An Economic Study of the Processing and Marketing of Montana Commercial Fisheries Products

Bureau of Commercial Fisheries
Project Number 1-45-R
Authorized by Commercial Fisheries Research and Development Act
of 1964

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INTRODUCTION

Preliminary results of current Montana Fish and Game Department research indicate a substantial supply of fish in the state for commerical markets. Some of the major species included in these estimates are goldeye, carp, and buffalofish, and other miscellaneous species, such as suckers, sheepshead, catfish, and bullhead. Harvesting these fish appears to present no unusual difficulties other than ice conditions during the winter months.

Before fish census data now being gathered by the Montana Fish and Game Department can be put to use in expanded commercial fishing operations, a knowledge of fish handling, processing, and marketing, as well as the institutions involved, and their costs must be obtained. Fishing operators and resource management personnel need as much knowledge of these subjects as possible to make rational decisions concerning what species to harvest and market, and how, when, and where to market.

In years past, several individuals have attempted to harvest Montