype of the Michigan fishing industry in 1975 was that it was in a state of decline, carried on by aging, isolated practitioners who continued the occupation of their forefathers. Although this stereotype is not entirely accurate, the results of this research give some support to that image.

AGE AND LIFESTYLE

The average Michigan commercial fisherman interviewed was 53 years old; the youngest man interviewed was 26, the oldest 81. This average fisherman was 5 years older than Lambert (1975) found for the Lake Erie boat captains of Ontario, 7 years older than fishermen on the inland Canadian lakes (England and Peters 1971), and 8 years older than commercial fishing vessel owners in Oregon (Smith 1971). This study, however, concentrated on the licenseholder rather than the captain (Lambert 1975) or the most active fisherman under the license (England and Peters 1971). The average age of all crewmen in the Michigan fishery, including owners and captains, was 41, the same age of the Oregon commercial fishery crewmen (Smith 1971). As a basis for comparison, the average Michigan farmer in 1975 was 49.5 years old.

The traditional image of the fishery emphasizes an isolated, stable way of life. Although many aspects of the Michigan fishery belie this description, more stability appears than is the case in other fisheries and other occupations. The 1970 census indicated that 66 percent of the American-born Michigan resident males 20 years old and older were born in Michigan. In contrast, 87 percent of the Michigan fishermen were born in Michigan. Forty-five percent of the fishermen interviewed resided in the community where

they were born, 78 percent beside the same lake. Twenty-six percent were born elsewhere in Michigan but on the shores of the same lake, while 7 percent were born on the shores of the same lake but in another state. Only 7 percent were not born in a lakeshore community.

These percentages indicate that Michigan fishermen have moved less frequently than, for example, Ontario fishermen, of whom only 60 percent were still living beside the same lake where they were born. This difference is probably due to the greater expansion that has occurred in the Ontario fishing industry during the past 40 years.

The mean length of time that the fisherman had resided in his current community was 39 years. Of those fishermen who were not living in their birth place, 62 percent indicated that they had moved to change their fishing port; 14 percent indicated that they had resided in the same port since their families moved when they were young. Twelve percent said that they had moved to start fishing; these included the fishermen not born in a lakeshore community. Thus in 1975, 95 percent of the fishermen still lived where they did in 1970. In contrast, only 53 percent of all Michigan males over 20 years old resided in 1975 where they did 5 years earlier.

Also contributing to the image of stability associated with fishing as an occupation is the fact that it is often passed on from one generation to the next. The typical fisherman was either second or third generation (considering relationships both through the male and female lines), although some were first generation, and one was eighth. The average number of preceding generations occupied in the fishery was 1.5.

Generally the line of occupational inheritance was very narrow and direct; in most cases it did not skip over generations or include relatives beyond

cousins. On the average, 5.65 relatives in each family had fished commercially. In the case of a second generation fisherman, these five relatives were most likely the father, brother, uncle, and two cousins. A third generation fisherman with six relatives would add a grandfather to that list. In general, a fisherman's brothers had also participated in the industry to some extent, usually because their father had been a fisherman. The same was true of uncles. As most fishermen had either a maternal or paternal fishing heritage but not both, slightly less than 50 percent of the fishermen's uncles had fished. On the average, about half of the fisherman's relatives who had fished were still doing so.

EDUCATIONAL CHARACTERISTICS

In general, Michigan fishermen do not possess a high level of formal education. They averaged 9.75 years of education, ranging from zero through 16. The average Michigan farmer and farm manager in 1970 had completed 10 years of school. Construction laborers also had an average of 10 years of education, and craftsmen had an average of 10.8 years.[1] The average number of years of education for the Michigan fishermen was slightly less than that of the Canadian Lake Erie fishermen (9.9 years) but 4 years more than that of the Canadian inland lakes fishermen. Older fishermen usually had less formal education than the younger men. It seems likely that most fishermen simply completed the number of years of education required by law at the time they were in school. Consequently, many fishermen rely on their wives or on professionals for assistance in keeping accounts and making reports.

It would appear that fishermen have tended to substitute training in fishing for formal education. Nevertheless, for some fishermen the years in

school did contribute to their fishing activities. Eighteen percent of the fishermen indicated that they had learned something in school that helped them in the fishery. Frequently this was welding or general shop skills, but in one instance it was accounting. Unfortunately, no institution offered a vocational curriculum specially designed for the Michigan fisherman, whereas on the eastern seaboard, training centers are readily available to fishermen. In contrast, 28.5 percent of a 1970 sample of Michigan males in other occupations had vocational training.[2]

MARITAL AND FAMILY CHARACTERISTICS

Of the fishermen surveyed (Table 1), 93.7 percent were married. In comparison, only 75 percent of all Michigan males age 14 or older were married. Perhaps because of their high average age, 52 percent of the married fishermen do not have any young children. The average number of children for the married fishermen was 3.3. This figure is slightly higher than Lambert's (1975) for Canadian fishermen (3); this may be because the average Michigan fisherman was a little older. In contrast, the average farm family in 1970 had 3.9 children.

TABLE 1
MARITAL AND FAMILY STATUS

Status	Percent
Single	6.3
Married, no children	8.4
Married, young children	22.1
Married, young and adult children	20.0
Married, adult children	43.2
	100.0

ENTERING THE FISHERY: CAREER TRAINING

Although most fishermen were pointed in the direction of a fishing occupation, their paths to a final occupational choice were not direct. Seventy-four percent of them fished during the period of their formal education -- during summers, after school, and on weekends. Upon leaving school, 72 percent began fishing immediately, 18 percent took some other employment, and 10 percent entered military service.

Even after starting to fish, most fishermen interrupted their careers. One-half either entered military service or worked for more than a year at some other occupation; 21 percent did both. That 50 percent of the fishermen were military veterans seems high, considering that fishermen were eligible for deferments as food producers in World War II if they worked on a vessel of 20 tons or more. By contrast, only 28.2 percent of rural farm males 16 years old and older were veterans, while 41.8 percent of all Michigan males in those ages were veterans. Although the average fisherman began fishing 36 years ago at the age of 17, as a result of these interruptions he had only fished 33 of those 36 years, having spent an average of 2 years in military service and 1 year at another job.

Military service in the Army was the most frequent (18.9 percent), surpassing the Navy (8.4 percent), the Coast Guard (4.2 percent), the Marines (1.1 percent), and the civilian service of the Merchant Marine (1.1 percent). In addition to providing something to do before settling down to fish, military service was also an occasion to learn skills for the fishery. Twenty-three percent of the fishermen indicated that in the military they had learned something that could be applied to fishing. In most cases this concerned a knowledge of diesel engines, but occasionally it involved working with electronic gear or cables, or improving general mechanical skills.

After trying other occupations, the fishermen eventually entered the fishery. Only 17 percent of the fishermen had fathers who had no involvement with the fishery, while 63 percent had fathers who had been full-time fishermen all their lives. Thus it is not surprising that 40 percent of the fishermen inherited their fathers' outfits or were given a partnership in the outfit, and an additional 2 percent inherited part of their outfits from relatives (usually their fathers). The fishermen who did not inherit an outfit had to purchase one — either via a partnership (usually with their father) or individually (usually by starting small and gradually building up).

Most fishermen learned how to fish during summers and afternoons, and after graduating or leaving school. Forty-three percent of the fishermen reported that they learned how to fish solely from their fathers, while 27 percent learned from their father and another fisherman. Eighteen percent of the fishermen learned from unrelated fishermen or on their own. This 18 percent included most of the 14 percent whose fathers did not fish. Others learned from brothers, uncles, mothers, grandfathers, and cousins. Forty-four percent of the fishermen worked for unrelated fishermen before becoming a part or full owner of an outfit.

The content of the knowledge learned for the fishery can be divided into various areas. First, 89 percent of the fishermen learned certain places to fish; 13 percent also learned places not to fish. A fisherman might want to avoid an otherwise good spot for several reasons, the most common of which are old pound net stakes that snag the nets, clinkers from the old coal engines that get in the nets, a bottom composed of sharp rocks that chafe the nets, and areas where the currents are so strong that the nets move or lie flat on the bottom. Second, 43 percent of the fishermen learned a special technique for

making the gear; more than half of these techniques involved the tightness of the twine. If a gill net is made too tight, the tension is so great that many of the desired fish are sprung backward before they are caught. If it is made too loose, the net will catch many undesirable fish -- undersized or unsaleable fish (such as alewives). The tightness of a net is expressed in terms of the ratio of the size of four meshes, stretched as far as possible, to the length of float line (and lead line) to which those four meshes are attached. These four meshes are called a phrase; a phrase is attached to the lines with knots at the beginning and the end of the phrase (and thus at the beginning of the next phrase). To string 4.5-inch mesh nets on halves means to put 18 inches (stretched measure) of twine on 9 inches of line. Usually the large mesh nets are strung on slightly less than halves (i.e., tighter) to avoid the unsaleable fish. In addition to these distinctive aspects of making the gear, 33 percent of the fishermen learned a special technique for fishing the gear (e.g., a way of setting the net).

The tendency for fishermen to live in the communities of their births and/or childhood masks a large amount of mobility that has occurred during their lives. Not only have they experienced military service and employment outside the fishery (both of which have usually occurred in other communities), but most fishermen have spent several years fishing in other areas. The fishermen involved in this study spent an average of 5.9 years fishing elsewhere. However, as the study included fishermen at various stages of their careers, the figure for average total number of years spent fishing elsewhere during one's career would probably be greater than 6.[3]

Often some of the time spent elsewhere was spent with an unrelated fisherman during one's training period or was due to a seasonal pattern of

exploiting different areas of the lakes. Following this pattern, a fishing outfit would move from southern Lake Michigan to northern Lake Michigan or Lake Superior as the ice went out in the spring, would move back to the south in the late fall and early winter, and then would return to northern Lake Michigan or Lake Superior to fish through the ice during the winter.

To obtain an indication of how the fishermen viewed the skill and knowledge associated with the fishery, they were asked to indicate the special knacks or skills which they possessed. Thirty-nine percent said they had none. Thirty-three percent indicated a special skill in setting the nets, 20 percent claimed a special knack for icing the fish. The fishermen learned these skills most frequently from their fathers, secondly on their own, and least frequently from other fishermen. After describing their own skills, the fishermen were asked if, in general, some fishermen were more skilled than others, and what were the areas of those skills. Ten percent of the fishermen responded negatively. The most frequent positive responses were knowledge of grounds and making of nets. Finally, 58 percent indicated that some fishermen were luckier than others.[4]

FISHERY PRODUCTION TECHNOLOGY

FISHING BOATS AND GEAR

Thus far we have looked at the demographic characteristics of Michigan commerical fishermen, their family characteristics, and their educational backgrounds. We turn now to fishing production technology -- fishing boats and gear and the techniques and mechanics of the industry.

Every fisherman interviewed had at least one boat; the average number of boats per fisherman was 1.5. Forty-four percent had two boats; 10 percent had

three boats. The most common type was the gill net tug, an enclosed vessel 25 to 50 feet in length (Table 2). The second most common boat was the trap pound net boat, usually 20 to 45 feet long, with a cabin forward and an open deck aft. Two percent of the fishermen had trawlers, rigs with a derrick and apparatus for pulling and lifting a trawl net. Sixteen percent had only open motorboats or skiffs. The skiff owners included the one fisherman who was using a haul seine for his fishery.

Boats other than skiffs usually had some mechanical device for lifting the nets. Gill net boats (Figure 1) had automatic gill net lifters, while trap net (Figure 2) and pound net (Figure 3) boats had winches. Three percent of these lifting devices were operated manually, the rest used some sort of power device. A gill net lifter is a set of rotary jaws, on which successive sets of teeth grab the cork and lead lines and pull them into the boat a few inches until the next set of teeth grabs further down the lines and the first set releases. The lifter is powered by a separate gasoline engine or by a mechanical or hydraulic power takeoff arrangement on the main engine. Lifters powered by separate engines are traditional for gill net outfits, but are regarded as somewhat dangerous (because they require flammable gasoline) and are difficult to control. Twenty-seven percent of the lifting devices are powered by the main engine, by either a shaft or a chain drive. Although requiring that the main engine be left running, these devices are safer than those that use a separate gasoline engine, and they are capable of operating at several speeds. Eight percent of the lifting devices are run by a hydraulic system, which has a continuous speed range and also takes its power from the main engine. The lifting speed is important for gill nets, because lifting too fast may tear the nets or cause them to pile up and get tangled when the men

TABLE 2
BOATS OF THE MICHIGAN COMMERCIAL FISHERY

Kind of Boat	Percentage
Gill net tug	40
Trap net boat	19
Pound net boat	16
Skiff	22
Trawler	1
Pound net stake driver	1

	Characteristics of Boats			
	Mean Length (feet)	Mean Age (years)	Mean Value (including engine)	Mean Horsepower
Gill net tug	43.0	29.1	17,500	136
Trap net boat	38.2	25.0	13,000	159
Pound net boat	29.0	19.1	7,750	144
Skiff	18.0	11.0	2,500	29
Trawler	56.5	27.0	50,000	360

	Material				
	Wood (%)	Steel over Wood (%)	Steel (%)	Aluminum (%)	Fiber-glass (%)
Gill net tug	3.9	25.9	70.6	-	-
Trap net boat	10.7	3.6	85.7	-	-
Pound net boat	4.2	-	95.8	-	-
Skiff	6.1	-	42.4	45.5	6.1
Trawler	-	-	100.0	-	-

	Engine		
	Diesel (%)	Gasoline (%)	Outboard (%)
Gill net tug	100.0	-	-
Trap net boat	76.0	24.0	-
Pound net boat	8.7	56.5	34.8
Skiff	-	-	100.0
Trawler	100.0	-	-

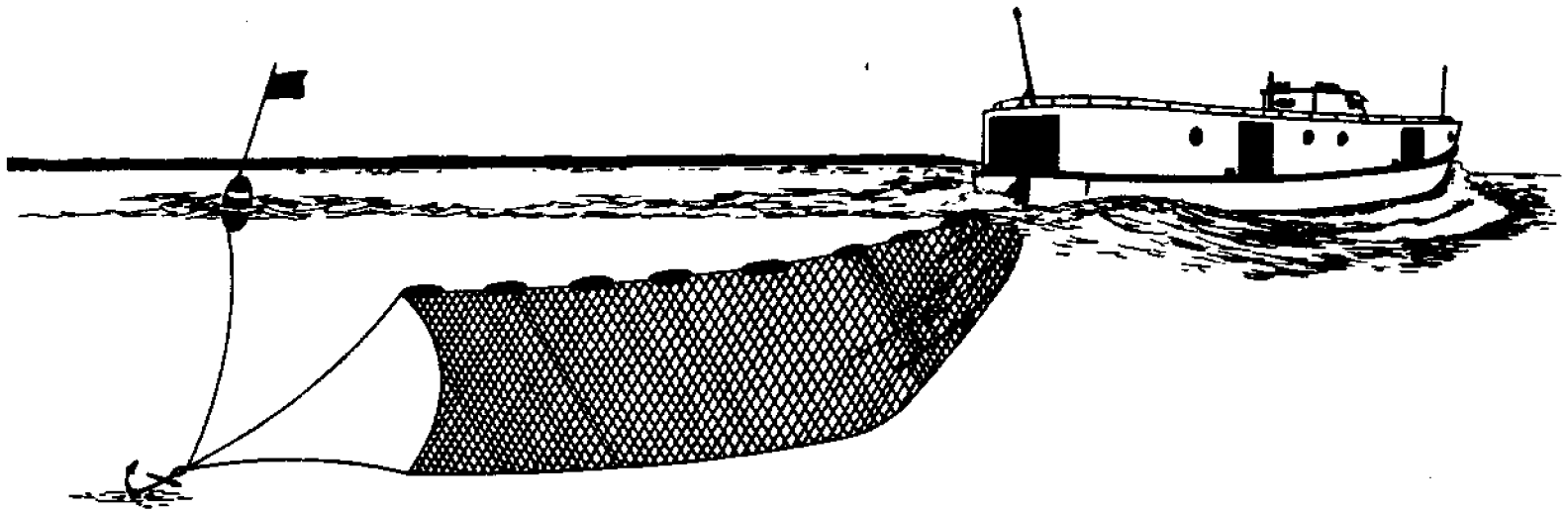

Figure 1. Gill net tug setting net.

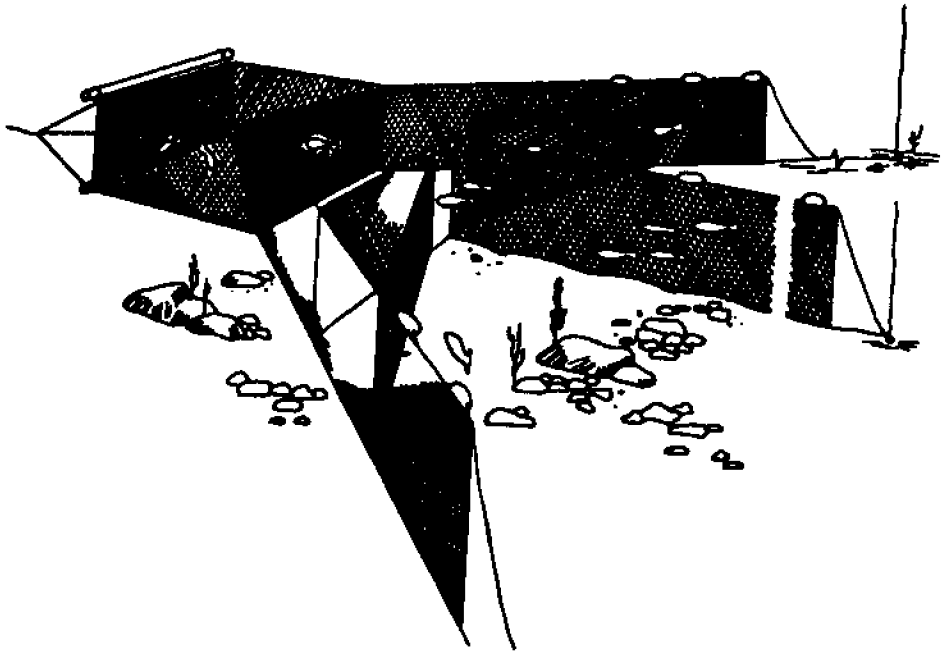

Figure 2. Trap Net (after Adams and Kolenosky 1974)

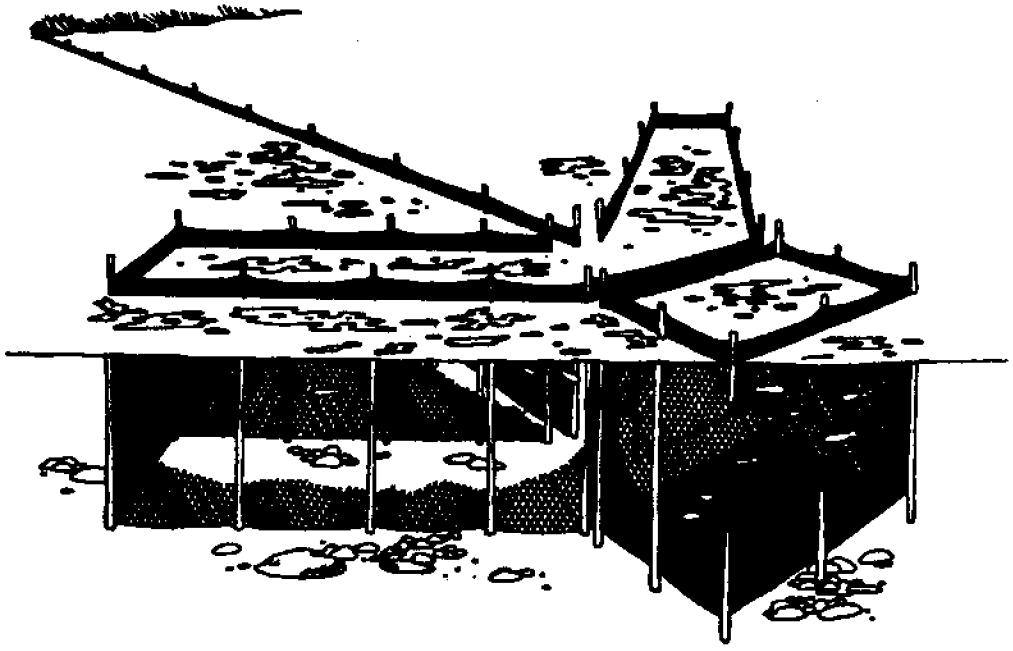

Figure 3. Pound Net (after Adams and Kolenosky 1974)

are picking out the fish. Lifting too slowly may leave the men idle or allow the nets to tangle and foul in the water. Hydraulic systems are widely regarded as the best, but the fishermen disagreed on whether they were worth the cost.

While there are many technological approaches for lifting the gill nets, there are few approaches for setting them. A few (14 percent) of the gill net tug or skiff owners had a spreader bar or a wheel to assist in setting the net without twists or snags. The others simply let the net run out the back of the boat. Setting trap nets requires a skiff or second boat to run anchor lines, but no special gear otherwise. Setting a pound net requires a pile driver or an air jet device to drive the stakes, and a skiff to help arrange the net.

In deciding where to set the nets, three facts about the lake bottom are relevant: composition, depth, and configuration. Knowing the composition of the bottom is important because fish prefer a soft bottom, trap nets get torn up on a hard bottom, and pound nets can only be set on a soft bottom. A sounding lead gives the best information about bottom composition, although a depth recorder gives some indication.

Although a few fishermen still use the sounding lead to find the depth of the water, most use either a flashing depth sounder or a depth recorder. Fishermen expect the fish to be at a certain depth at a certain time of year, and try to set their nets at that depth. All three devices give that information, but the flashing depth sounder requires constant attention while the recorder does not.

Occasionally, fishermen will look for certain topography -- a bank, a plateau, or a channel. These features can be located by watching a flasher closely, but are easier to find with a recorder. Furthermore, the recorder

can locate schools of fish; often it is even possible to identify the species.

Thus, the recorder is most useful for a trawl or purse seine outfit, where the school of fish has to be located for the net to be effectively set. Eleven percent of the fishermen had depth recorders on their boats, largely because of their usefulness in identifying grounds in the trap net fishery. Sixty-eight percent of the outfits had depth flashers. Most of the fishermen who used the sounding lead only were small outfits fishing with gill nets out of skiffs.

The fishermen used radios on their boats to call for assistance, receive weather bulletins, learn of good spots from other fishermen, and tell the shore operations how many fish would be brought in and when. Despite the number of possible uses for a radio, only 45 percent of the fishermen had one on the boat.[5]

Radar is useful for finding one's net buoy on a foggy day and for avoiding collisions. Nevertheless, only 20 percent of the fishermen had radar on their boats; most of those who did had gill net tugs fishing far out in the lake.

An automatic pilot can be used to steer the boat in a predetermined direction, freeing an additional person to dress the fish, and making a long trip less tedious. This feature is especially beneficial to the gill net fisherman who works far offshore. Using an automatic pilot, however, is also more dangerous; during the research period one boat running on automatic pilot collided with an ore freighter. As one might expect from the limited usefulness of this equipment, only 18 percent of the boats had automatic pilots.

State fishery rules require that ice must be carried on the boat between May and September to keep the fish fresh. In fact, most of the fishermen take ice out with them from April through November; some take it out year-round. Important factors in determining whether or not to take ice on the boat are the

species of fish and the lake temperature. Whitefish and menominees hold up well; chubs and herring get soft rather quickly. If fish are being taken from gill nets in early spring, the fish themselves are cold and do not need ice. If fish are taken in summer or from shallow trap nets, they are warm and will spoil quickly if not iced.

Fishermen are not required to carry ice for catches not intended for human consumption. Alewives and smelt to be used in animal food or fish meal, for example, require no icing. Except in these cases, all of the fishermen needed a supply of ice for each trip. Fifty percent of the fishermen owned an ice-making machine with an average capacity of 2 tons per 24-hour period. Twenty-eight percent of the fishermen got ice from the dealer who buys their fish as part of their business arrangement. Eleven percent of the fishermen cut blocks of ice in the winter and stored them for later crushing.

If we consider the different kinds of gear -- trap nets, pound nets, large mesh gill nets, small mesh gill nets, seine nets, and trawl nets -- then the most common fishing outfit employs two kinds of gear. In most cases, these are some size of gill net and a type of impoundment net. Two percent of the fishermen owned trawl nets; one fisherman owned a seine. These three percent of the fishermen used only their one respective gear.

A description of the gear used in the Michigan commercial fishery is presented in Table 3. For each type, the table indicates its quantitative significance and some of its important aspects. Nylon webbing has been available for nets since the early 1950s; nylon twine and nylon monofilament have largely replaced the traditional cotton and linen webbing. Nylon nets are more than twice as efficient for catching fish as cotton nets (see Pycha 1962) not only because of nylon's greater strength and lesser visibility but also

TABLE 3
NETS OF THE MICHIGAN COMMERCIAL FISHERY

	Outfits which Utilize that Kind of Net (percentage)	Mean Length or Number of Nets per Outfit	Nets which are that Kind of Net (percentage)
Large mesh gill net	52	10.1 miles	29
Small mesh gill net	65	10.3 miles	37
Pound net	22	8.8 nets	12
Trap net	36	11.1 nets	20
Seine (hawl)	1	1.0 nets	1
Trawl	2	6.0 nets	1
			100

	Large Mesh Gill Net	Small Mesh Gill Net	Pound Net	Trap Net	Trawl
Kind of Twine					
Nylon	76.6	88.4	68.4	83.3	100.0
Monofilament	21.4	10.6	-	-	-
Linen	1.0	1.0	-	-	-
Cotton	1.0	-	31.6	16.7	-
Treat nets with preservative	6.3	6.8	100.0	97.1	100.0
Dye nets	6.3	6.8	5.0	0.0	0.0
Who repairs nets					
Owner(s)	45.9	36.3	47.5	39.6	50.0
Owner and crew	42.9	53.2	35.0	55.9	-
Shore crew	8.1	4.8	7.5	1.5	50.0
Crew	3.0	5.6	10.0	3.0	-
When are repairs done					
All year round	70.2	75.0	30.0	58.6	100.0
Slack period	29.8	25.0	70.0	41.4	0.0
Build own nets	87.8	88.5	71.4	51.5	50.0
Source for twine					
Twine company	86.4	85.2	86.9	91.1	100.0
Dealer	11.3	11.1	2.6	-	-
Association	2.3	3.7	10.5	8.9	-

because nylon nets do not decay like cotton nets. Thus, they need not be brought in, reeled up, and dried so frequently, and they do not need regular treatments. This saves time which can be allocated to increased production or leisure; it also decreases the number of nets a fisherman needs as each net will last longer and can be fished more frequently.

The different nets may require a preservative treatment either to prevent rot or to prevent deterioration from light. Synthetic gill nets (which are set in deep water) do not require treatment. Synthetic impoundment nets, however, do require treatment because they are set in shallow water where light penetrates. Any natural twine, no matter what kind of net or where it is set, requires treatment to prevent rot. Because synthetic twine does not rot, these nets do not require the regular care that formerly occupied the crews. Although some fishermen dye their small mesh gill nets to reduce visibility, this is not common practice.

More fishermen own small mesh than large mesh nets because large areas of the lake can accommodate only small mesh fishing. Southern Lake Michigan has not had a large mesh fishery since the decline that occurred during the late 1940s due to lamprey eel predation (see Hile et al. 1951). It is not clear whether more large mesh fishermen than small mesh fishermen have converted to monofilament because the whitefish fishery is healthier and more profitable, or because the efficiency of monofilament is greater for catching whitefish than for chubs.[6]

Net repair varied among the types of nets with respect to who repaired them and when. In all cases, the crew was less likely than the owner(s) to be involved with repairs. The repair of gill nets was done all year-round rather than during a particular season, because gill nets were regularly lifted,

examined, and moved. Trap nets were repaired less frequently than gill nets, but more often than pound nets because trap nets were occasionally moved during the fishing season.

Nets also varied with respect to who built them and where the materials were obtained. Most fishermen built their own nets, rather than buying them ready-made or paying to have them built. This was especially true for gill nets, but was true for all types of nets. In all cases, fishermen who made their own nets were most likely to buy their twine from a twine company, although fishermen who made their own gill nets were more likely to buy their twine from a dealer (thus helping the community's economy) than those who built their own impoundment nets. All fishermen, no matter what gear they used, made their own lead weights; at the time of the study most of the fishermen had old leads in large quantities to spare.

HAZARDS OF THE INDUSTRY

In earlier periods of its history, the hazards of the fishery reached alarming levels. As boats fished farther from shore and stayed out on the lake over one or two nights in the late 1800s, the average annual rate of occupational mortality increased to three per thousand. In an effort to obtain a contemporary indication of the danger of the occupation, the fishermen interviewed were asked how long it had been since there had been a bad accident involving a boat from their port. Twenty-three years was the mean response. The fishermen were then asked how many men had been killed in that accident; the answers ranged from zero to three. In 41 percent of the accidents, the principal cause was attributed to human error such as drinking or other unsafe practices; 31 percent were attributed to bad weather on open water. Fourteen percent were attributed to bad weather on ice, and 12 percent to mechanical failure.

DECISION MAKING TECHNIQUES

Although fishing activities were not observed first hand, the fishermen were asked about their decisions regarding fishing techniques. When asked how they decided where to set the nets, 58 percent of the fishermen said they just set them in the traditional spots. This response implied some notion of moving the nets according to where the fish had been caught in large quantities in the past. Sixty percent of the fishermen kept a record of their catches at the various spots; 20 percent moved the nets toward shore or away from shore according to where the fish were concentrated in the nets, or according to the direction in which they seemed to be heading. Direction was indicated by the end of the net in which the most recently caught fish were found. Ten percent of the fishermen decided on spots to set by looking at charts of the lake bottom.[7]

In some fisheries, a fisherman had territorial rights to certain grounds and these rights were respected by the other fishermen. Thirty-three percent of the fishermen indicated that this arrangement was practiced in some areas where they fished. This occurred most frequently with pound nets, because the stakes were driven and the net was cut to match the slope of the bottom. It occurred occasionally with trap nets, again because the net was sometimes made especially for a spot. Sometimes gill net outfits made an effort to stay away from each other, and in a sense allocated a particular area to each outfit. These allocations lasted for the season. Seventy-three percent of the fishermen did not claim locations for their own; almost half of those who claimed locations did not mark their claim. Those who did mark their locations did so by setting out the entire net early in the season, rather than just a partial marker, such as the stakes or lead or buoy.

Fishermen had different ideas about the ways to discover good fishing grounds. Seventy-seven percent said it was a matter of trial and error, the only way was to set a net and see what it caught. Fifteen percent responded that good grounds could be discovered on the charts or by studying the bottom composition and configuration. The distribution of knowledge of good grounds among the fishermen was not universal. Sixty-two percent of the fishermen said that it was difficult to find good spots which were not already known. At the same time, 55 percent of the fishermen said that good spots were common knowledge. Twenty-four percent of the fishermen said that they knew of good locations which they kept secret from the other fishermen. A younger crewman learns these grounds by working for another fisherman, and a son learns them from his father (Comitas 1962). Questioned about the extent or quality of their knowledge of the grounds, 52 percent of the fishermen described themselves as having a good knowledge of the grounds.[8] Information on the fishing grounds can be very valuable; Smith and Snell (1891) noted that knowledge of good grounds should enable a fisherman to catch 33 to 100 percent more fish.

To return to a spot, fishermen had three techniques:

1) look for a certain depth and bottom configuration;

2) follow the same compass course for the same amount of time;

3) use land ranges (landmarks) to locate the spot.

Locating the spot with ranges was the technique most frequently used (67.1 percent), however this technique was feasible only when fishing close to shore. Fifty-one percent of the fishermen used depth and bottom configurations, but this method could only be used where the bottom was sufficiently variegated. Finally, 50 percent of the fishermen used time and compass course. Although

ranges were used for both gill nets and impoundment nets, gill net fishermen were also likely to use time and direction, while impoundment net fishermen used depth and bottom configuration.

Asked whether they tried to find the fish to set their nets, or whether they just headed for a certain spot, 88 percent of the fishermen indicated that they just went to a certain spot and set their nets. In response to a question on how they located fish, 75 percent said they set a net. Nine percent indicated that they found fish by going where the other fishermen were getting good lifts; 6 percent set several nets simultaneously in various spots. Only 4 percent used a depth recorder to find fish. Eighty-three percent tried different grounds for fish. This response usually meant that they moved to a different spot if they did not catch enough where they were. Although 7 percent indicated it might be possible to attract the fish, they commented that most of these techniques were either illegal (such as lights on the nets) or dubious (such as recipes for treating the nets).[9]

Sixty-two percent of the fishermen interviewed indicated that they needed to know the currents and winds to set their nets. For example, it was helpful to know where the current was too strong for the net to stand erect, where the moss and seaweed carried by the current would clog the net quickly, and how to set the net so that it remained taut.

One of the strategies that makes a fishery operation viable is the allocation of effort among the catching of several types of fish. This strategy was employed by 40 percent of the fishermen. Those who used gill nets were more likely to pursue several species of fish than fishermen who used impoundment nets. Those who pursued several species did so at different times, and with different gear (Table 4). This gear could be impoundment and gill nets, or large and small mesh gill nets.

TABLE 4
PURSUIT OF MULTIPLE SPECIES

	Same Gear	Different Gear
Same time	1.1	16.1
Different time	2.2	20.4

In view of the long standing controversy over the number of dead fish taken in the commercial nets, it is interesting to note that 34 percent of the outfits lifted their nets every day. Although no effort was made to assign a percent of dead catch to the different lifting practices, the fishermen contended that daily lifting minimized fish mortality.[10] The fishermen's lifting practices are shown in Table 5. If we assume a 6-day week, the response "every other day" is equivalent to "three times a week."

TABLE 5
FREQUENCY OF LIFTING

How often do you lift a net?	Percentage
Daily	34.1
Every other day	20.7
Three times a week	8.5
Twice a week	30.5
Once a week	6.1
TOTAL	99.9

One of the variables which the fisherman controls, within boundaries set by the rules of the Department of Natural Resources, is the amount of net he

sets at any one time. In making this decision, the fisherman takes into account:

The amount of net he can lift,
How much fish he wishes to market,
The abundance of fish,
How quickly the fish will spoil,
How soon he will be able to lift the nets, and
How long it will take the nets to catch
the desired amount of fish.

In some fisheries, the catch per net is directly proportional to the number or length of nets set.[11] Only 21 percent of the fishermen believed this to be the case with their fishing. Considering all of these factors, a fisherman decides to set a certain quantity of net which he regards as his normal or usual amount. Seventy-three percent of the fishermen did not set more than their usual amount of net at any time during the year. The 27 percent of the fishermen who occasionally set more nets did so when:

Cold water during winter months allowed the fish
to retain their quality longer,
The fish catch was unusually low or high,
The market price for fish was high, or
Longer summer days allowed more nets to be lifted.

In contrast, 43 percent sometimes set less than their normal amount of net. One-third of these respondents did so because they could not get out to lift as often, and/or the fish did not keep as long, in bad weather. One-quarter said

they decreased the amount of net when fish were more abundant. Other reasons mentioned were low abundance of fish, fish not keeping as long in warm water, and bad weather ruining the nets.

On the average, fishermen worked 5 days per week, 10 hours per day, 11 months per year. Eighteen percent of the fishermen worked all year in the fishery, either fishing under the ice or using their tug to break through the ice. Sixty percent regularly stopped fishing during winter; another 7 percent stopped if the ice got too thick. Eight percent stopped only during the closed spawning season in the fall, but then went back out in December rather than laying up for the winter. In some parts of the fishery there was a summer slack period (especially for pound nets) during which the fishermen would lay up. Most of the fishermen used that period for repairing and building nets and repairing boats. Fourteen percent worked at another job during lay-up, and 12 percent took a vacation. In a 1973 Great Lakes Fishery Advisory Committee study, the fishermen indicated that they actively fished commercially 9 months out of the year. The present research suggests that an additional 2 or 3 months were spent on maintenance, repair, and construction.

ECONOMIC ASPECTS OF THE MICHIGAN FISHERY

ADDITIONAL FISHERIES, PROPERTIES, AND SERVICES

In addition to the boats and nets, the capital invested in the fishery consists of docks, sheds, land, and stores. Forty-one percent of the fishermen interviewed owned their dock; 16 percent used a public dock; 45 percent rented a dock. Eighty-two percent of the fishermen owned a shed where they stored, built, and repaired nets, operated their ice machine, and stored other gear. Thirty-nine percent of the fishermen owned land they used for their fishing

operations, usually to spread or hang impoundment nets for drying and inspection. These operations required 1 or 2 acres at most Fifty-two percent of the fishermen did not need land for their operations; the other 8 percent rented or borrowed land. Twelve percent of the fishermen owned a retail market separate from their shed.

In some fisheries, the provision of common property capital and services is a significant aspect of the operating conditions of the fishery. The common property capital may be provided by a governmental unit or an association of the fishermen. Its distinguishing feature is that access cannot be denied to any fisherman of the community. Some examples of common property capital mentioned in the literature on fisheries include:

Bait service

Bounties for renovation or construction of boats

Public docks or wharfs

Marketing organization

Harbor service

Ice subsidy

Insurance

Lighthouse and rescue service

Biological and technical research

Salt service or subsidy

Public working space

Thirty-four percent of the Michigan fishermen interviewed felt they benefitted from some sort of harbor service -- usually the channel and entrance maintenance done for major harbors. Some fishermen mentioned the weather

reports as a helpful service, some complained that the Coast Guard ice breakers could be more helpful in the winter gill net tug fishery. Almost three-quarters (71 percent) of the fishermen had no contact with a fish inspector; 70 percent had no contact with a boat inspector. Ten percent of the fishermen received financial assistance from the National Marine Fisheries Service or the Small Business Administration.[12] It is interesting to contrast farming with these forms of public assistance to the fishery. In 1974 the average Michigan farmer received $130 in government payments for various programs, or one-half of one percent of the total gross income.

THE FISHING CREW -- LABOR IN THE FISHERY

Boats, nets, and other property represent only the potential for fishing activity; it is the work of the crew to utilize that potential in the production of fish. The average crew was composed of 3.5 men, including the owner or owners. The owners comprised almost half of the crew, 1.6 men out of 3.5 men. The number of crew varied from one (mostly the skiff fishermen) to eight (the outfits which fished two boats at once and thus required two complete crews). The number of owners involved in an outfit varied from one to four.

Characterizations of the crewmen must be somewhat inaccurate, as almost as much variance occurred within crews as between crews. In some cases, the individual members of the crew remained fairly constant over time, and the crew aged as time passed. At some point the crew retired and the outfit was retired or sold. In other instances, the members of the crew changed; the average age remained almost constant. But at some point, the ownership of the outfit

passed from one member to another. This second pattern was found in 83 percent of the outfits in the Michigan commercial fishery.

The average crewman, not including the owners, was 33 years old -- 20 years younger than the average owner. This crewman had worked for the owner for 8 years (but responses ranged from 2 to 35 years). Whereas the owner on the average worked 10.5 months during the year, the average crewman worked 9 months. This disparity occurred because owners tended to repair and build nets on their own. The majority of the crew was married and had children, while only 31 percent were single. Thirty-three percent of the crew did some additional work outside the fishery, and 5 percent were employed with other fishing outfits also.

Some members of the crew interacted with the owners beyond just the exchange of labor for wages. Fifteen percent of the crewmen lived and/or boarded with an owner; 23 percent of the owners had one or more crewmen living with them. In most cases, these were sons who had not yet established an independent household. Although one might argue that these men would be living with their parents regardless of whether or not they fished together, it could also be argued that these sons would have moved to another location to find employment and set up housekeeping if they were not involved in the fishery. Of the owners who had crew living with them, one-third received a payment averaging $1,300 per year for room and/or board. Both the owner and the crewman derived advantages from this situation. The owner was not pressured to pay the crewman enough to live independently, and the crewman did not have to devote a large portion of his earnings to living expenses. By having a crewman at his home, the owner received uncompensated labor (the crewman was available whenever jobs needed doing, but he received no greater pay than a crewman who

lived separately and avoided these occasional peripheral tasks). Because the crewman was always available, he participated in all phases of the fishery work; by participating in the full range of activities he learned skills and tricks from the fisherman that otherwise he would have had no opportunity to see.

Fifty-two percent of the crewmen were related to the owner, as shown in Table 6. Brothers were the most frequent jointly owning relative (48 percent), for reasons which have been discussed by Firestone (1967), Faris (1972), and Nemec (1972). Sons were the most frequent non-owning relative, and the second most frequent jointly owning relative. In comparison, 75 percent of the farm laborers on Michigan farms in 1975 were members of the owner's family. This difference may be due to the relatively equal distribution of difficult work in the fishery, in contrast to the much greater variation in the difficulty of the assorted tasks on a farm.

TABLE 6
KINSHIP IN FISHING CREWS

Relation to Principal Licenseholder	Joint Owners of Boat and/ or Gear	Non-Owners	All Crew
Not related	17.5	55.6	48.3
Brother	47.5	2.9	11.4
Son	25.0	21.6	22.2
Father	2.5	0.6	1.1
Cousin	-	2.9	2.4
In-law	7.5	7.0	7.1
Nephew	-	5.8	4.7
Grandson	-	2.9	2.4
Uncle	-	0.6	0.5
TOTAL	100.0	100.0	100.1
	(N = 40)	(N = 150)	(N = 190)

Nineteen percent of the crewmen were identified as the owner's neighbors. This 19 percent excluded crewmen who were also identified as relatives. This supports the notion that neighbors are more likely to be selected as crewmen than non-neighbors; however, the existence or ordering of a causal relationship is not clearly indicated. As Tunstall (1962) has shown, one could argue that men are led by their common interest in the fishery to live close to the docks and thus to each other. Although a crewman may have been the captain's neighbor at the time of the interview, we cannot infer that they were originally neighbors.

Fourteen percent of the owners regularly supplied food for lunch on the boat or on shore; otherwise each man brought his own. Often lunch on the boat consisted of part of the day's catch, cooked on the space heat stove.

Most crewmen who built nets also lifted, picked, dressed, packed, and mended. No crewman just lifted nets, and a crewman's job always included some handling of the fish after lifting. The high percentage (23.6 percent) of outfits which involved their crew in the management of the operation may be due to the high number of outfits in which all crewmen were also owners. The extent to which crewmen were involved in the different activities of the fishery is shown in Table 7.

In contrast to the older pattern of a division of labor, only 8 percent of the fishermen maintained a separate shore crew to repair their nets. At the same time, 8 percent of the fishermen relied on a shore crew partly or entirely for making new nets; however, these were not the same 8 percent. The repair shore crews tended to belong to gill net outfits while the shore crews for building tended to be in impoundment outfits. Overall, 10 percent of the

TABLE 7
JOBS DONE BY CREWMEN

Job Description	Percentage
Lift nets	0.0
Lift nets and pick fish	3.4
Lift nets, pick fish, and pack fish	16.9
Lift nets, pick fish, pack fish, and mend nets	28.1
Lift nets, pick fish, pack fish, mend nets, and build nets	27.0
Lift nets, pick fish, pack fish, mend nets, build nets, and manage operation	23.6
TOTAL	99.0

fishermen purchased their nets rather than building them; however, this varied according to the different kinds of nets, as noted before.

As one of the conditions of their licenses, the fishermen were required to keep records of their effort and their catch, and report these data to the Department of Natural Resources once a month. If an owner hired a captain and crew to fish one of his boats, the captain was responsible for the record keeping. Sometimes a fisherman would rely on his wife to keep the records, and in a large outfit one of the employees may have kept the records. In 89 percent of the cases, the fisherman himself handled the records.

Similarly, a fisherman must keep an account of his income and expenses for tax purposes. Three percent of the fishermen hired an accountant for this purpose, and 22 percent relied on the services of their wives. Some partners kept the accounts jointly, while others left the accounting to one of the partners. Of the entire sample, 74 percent of the fishermen kept their own accounts.

In 97 percent of the cases in the Michigan fishery, the owner managed his own outfit. In three percent of the cases, an owner allowed the captain to

manage the outfit on his own: these were situations where the owner was not involved at all in the fishing, or where the outfit was not located near the owner's port. In these cases the captain made decisions on setting, lifting, going out, selling the fish, and repairing the boat and gear. Otherwise the owner or owners made these decisions.

On any day, the main part of the activity of the fishing outfit was governed by two decisions: whether to go out on the lake and lift the nets, and if so, where to set the nets after lifting them. In deciding whether to go out, a fisherman considered such factors as how heavily the fish had been coming, how long they could remain in the nets without deterioration (which is in turn determined by the depth of the water in which the nets were placed, the season of the year, and the species of fish), the market demand price for fish, and the weather. The first three factors are combined in an estimation of expected profit, but the fourth factor is not comparable to the other three as it affects the lives and safety of everyone on the boat. Sixteen percent of the owner/operators indicated that they decided jointly with their crews whether to go out or not, and 32 percent of the fishermen reported that much dicussion occurred over the matter. Although a joint decision presumes some discussion, discussion does not imply participation in the actual decision. Respondents reported that the weather was the main subject of the discussion. Almost all of the fishermen mentioned that they sometimes started out onto the lake but then returned to port when they saw it was worse than they thought.

The decision of whether or not to go out affected the lives and safety of the crew. In contrast, from the perspective of the crew, the decision of where to set the nets affected the length of time the trip would last as well as the income on the next trip (if the outfit fished on shares). Only 9 percent of

the fishermen made this decision jointly with their crewmen, but 32 percent said that it was a matter for discussion. The fishermen were asked if there was disagreement over these decisions; 93 percent responded negatively. Those who said yes indicated that occasionally the younger crewmen would want to go out when they (being owners and being older) felt it was too rough.

It has been indicated several times that the fishermen received various kinds of assistance in the fishery from members of their households: selling the fish, dressing the fish, keeping records or accounts, and going out on the boats. Forty-two percent of the fishermen received some assistance from their wives; 13 percent received assistance from their children. Only 8 percent of the fishermen received help from members of the households of their crews. Unfortunately, there are no comparable data from farming. It is known that in 1975 family workers composed 75 percent of the total number of workers on farms (excluding the owner), and that the average farm had 1.25 family workers in addition to the owners during some part of the year.

INCOME AND COMPENSATION

MARKETING THE FISH

If a fisherman does not sell his fish to local retail outlets, he has two alternatives for disposing of them: to sort the fish by species and grade, and pack them in ice in 50 pound boxes for shipment to wholesale dealers in New York, Detroit, or Chicago, or to turn the fish over to a dealer in his port. In the second instance the fisherman and his crew minimally sort and pack the fish in boxes with ice. The dealer and his employees unpack, sort, grade, weigh, and repack the fish for shipment. The dealer negotiates with the wholesale dealers for the best price and pays the fisherman some portion of

that price. The dealer may pay the fisherman the price received from the wholesale market minus a flat commission (usually 5 cents a pound), or he may pay him an average of recent prices minus the commission. Unless the dealer takes a flat commission, he must decide the extent to which he wishes to pass along to the fisherman the windfall profits or losses from unusually high or low prices. The fishermen who turn their catch over to a dealer favor this alternative because it shortens their workday, decreases the number of factors which they must manipulate in their operations, and provides a source of ice. In one port all fishermen are obliged to consign their catch to a dealer because the dealer owns the dock.

Overall, 10 percent of the fishermen relied on a dealer to pack the fish; 84 percent of the fishermen packed the fish themselves or with their crews, and 6 percent relied on the crew alone to pack the fish.

If the fisherman sells his catch directly to a wholesaler or consigns it to a local dealer, then only the owners are involved in the transaction. If a fisherman retails his catch or distributes it to local retailers, then he may require the assistance of his crewmen or other employees. For many outfit owners, these assistants are his wife and/or children. Twelve percent of the fishermen relied on their crewmen for a part of the selling activities; 10 percent relied on additional assistance beyond their crew.

Considering all aspects of the fishery except wholesale dealing, the mean gross income of a fishery outfit was $39,446. This included all money from the sale of fish and the operation of a retail fish market. The fishermen were asked what level of gross income they would consider to be a failure; the average response was 46 percent of the current gross, or $18,053.

LABOR COMPENSATION

The first claim on the gross income of the outfit is compensation of labor. Historically, the two predominant forms of compensation in the Michigan commercial fishery have been shares of the gross value of the catch, and daily or weekly wages (Milner 1874, and Arnold 1936a, b, and c). A third common form of compensation is shares of the net value of the catch (gross value minus expenses), which usually occurs on a boat where the crew consists entirely of owners.

The methods of compensation and the relative frequency of each are shown in Table 8. It is evident that the most common form of compensation is the distribution of shares. The fishermen indicated that, characteristically, gill net outfits have distributed shares while trap and pound net outfits have been likely to pay wages. The present research suggests that this association between kind of outfit and form of compensation is due to the fisherman's need to match the variability in his expenses to the potential variability in his income. Because gill nets can be fished at different locations and during much of the year, a fisherman can compensate for the variable labor expense by reducing or expanding his production activities. An impoundment net fisherman, however, must limit the variation in his labor expenses because he is restricted in his ability to vary his fishing efforts.

TABLE 8
FORMS OF COMPENSATION

Form of Compensation	Percentage
Share of gross	40.5
Share of net	21.3
Wage	34.1
Other	4.3
TOTAL	100.2

No share is allocated specifically to the owner of the boat and/or gear as such when the shares are divided. A certain percentage goes to the crewmen (which may include the owners if they work on the boat); the remaining percentage goes to the boat. Out of the boat's share the expenses are paid and the capital investment is amortized. Any remaining amount of the boat's share goes to the owner as profit. In fact, most owners pay the expenses and take the rest as profit, knowing that they must save for the eventual replacement of boat and gear.

The owner/operators were asked why they used their particular form of compensation. Of the fishermen who paid wages, 54 percent did so to make the profit available for the gear and boat if needed; 31 percent did so to secure and retain a crew. Of the fishermen who paid shares, 32 percent did this so that labor costs would match revenues. The same percentage indicated that they did so to give the crew an incentive to work harder. Sixteen percent paid shares to be fair, and 10 percent paid shares in order to secure and retain a crew. The most frequently given reason for paying wages suggests that these outfits are relatively capital intensive; the reasons most frequently given for paying shares suggests that revenue is subject to great fluctuation.

The mean wage paid per week was $182.80, with variation from $110.00 to $300.00. On the average, a crew on shares received a total of 50 percent of the gross value of the catch, each individual receiving 20 percent of the gross value. An average annual gross income of $39,000 would give a crewman a gross income of $7,800, roughly the equivalent of 43 weeks at $182.00 per week. As the average (non-owning) crewman worked 39 weeks, the crewman on shares had a larger average annual gross income than the crewman on wages. The crewman on wages had social security and withholding tax deducted from his pay, whereas it

was left up to the man on shares to pay these himself or not to pay them, as he wished. Thus, the immediate average net income of the man on shares was considerably larger than that of the man on average wages.

SUPPLEMENTAL INCOME

The income that the crewman receives from shares or wages is supplemented in several ways. Thirty-one percent of the outfits contributed to unemployment compensation, so the crew and sometimes the owners were eligible for unemployment benefits during periods when they were laid off from the fishery. Outfits which pay wages are more likely to participate in the unemployment compensation system (55 percent participated) than outfits which pay shares (19 percent participated). Eighteen percent of the fishermen indicated that they or some of their crewmen received social security or pension benefits. In addition, each crewmember took home a quantity of fish nine times per month, or about twice a week. Thus, in addition to supplying income, the fishery gave the crewman and his family the main course for nine meals per month.

The owners also kept some of their catch for home consumption at least as often as the rest of the crew (nine times a month) and perhaps more often. Some owners ate fish every day; some said they "never touch the stuff." It has already been mentioned that fish were often cooked and served on board during the workday. In addition, 9 percent of the owners traded fish to local suppliers for food and/or goods and services.

Subsistence production outside the fishery contributes significantly to a fisherman's livelihood. The households of 14 percent of the fishermen maintained a garden as a source of food; 2 percent of the fishermen farmed extensively. Twenty-eight percent hunted, but the amount of food they derived

from this source varied from a few ducks to 30 meals of fowl and game. Separately, none of these sources made a great difference, but if a fisherman combined nine fish meals per month (approximately 100 per year), 15 game meals per year, and the produce from a garden, he had supplied perhaps a sixth of his household's food for the year. In addition to supplementing their incomes with food, 29 percent of the fishermen used their manual skills to build or make additions to their houses.[13]

In addition to these non-monetary contributions to their livelihoods, 44 percent of the fishermen did some remunerated work outside the fishery, with 22 percent earning more money at their non-fishing employment than at the fishery.[14] In contrast, 54 percent of the Oregon fishermen worked outside the fishery, with 38 percent earning more money at their non-fishing jobs. Part of this difference is due to the inclusion of all crewmen in the Oregon data. The most common type of outside work was construction; the kinds of outside work and their frequency are shown in Table 9.

TABLE 9
TYPES OF WORK OUTSIDE THE FISHERY

Outside Work	Percentage
None	56.4
Construction	10.6
Service occupations	7.4
Tourist industry	6.4
Retail occupation	6.4
Real estate	4.3
Woods work or trapping	3.2
Road work	3.2
Industrial occupations	2.1
Fish dealer	1.1
TOTAL	100.1

The average amount earned from outside work was $4,038, but this figure is misleading due to one extremely high value. Without that high value, the mean outside earning was $3,010. Two percent of the fishermen indicated that outside employment enabled them to collect unemployment compensation during part of the year. In the 1973 Great Lakes Fishery Advisory Committee study, 15 percent of the fishermen's gross income came from outside the fishery. The Michigan Agricultural Statistics indicate that the average farmer works 101 days off the farm; therefore, if we assume a wage of $4.00 per hour ($32.00 per day), the average farmer was earning $3,232, or slightly more than the average fisherman.

Of the fishermen who did outside work, 24 percent held a regular, fulltime job. In these cases, fishing was done before or after work, and on weekends and vacations. Sometimes the fisherman was able to work an evening shift on an outside job and fish during the day. Twenty-two percent of those with outside work had a seasonal job that left them free to fish during a particular part of the year, often the winter. Only 25 percent of the fishermen who did other work indicated that they ever had to choose between fishing and their other job.[15]

As was noted earlier, some of the fishermen were eligible for unemployment compensation during their layup. Others received pensions from prior employment, and some had begun to draw social security benefits. Altogether, 17 percent of the fishermen derived income from one or more of these sources of transfer payments. If the transfer payments are spread over the total number of fishermen, then the average amount received was $640. Considering only those fishermen who actually received some form of transfer payment, the average amount was $3,762, ranging up to $14,400. The average amount received by most Michigan fishermen was considerably less than that received by the average Newfoundland fishermen (Faris 1972).

Just as the fishermen bring in income from outside the fishery, other members of the fishermen's households also work at jobs outside the fishery and/or receive transfer payments of their own. If this income from other members of the fisherman's family is spread over the total number of fishermen studied, the amount contributed by other members averaged $1,013. Considering the 23 percent of the households that actually received some income, the average amount was $4,486, and ranged up to $8,000.

The average gross annual income of a fishery outfit was $39,446, including all aspects of the fishery except wholesale dealing (that is, including all money from the sale of fish and the operation of a retail fish market). This provided the fishermen with an average annual take home pay of $9,604. Usually this figure included both the wage or share which they received for their labor, and whatever profit they retained from the boat's share. This compares favorably with the average realized net farm income of $7,503 per farm per year for Michigan farms in 1974.[16] If we assume that this amount is entirely a result of the fisherman's labor, and considering that the average fisherman works 2,400 hours per year, this income would be the equivalent of a wage of $3.74 per hour. This amount compares very favorably with the highest farm wage rates in 1975, earned by machine operators, of $3.09 per hour.

In the past, it was difficult for the fishermen, as self-employed individuals, to become part of the social security system. By the time of the study it had become easier, and 81 percent of the fishermen contributed to it. Most of those who did not either were already receiving benefits or did not earn enough to be required to pay.

All of these sources -- the fishery, outside employment, contributions of other members of the household, and transfer payments -- combined to give the

average fisherman a total household annual income of $15,935. Adding the value of fish consumed, game and garden produce, food and goods received for fish traded, and housing supplied, raises the figure by perhaps a thousand dollars, probably not much beyond $17,000.

SAVINGS AND DEBTS

Fishermen can store their income in two basic ways -- as savings and capital. Stores of value not connected with the fishery are "savings." These include:

Stocks

Bonds

Deposit accounts

Pensions and retirement plans

Rental property

Non-income real estate

Fishery "capital" includes items such as:[17]

House

Shed

Dock

Land associated with the house and dock

Store

Boat(s)

Nets

The distinction between these two types of stored income is useful when examining the impact of quitting or retiring from the fishery. A fisherman's savings retain their value whether he continues to fish or not, but his capital loses its use value when he leaves the fishery. This holds true even for his house, as part of its value is due to its proximity to his dock and shed. Thus it becomes less valuable to him after he stops fishing.

In addition to the capital described above, the average fisherman held $45,468 in savings; however, this figure may be misleadingly high because of a few cases with extreme values.[18] It must be kept in mind that, considering the age of many of the fishermen, these savings represent the bulk of what they will live on for the rest of their lives.

The financial position of most of the fishermen appeared to be fairly sound. The average debt owed by the fishermen for fishery goods was $1,568, or one-tenth of their mean annual household income, but ranged up to $50,000.[19] Eighteen percent of the fishermen owed debts of $1,000 or more, and 5 percent owed more than $10,000. Of those who had some outstanding debt, only 35 percent thought that their creditors would be concerned about their repayment if they were to quit fishing. To obtain a sense of how the fishermen felt about their current and prospective financial situation and standard of living, they were asked to compare their expectations with the positions in life their fathers had attained. Three-quarters of the fishermen expected to surpass or already had surpassed their fathers. They were also asked to compare their position now with their position when they began fishing, and with their position when they got married. Again, 75 percent of the fishermen said their position in life was better now than when they started or when they got married.

ECONOMIC RELATIONS WITH THE COMMUNITY

Fishermen could contribute to the economic well-being of their communities by the purchase of other inputs besides labor. These operating expenses included:

Fuel

Ice (if one does not make one's own)

Electricity

Wood for smoking fish

Coal for heat on the boat or in the shed

Boxes, paint, lumber

Other supplies

Clearly the largest operating expense after labor is fuel; the average amount spent per outfit for fuel was $1,967.[20] The average amount spent for electricity, used mostly for running the ice-making machines, was $229.

In 1973 the Great Lakes Fishery Advisory Committee estimated that the annual average operating cost for a gill net outfit was $22,500, and for a trap net outfit, $30,000. They attributed the difference entirely to the depreciation of the more expensive trap nets. More detailed information on the expenses of Michigan commercial fishing operations is available from the Fishery Economics Study, Michigan State University School of Natural Resources (Kevern, undated).

One way in which a fisherman minimizes his expenses is by doing the maintenance and repair on his boat and machinery himself. Many fishermen claimed that it was necessary for them to repair and maintain their own boat and machinery, and that paying a mechanic's charges would absorb the profit.

Their answers to the question of whether they performed any repairs themselves are shown in Table 10. If we delete those fishermen who do all of their own repair work, we can ask of the remaining fishermen whether others in their communities do the repair (Table 11). Considered together, the data in Tables 10 and 11 indicate that 32.8 percent of the fishermen purchased some or all of their repair services in their communities and that 45.7 percent of the fishermen purchased some or all of their repair services outside their communities.

TABLE 10
PROVISIONS OF OWN REPAIR SERVICE

Do you do any repair yourself?	Percentage
No	15.1
Some	51.6
All	33.3
TOTAL	100.0

TABLE 11
COMMUNITY SOURCE OF REPAIR SERVICE

Does someone else in the community do the repair?	Percentage
No	50.8
Yes, some of it	36.1
Yes, all of it	13.1
TOTAL	100.0

With respect to repair services, the three alternatives have a direct influence on the economic well-being of the fishery and the community. First, if a fisherman does his own repair, he minimizes his cash expenses. Second, if he hires a local person he may receive a discount rate (see Arensberg and Kimball 1968), and he creates income opportunities for his neighbors. Third, if he has an outside person do the repair or takes the machinery elsewhere to be fixed, he neither saves cash expenses nor provides economic opportunity for his neighbors. The fishermen were asked how much repair they did on their engines and boats, and who did the repair if they did not. Their answers are shown in Table 12.

TABLE 12
SOURCES OF REPAIR SERVICE

	Percentage
How much of the engine repair do you do?	
None	12.9
Some	35.5
Most	17.2
All	34.4
Who does the engine repair if you do not?	
Local mechanic	46.1
Out of town mechanic comes	22.6
Take it to a shop	31.3
How much of the boat repair do you do?	
None	9.8
Some	9.8
Most	18.5
All	62.0
Who does the boat repair if you do not?	
Local boatyard	37.1
Out of town boatyard	62.8

As with repair, we can look at the sources the fisherman uses for his various other supplies, and particularly at whether he obtains these supplies from local sources. Each need of the fishery creates a potential link between a fisherman and his community, thus stimulating the local economy. Ninety-eight percent of the fishermen bought their fuel locally, and most of the fishermen who purchased ice bought it locally. Fifteen percent purchased their twine from a local fish dealer. Forty-four percent of the fishermen bought their boxes locally, either from a dealer or from one of three or four wooden box companies scattered around the state. Nine percent of the fishermen bought wood locally to smoke their fish. Thirty-five percent bought a significant amount of other supplies (such as lumber, paint, and hardware) locally.

At the same time that the fisherman stimulates the local economy by his purchases of goods, supplies, and services, he contributes to local economic activity by his local sale of fish. It can be argued that sales to local restaurants earn as much good publicity for the fishery as they earn in income (see Great Lakes Fisherman 1975). Thirty percent of the fishermen sold some of their fish directly to local restaurants. Twenty-three percent reported that they sold their fish to local grocery stores and food markets.

Not only do local sales earn good publicity and contribute to the economic health of the community in which a fishery operates, but they may be ultimately more profitable for the fisherman. In the Great Lakes Fishery Advisory Committee study (1973), the fishermen indicated that "filleting, smoking and otherwise processing" their fish added an average of 29 percent to their gross income. As these forms of processing require little expense other than the fisherman's labor (which at the margin of the rest of his fishery activities has low opportunity cost), 29 percent of his gross income is significant.

Thirty-two percent of the fishermen sold at least some of their fish to a local processor, either for smoking or filleting for resale.[21] As noted before, 68 percent of the fishermen sold to a local dealer who handled the marketing of the fish; in some cases the dealer also processed the fish and operated a retail market. Twenty-four percent of the fishermen operated a retail market of their own, but this varied from sales to a small clientele at the dock or shed, to sizable retail operations employing several assistants for the processing and sales.[22]

ECONOMIC EXPECTATIONS

It has been seen how fishermen entered the industry and learned fishery skills, and what they earned. What they expected from the future -- for themselves and their outfits -- will now be examined. In 57 percent of the outfits, the fishermen had an adult son or son-in-law, 18 years old or older, who had started to fish with him; these outfits represented 83 percent of all the fishermen who had an adult son or son-in-law who could enter the fishery. In addition to these 57 percent, 18 percent had children who could grow up to be fishermen or marry fishermen. An additional 2 percent had adult sons who fished with other outfits. Except for the 15 percent of the fishermen without children, almost all could look forward to the possibility of having a potential male heir for the outfit.

In order to measure their attitudes toward fishing as an occupation and to obtain an indication of their expectations for their sons, the fishermen were asked how they felt or would feel about having a son enter the fishery. Eighty-four percent said they would be happy to have a son in the fishery, although about half of these qualified their approval with remarks about the

current regulations. Seventeen percent of the fishermen did not want a son to enter the fishery, a much lower percentage than Tunstall (1962) found for the English trawling fishery. This may be partly due to the difference in gear and the contrast between regular crewmen and licenseholders.[23]

For another measure of how comfortable the fishermen felt with the fishing lifestyle, they were asked whether their children would be better off than they were. The responses were split almost equally, with 51 percent saying "yes," and 49 percent saying "no" or "don't know." Many of the fishermen who responded "yes" qualified their response with a comment that living conditions were always improving, implying that their children's lives would improve as a result of this historical trend. Fifty-six percent of the fishermen thought that at least some of their children would attend college.

SOCIAL INTERACTION OF MICHIGAN FISHERMEN

RELATIONSHIPS WITH OTHER FISHING OUTFITS

An important aspect of the fishery is the relationships which exist between the fishing outfits. Although 41 percent of the fishermen did not discuss fishing with other fishermen, 37 percent said that they discussed new techniques and gear, and the same percentage said that they discussed fish locations and behavior with the other fishermen. Twenty-three percent discussed events in the fishery with other fishermen. Although some fishermen indicated the existence of patron-protege relationships, their discussion of fishery topics was not confined to such a relationship. Fifty-two percent of the fishermen said they did not compete with the other fishermen in any way, and 55 percent said that other fishermen were willing to share information about how much fish they had caught. Most of those who did compete with the

other fishermen explained that the competition was to catch the most fish, rather than to keep the other fisherman from catching fish.

How a fisherman related to his fellows in the industry varied greatly with the number of other fishermen near him and with his personal inclinations for sociability. On the average, a fisherman's home port community was also the home port of three other fishermen. The total number of fishing outfits in a community ranged from one to 11; the total number of fishing boats in a community ranged from one to 18, with the average being 4.7. The mean distance between a fisherman and his closest fishing neighbor was 4.8 miles, ranging from next door to 40 miles. Forty-eight percent of the fishermen indicated that more than one other fisherman lived nearby. The quality of the relationships among the fishermen was measured by the frequency with which they got together, which is shown in Table 13. When the fishermen got together, it was almost always at the dock or at their sheds if they were nearby the dock. Unlike the Newfoundland ports where almost all of the fishermen got together nearly every evening at one of the community stores (see Faris 1972), the Michigan fishermen very rarely got together away from the fishery. On a stormy

TABLE 13
FREQUENCY OF SEEING OTHER FISHERMEN

How often do you see the other fishermen?	Percentage
Daily	46.2
Two to four times per week	9.7
Weekly	12.9
Semi-monthly	5.4
Monthly	7.5
Less than monthly	12.9
Never	5.4
TOTAL	100.0

day they sometimes gathered at a restaurant, and at the end of the day they occasionally got together at the packing house; otherwise they went their separate ways.

Each fisherman was asked if it would be possible for more boats to fish out of his port (assuming that the regulations allowed boats to change ports or new outfits to enter the fishery). Sixty-nine percent said yes, and indicated that an average of eight more boats could fish out of their ports. Of the fishermen who said that it would not be possible, the reason most frequently expressed was the lack of fish. This contrasts with the situation described in many of the Newfoundland ports, where fish and space for nets were available, but no room remained for additional docks and sheds.[24] In the Michigan fishery, on the contrary, only 16 percent of the negative respondents indicated lack of shore space as a reason. If a new outfit did enter the port, most of the fishermen (73 percent) felt that it would not make any difference what gear the outfit fished; either opportunity existed for both gill and impoundment nets, or it did not exist at all.

In other fisheries, the organization of the fishermen for cooperative selling and/or purchasing is a prominent feature. The only organized cooperative in the inland United States fishery at the time of the study involved the Native American fishermen of the Red Lake Reservation in Minnesota. At times in the Michigan fishery, attempts have been made to organize a cooperative, but one had not become established at the time of the study. A cooperative marketing organization operated for a while in the Keweenaw Peninsula, but it failed after several years.[25] Six percent of the fishermen referred to this cooperative; half of them had been cooperative members. The nearest thing to a cooperative organization in the Michigan

fishery involved 5 percent of the fishermen who occasionally purchased twine jointly from Japan to obtain the lowest price, but this was an informal arrangement. Since the time of the study the Michigan Fish Producers' Association has formed a purchasing cooperative.

SOCIAL INTERACTION OUTSIDE THE FISHERY

In addition to the interaction among fishing outfits (as discussed above), an important aspect of the fishery is the relationships which exist between the fisherman and his crew. Some of the factors which might make a crewman decide to go to work for a certain owner have been considered. Now the sort of activities that might follow as a result of that decision will be examined. One such activity is working together outside the fishery. Fifteen percent of the owners worked with some or all of their crewmen in another job. For 28 percent of this group, these were regular, fulltime jobs, while fishing was a part-time, secondary occupation carried on before or after work and during vacations. For the remaining 72 percent, these were part-time jobs which were interspersed with fishing activity.

As an indication of the strength of the social and emotional relationships between an owner and his crewmen, one can look at how often the owner and crew members get together socially outside the working hours. The answers given to this question by the owners are shown in Table 14. The occasions for getting together varied from frequenting taverns or playing cards, to hunting. Each owner was also asked how often his family and the families of the crewmen got together socially; these responses are also shown in Table 14. Conclusions about the effects of crew membership on social ties or interpersonal feelings within fishing crews have to be qualified by the realization that, on the

TABLE 14
SOCIAL INTERACTION OUTSIDE THE FISHERY

	Self and Crew Get Together Socially (percentage)	Families Get Together Socially (percentage)
Not at all	43	56
Rarely	6	4
Occasionally	29	31
Frequently	22	10
TOTAL	100	101

average, almost 50 percent of the crewmen are closely related to the owner. Therefore, it is difficult to distinguish social activities that are due to kinship from social activities that are due to crew membership.

The fishermen indicated that, on the average, two other fishermen came to them for advice during a year, and they gave advice to these men. Therefore the image of a fishery composed of cooperative, mutually beneficial relationships is consistent with data showing that many fishermen rely on some help from other fishermen to find concentrations of fish.

During the previous year (1974), the average fisherman attended five meetings with other fishermen concerning the fishery. The number of meetings held that year was reported to be unusually high, so it may be more useful to think of the fishermen as attending half of the meetings which were held. The average fisherman visited seven fishermen outside his own port during the previous year, with the responses ranging from zero to 50.

MAGAZINES -- USE OF MEDIA

The Great Lakes commercial fishery is serviced primarily by two monthly magazines. The Fisherman is the oldest, and is published in Grand Haven, Michigan by a family of former fishermen.[26] The other magazine, The Great Lakes Fisherman, is published in Canada on Lake Erie, but serves both the Canadian and United States fisheries. Eighty-five percent of the fishermen subscribed to one or both of these magazines. In addition, many fishermen received national magazines dealing with fishing boats, fishing gear, and other fisheries in the United States. The fishermen relied on the two Great Lakes publications for news about events (especially new laws and rules, and the activities of the Department of Natural Resources) in this fishery. They relied on the national publications for news about developments in the other fisheries.

CONCLUSION

The results of this research give cause for both optimism and pessimism about the future of the Michigan Great Lakes commercial fishery. The adoption of marginal technological changes has not affected the scale or pattern of its organization. It is a small-scale fishery without large corporate investment in modern harvesting equipment; most fishermen are limited in the amount of gear they use. The fishery is relatively labor intensive and characterized by a low level of competition and by a seasonal pattern of mobility to exploit different areas of the Great Lakes. It is manned by people of a high average age who have tended to substitute learning through experience for formal education, often learning their skills from the preceding generation of family fishermen.

The financial position of most Michigan fishermen appears to be fairly sound. Income from the fishery is supplemented by outside employment, by contributions of other family members, and by transfer payments. As a measure of their attitudes toward fishing as an occupation and their expectations for the future of their sons, the large majority (84 percent) of the fishermen indicated that they would like to have their sons in the fishery (qualifying this with remarks about current regulations).

Since the period of this research, the Michigan commercial fishery has suffered the impacts of several additional problems. Pollution levels in Lake Michigan, especially pesticides and PCBs, have raised questions about the healthiness of eating fish and about the stability of the fish populations. The growing Native American fishery has increased the competition for the existing fish stocks. The conversion from gill nets to impoundment nets has

moved slowly, while the courts have considered the issues involved in the state regulations.

Future investigations will concern the ways in which the fishery and its members have adapted to the changing legal and biological environment of the Great Lakes. Specific questions will address the relative adaptability of large and small scale oufits, specialized and diversified operations, and different geographic areas. In assessing the effects of the ban on gill nets, we will look at the welfare both of the fishermen who leave the fishery and of those who make the conversion. Our premise is that the fishery will persevere; our concern is to learn from the adaptations that enhance that perseverance.

NOTES, PAGES 1-38

[1] Statistics on farmers, craftsmen, and laborers were computed from the 1970 Census reports.

[2] Based on Michigan males ages sixteen to sixty-four with less than fifteen years of schooling.

[3] On the other hand, the Michigan Department of Natural Resources revised the rules in the late 1960s to make it more difficult to fish more than 50 miles from one's port, so this aspect of career patterns may be declining.

[4] One might suspect that a belief in the significance of luck says more about the believer than about other fishermen. This suspicion would be supported by a comparison between believers and non-believers, for success in the fishery. As compared with non-believers, the outfits of believers have on the average $13,000 lower gross income, and believers have $5,700 lower take-home pay from the fishery on the average. One should note, however, that these are not necessarily indications of success and lack thereof, but may be indications only of the size of the operation.

[5] See Stiles (1972) for a description of some of the negative consequences that followed the introduction of radios in the Newfoundland fishery.

[6] For a review of the research on the efficiency differential, see Pycha (1962).

[7] For additional discussion of contrasting strategies of fishing, see Dickie (1970), Dean (undated), and Andersen (1972).

[8] One might suspect that there were reasons for not admitting one's knowledge of the grounds, but no such reasons were apparent. Further, the interviews seemed to elicit honest responses (see Harris 1978: 154-174). No data were gathered on which fishermen were reported to have such knowledge.

[9] Burroughs (1960) reported that the Chippewa fishermen dipped their nets in a decoction of calamus root (Acorus calamus) to attract fish.

[10] England and Peters (1971) indicated a figure of 30 percent for fish that are no longer saleable, as a percentage of all fish taken, but it is not clear where they obtained these data.

[11] For example, Malaya (Firth 1966), Thailand (Fraser 1960 and 1966), and floating gill nets (Holdsworth 1887).

[12] Although fishermen are eligible for financial assistance under the Farm Credit System (Prochaska 1973), none reported using this opportunity.

[13] By way of contrast, in 1974 the average Michigan farm obtained $2,100 in non-money income, considerably more than the average fisherman.

[14] Although 22 percent of all the fishermen (owners) earned more income outside the fishery than from the fishery, this does not indicate that fishing was a secondary occupation for those 22 percent. A better indicator of primary occupation is the combination of time spent and amount of income earned. Thus, 10 percent of the fishermen reported holding a full-time job outside the fishery, and 9 percent of the fishermen reported earning more money at a fulltime job than they earned at fishing. It is for this latter group of 9 percent that fishing was a secondary occupation.

[15] Similarly, Dyck et al. (1962) found that Wisconsin farmers were able to fit their farming activities into the hours left from their other work.

[16] Norr and Norr (1974) have suggested that fishery incomes can be expected to be higher than agricultural incomes because greater teamwork and closer coordination of tasks are required, because the workplace is more sharply separated from the home, and because the exposure to physical risk is greater.

[17] No specific data on the amount of working capital were gathered, but the amount would probably not be large, certainly in comparison with agriculture. The lag between shipments of fish and payments is not more than a week, whereas the lag between labor and sales in farming can be a season or longer.

[18] Because the identity of the wealthiest fishermen is commonly known by the other fishermen, recalculating mean savings without these extreme values would reveal the wealth of these individual fishermen. Thus, the re-calculated figure will not be presented. The median income of all the fishermen is approximately $10,000.

[19] For additional discussion of the use of financial loans by fishermen, see Bird (1972).

[20] See Cato (1973) and Cato and Veal (1975) for a discussion of the fuel tax exemption for fishermen.

[21] It had been anticipated that there would be a significant amount of sales of fish between fishermen, in order to fulfill a contract or to take advantage of a high price. Only 4 percent of the fishermen reported selling to other fishermen. The expectation proved false because fishermen who sell directly to a wholesaler sell only what they expect to bring in on that day, and a fisherman who sells to a dealer can get rid of his entire catch. One can speculate that there is an implicit norm against arbitrage on the part of a fisherman. In contrast, a dealer who did not pass on a high price to the fishermen would be spoken ill of, but his behavior would be accepted as part of his role as a dealer.

[22] For a further discussion of the relative merits of management practices and marketing activities as strategies for improving the profitability of a fishing operation, see Smith (1975a, 1975b).

[23] Most of Tunstall's interviewees were crewmen on the trawlers, whereas the Michigan fishermen interviewed were largely owner/operators of their boats. Tunstall noted that when the efforts of the English fishermen to discourage their sons were unavailing, the fishermen retreated to admonishing them to raise themselves to the level of skipper or captain.

[24] See Faris (1972) and Firestone (1967).

[25] See Moore (1975). When the cooperative was liquidated the members were left as joint owners of a refrigerated warehouse and building, which they now rent to the local dealer.

[26] It is a pleasant irony that, by virtue of its age, it has held the name of The Fisherman, and thus forced the magazines of larger, more prosperous fisheries to call themselves The Pacific Fisherman, The Southern Fisherman, etc.

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APPENDIX A

INTERVIEW SCHEDULE

How many years have you fished?

How old are you? Where were you born? How long have you lived here?

Why did you move -- start fishing, or change fishing port? Why here?

If you switched to fishing from another occupation,
how did you come to take up full time fishing?

Since you started fishing has there been a year in which you did not fish?
When and why?

Did you fish during summers while in school?

Are you married? Do you have children? Their ages?

Their occupations/their spouses' occupations?

How many years of school did you complete? Any high school? Any college?

What did you do after you finished/quit high school? Any military service?

Did you learn anything in the military that helped you in the fishing?

Did you learn anything in school that helped you in the fishing
(shop, business)?

Obtain career history/jobs. Obtain all occasions of fishing.

What was your father's occupation? Was he ever a fisherman?
Part-time/full time? How long?

Were any of your uncles fishermen?

Who was the first fisherman in your family?
Did he have any brothers or sons in the fishery?

Trace the genealogy from the first fisherman,
and the inheritance of boats and gear.

When you started fishing, did you inherit any of the gear that you used?

Was any given to you? Where and when did you buy it?

During the years that you have been fishing, have you ever inherited any of your gear? Was any ever given to you?

From whom did you learn how to fish? When did you learn? Where? How long?

Did you learn from any other fishermen? Did you work for any other fishermen?

Did you learn certain places to fish? Certain places not to fish -- why?

Did you learn special techniques of making gear? What?
(how far floats apart, how far knots apart, how tight twine)

Did you learn special techniques of fishing the gear?

Did you ever fish any other areas? When? How long?

Where did you stay while you were fishing there? Why choose there?

Do any of your relatives fish? Cousins? Brothers? Sons? In-laws? Others?

Does (do) your son(s) fish with you?

(If all children already settled in occupation)
Do any of your grandchildren expect to become fishermen?
Would you like to see them become fishermen?
Do you expect to pass any of your gear on to them?

(If no sons fishermen) Would you have liked your sons to become fishermen?

(If sons fishermen) Are you happy that your sons are fishermen?
Did you help set him (them) up with gear?

(If some children not settled in occupation)
Do any of your children expect to become fishermen?
Would you like to see them become fishermen?
Do you expect to pass your gear on to him? If not, why not?

Have your children gone (do you expect your children to go) to college?

Do you expect that your children will be better off than you are?

What size boat do you have? Length? Tonnage (carrying capacity)?
What kind of boat is it?

Wood/steel/steeled over (partially or entirely)? Age? Where did you get it?
Value? Cost? Name? Do you have any other boats?

What kind of engine does it have? What power or size? Where did you get it?
Age? Value? Cost?

What equipment do you have for lifting your nets? What size?
Chain/hydraulic/air? Gas engine/main engine? Where did you get it?

What equipment do you have for setting your nets? Size? Where did you get it?
Do you have any equipment for refrigeration on board? Where did you get it?
Capacity?

Do you have an ice machine on shore? What capacity?

Do you take ice out with you when you go? Where do you get it?
How much do you take?

What electronic equipment do you have on your boat? Cost?
(depth finder, recorder, radio, radar, automatic pilot)

What do you use these for? Safety/production?

What kind of net do you use? What size mesh is it? What type of twine?

What size is the net?
How many nets do you have, or what total length of net do you own of each type?

Do you treat your net? How often? Who does it? Do you dye it? How often?

Who does it? What color? Why? Who takes care of the net? Who repairs it?

When do you do the repairs?

Do you build your own nets?
Where do you get the nets or the materials for the nets?

Where do you get twine, leads, floats? How much do they cost?

Where do you buy the rest of your gear?

Do you do any research or contract fishing for the DNR or other agency?
What kind? What arrangements? For whom?

How many other men do you regularly fish with? Names?
How often do you fish with them? How old are they? Are they married?
Do they have families? What periods are they hired for?
How long have they worked for you?
Do any of these men own part of the gear or the boat? Jointly or individually?
Does someone who doesn't fish with you own part of the gear or boat?

Do any of these persons live with you or board with you,
part of the time or all of the time? Live on your land?
Live in another building of yours?

Do you supply food on the boat or when working on shore?

Is any of these persons a relative of yours?

Is any of these persons a neighbor of yours?

In addition to going out with you, what other fishing jobs do they help with?

Who packs the fish? Who mends the nets? Who builds new nets?
Who manages the selling?

Who keeps the fishing records? Who keeps the business accounts?
Who manages the operations?

What other work do they do to earn their living? Fishing with another group?
Other than fishing?

What other work outside fishing do you do with them, if any?

Do you see them often socially?
What social activities other than work do you do with them?
(visiting, parties, going out, dances, travel, hunting, sport fishing,
cards, drinking, etc.)

Do any of the members of your family or household help with the fishing?

Do any members of the families or households of your crew help with the fishing?

What activities other than fishing do your families do together?
(probe with above list)

How are decisions about fishing made in your operation?
Whether to go out or not? Where to set? When to haul?
Where to sell? Whether to move nets? Other?
Is there much discussion of any of these decisions? Which ones?
Are there things you disagree about? What issues?

Are the men in your crew paid in shares or wages? What wages?
What is the cost for the shares? How are the shares allocated?
Do the men who own part of the gear get a share for it?
Why do you pay in shares or wages?

Do you or any of the crew receive unemployment compensation during the winter?
Receive social security or pension? Receive welfare assistance?

Do you or any of the crew keep any of the fish for eating? About how often?

What other personnel are involved in the fishing? How are they paid?
How much? What amount of time do they work?

Would it make any problem if someone in the crew was not a relative of yours?
Came from outside the community? How would it work out?
What problems would it cause?

Do you or any of your household farm? (define household) Hunt?
Fish for eating?

Do you buy all of the rest of your food? Do you ever trade fish for food?
Do you ever trade fish for other goods or services?

Do you own your house or rent?
Did you buy your house, build it, or have it built?

If fisherman rents and boards, ask what he pays and what he contributes,
if anything.

Do you obtain income from other sources than fishing? What?
(timber work, road construction, snow plowing, farming,
sell bait minnows, other)
When do you do these jobs? For how long?

Does the time you spend at these jobs vary from year to year? Why and how?

Do you ever have to choose between fishing and time or overtime
on your other job?

About how much income do you receive outside of fishing?

Do other members of your household work? About how much income do they earn?
Does all of this go into the household?

Do you do anything with your boat other than fish?

In an average year recently, or last year, what was the gross income of your
fishery operation? What level would you regard as a failure? A success?

Of that average gross income, what would be your take home pay
from the fishery operation?

Do you pay into social security or a pension fund for yourself?

What was the total income of your household last year?

How much do you have in savings? In stocks or bonds?

Do you own land? How much? What kind?
Do you own anything other than house, land, boat, gear? What? (get details)
Value? (if not estimate)

Do you owe money to any person or business?
For household goods or productions expenses? How much?

If you were to cease fishing, would your creditors be concerned?

Do you expect to be better off than your father was?

Is your financial position better now than when you started fishing?
Than when you got married?

If any of the members of your crew eat with you or live with you,
do they contribute any of their income toward these expenses? How much?

Do you repair your boat and engine yourself?
Does someone in the community do it?
What repair and maintenance on the engine can you do? What can't you do?
Who does the work if you do not? Can you repair most breakdowns? Some?
What repair and maintenance on the boat can you do? What can't you do?
Who does the work if you do not?
(probe for work done recently on the engine or boat -- who, cost?)

Do you buy diesel fuel (gasoline) in your community? Ice? Twine? Knives?
Salt? Wood? Paper? Aprons? Other supplies?

How much diesel fuel (gasoline) do you consume in a year? Electricity?
Man days of labor?

Do you sell your fish to anyone in the community? Restaurants? Food markets?
Other fishermen? Processors? Is it processed here?
Do you retail fish yourself?

Does anyone in the community make or repair nets? Do you ever hire them?

How many other boats fish out of this community? Whose are they?
If it were not for the current DNR regulations,
would there be opportunity for more to fish out of here
(enough space to fish and dock, enough fish)? How many?
Would it matter what kind of gear they fished?

How far away from you does the nearest fisherman live? His name?
Do any other fishermen live near? Their names?

How often do you see these other fishermen? When? Where?

Is there a place (store, club, bar) where you get together? About how often?

Are there any women fishermen? Who and where/why not?

Is the dock privately owned or publicly owned? How is the dock kept up?
Do you own your dock, shed, land? What would be the value of the property?
If rent, how much rent do you pay? What sort of harbor service is there?

Is there any sort of ice service or subsidy here?
Are there fish or boat inspectors here?
How often does your boat get inspected?
How often do your fish get inspected?

Do you get any financial assistance when you buy a new boat or gear?
What kind? Where from? (disaster loan, government subsidy, NMFS program, etc.)
How did you learn about this assistance?

Is insurance available on your boat or gear? Do you carry any?
How much does it cost/would it cost? What does it cover/would it cover?

Is there any public space or equipment for drying or working on nets?
For working on boats?

Are you a member of a fishermen's cooperative? Is there one?
Does it buy and sell fish? Buy supplies? What? Why isn't there one?
Was there ever one? If so, what happened to it? Where you a member of it?

How many close friends do you have here in the community?

About how many people do you talk to in a week?

When was the most recent bad accident or fatal disaster in the fishing here?
Who was involved? What happened?

On any particular day, how do you decide where to set the nets?

Are different areas allotted to different boats?

Do you claim certain spots or locations for your own?
How do you mark your claim?

Are there good locations you know of that you keep secret?

Is it difficult to find profitable grounds? Are they common knowledge?
How do you discover good spots?

How do you locate a specific spot when you are going out?

Do you keep a record of your catches at the different spots?

Do you try to find out where the fish are at a certain time,
or do you just head for a certain spot?

How do you locate fish? Do you try out different grounds?

Do you try for different species? At the same time or at different times?
When? With the same gear or with different gear? What?

Is there anything that you can do to attract fish?
To modify the environment -- wrecks, trees, logs?

What length of net (how many nets) do you have set at any one time?
How often do you lift them? Why?
Does setting more nets improve the catch per net?
Is there a time of the year when you set more than usual? When and why?
Is there a time of the year when you set less (fewer) than usual?
When and why? Is there a time of the year when you lay up? When and why?
For how long? What do you do during that time?
(obtain a detailed picture of the fisherman's annual sequence of activities)

How many days do you work per week? On the lake or on the shore?
How many hours do you work per day? On the lake or on the shore?

Do you need to know the currents and the wind to set your nets?

How detailed is your knowledge of the grounds?

Do you have any special knack for icing the fish? Making the net?
Setting the net? Lifting the net?

Are some fishermen more skilled than others? In what ways?
(knowledge of grounds, building nets, setting nets, gear upkeep)

Are some fishermen luckier than others?

How did you learn the special skills and tricks you know? From whom?

Do you discuss fishing technology with other fishermen?
New gear and apparatus? Innovations? Events? Behavior of fish? Locations?
Markets? Prices?

Are there ways in which you compete with the other fishermen? For fish?
For price? For quality? For markets?

Do you know how much fish other fishermen catch? Do they tell you?
Does the dealer tell you? Does the trucker?

How have you financed your boat and gear?
During the years that you have been fishing have you ever gotten
a loan from a bank or a supplier, or an advance from a dealer?
Could you get a loan now if you needed one?

Where do you sell your catch?
What is the average price you receive for each species?
How much does the price vary over the season?
How much has the price varied over the years?
How closely do you know the price in advance?
Do you ever stop fishing because the price goes too low?
How often does this happen/ if not why not?

Do you receive credit from a store or company during the fishing season for
your supplies (fuel, ice, parts, nets, twine, etc.)?

Do you receive credit from a store or company during the fishing season
for your household supplies?

What do you do if the catch is not enough to pay the bill you have accumulated?
If a merchant gives you credit, does he do other services for you?

Could you buy your supplies from another place (other than that merchant)?

How do you pay the merchants from whom you buy your supplies and household goods?

What does the person who buys your fish do with them?

Do you process any fish yourself? How? How many? Who does the processing?

Do you buy fish from other fishermen? How much? What kind? From whom? How do you transport them? What do you do with them?

Does the person who buys your fish consider different qualities of fish?

What kinds of fish do you catch?

Could you catch other species? Underutilized species?
What market exists for these?
Would the establishment of a processing plant make it possible for you to market them?
What prices would you need to get to fish for them?

What do you do to keep up the quality of the fish until you bring them in?

(If fisherman owns a fish market, obtain separate data on fishing outfit and market.) How many pounds of fish did you catch last year (for each species)?

How much fish did you sell locally fresh last year (by species)?

How much fish did you sell for processing locally last year (by species)?

How much fish did you sell for processing away last year (by species)?

How much fish did you consume yourself last year (by species)?

Is there a large city where you go for shopping or for entertainment? What? How often?

Do you go to many meetings or conferences about fishing?
How many did you go to last year?

Do you visit any other fishermen outside this area?
How many did you visit last year?

Do you have any contact with people studying fish and fishing?

Do you have any contact with the Great Lakes Fishery Commission?

Do you receive any magazines or journals about fishing? Which ones?
Do you receive any bulletins about fishing techniques or gear? What?
What things do you learn from reading these publications? (probe for examples)

About how much time each year do you spend away from this community? Where? What doing?

Have you ever used any other gear then gill nets?
Have you ever used trap or pound nets?

Would you consider switching to another type of gear -- seines, trawl?
Would you consider migrating to another location to fish?
Would you consider relocating and being trained in the use of new type of gear?

Is there any place where you could go to learn more about the fishing?
About trap nets or pound nets in particular?

Do you belong to the Michigan Fish Producers' Association?
Do you attend any of its meetings?

If you were having a problem fishing, is there someone you could talk to
for advice? DNR? MSU? Have they been helpful? Is there anyone else?

Do many fishermen come to you for advice? About how many last year?

Who is the most respected/admired/successful fisherman around here? Second?
Third?

Are you familiar with the use of trap nets or pound nets?
Where did you learn about them?

Do you plan to convert to trap nets or pound nets?
If not/so, what factors influenced your decision?
(probe gradually with alternatives)

What size net will you get? How many?

Will you use any other gear in addition?

Would/will there be alternative employment available to you
if you did/do not convert? What? Where?

If you quit fishing, do you think that your acquaintances would/will
have less regard for you? Old acquaintances? New acquaintances?
Do you think that your standing in the community would/will change?

Do you think that the trap or pound nets would/will enable you to get farther
ahead in life than the gill nets would have?

Do you think that trap or pound nets would/will make your work faster
or easier then gill nets?

Which gear is riskier, trap and pound nets or gill nets?
Riskier for the boat and gear? Riskier for yourself?

Which gear, trap and pound nets or gill nets, will allow you to fish more often?
Will catch more fish? Will catch better quality fish? Will make more money?

If you cease fishing do you think you will be able to sell your boat and gear?
What will you do with it?

If you convert, can you convert the boat?

Will/would you be able to use your knowledge and experience from gill nets in setting trap nets or pound nets?

What would/will you do if you did/do not convert?
How would/will you find a job? What would/will you live on?

If you did/do convert, how much would/do you expect to make the first year?
How much fish would/do you expect to catch?
If lower than present, how would/will you compensate to balance your budget?
Who would/will you fish with? How would/will you pay them?
Where would/will you fish? How often would/will you lift the nets?
What species would/will you take? Where would/will you sell them?
Would/will you process any? How many men would/will you need in the crew?

If you did/do not convert, what would/do you expect to do?
Where would/will you live? Would/will your economic position improve?
Would/will some of your relationships with people in the community change?
Which? How? If you quit fishing, would/will you lose friends?
Would/will people like you less? Be less friendly toward you?

Have you talked with other fishermen about converting to trap or pound nets?
How have they influenced you?

Do you know any other fishermen who are converting? How many? Quitting?
How many?

Do you expect that converting to trap or pound nets would/will make a difference in whom you fish with? In the ways you work together?
In the other work you do? In the way the shares/wages are determined?
In the amount of time spent fishing?
How do you think the other members of the crew would/will feel about converting?

If you did/do convert, do you think that one form of organization (corporation, partnership, crowd, individual)
would/will make it easier for you to adopt the trap or pound nets?
Some type of supplemental income arrangements?

When they fish trap or pound nets, do they usually pay wages or shares? Why?
If you did/do convert, which would/will you pay? Why?

Are you more likely to have a really bad year with gill nets or with trap nets or pound nets? Why? In considering conversion as opposed to quitting, did the possibility of a really bad year occur to you?
How do you think you would handle it if it occurred?

What do you think the DNR is trying to accomplish with the transition to trap and pound nets? Any ecological benefits?

How much contact do you have with personnel from the Department of Natural Resources? On what topics? Are they any help?

Have any of the DNR personnel talked to you about conversion?
What have they said? Was it helpful?
Have they talked about changes in the organization of your operation?
Have they talked about other fishermen who have converted or are converting, and the changes they made? How many times have you talked with them?

Would you classify yourself as belonging to the middle class or to the working class?

Would you classify yourself as a Democrat or a Republican?

Would you classify your political opinions as generally liberal or generally conservative?

What are your feelings about programs for government assistance to people? (examples, if requested -- medicare, welfare, social security, ADC)

What are your feelings about government controls on the work people do? (examples, if requested -- safety regulations, environmental controls, wage regulations, rules on how a job can be done)

How often do you watch the news on television? Listen to it on the radio?

What newspapers do you receive? What magazines?

Do you think that a person should be able to get ahead on his own?

About how many hours a week do you watch television? Listen to the radio?

Do you know of any situations where the government is intervening to try and protect some natural resource?

What is your religious preference?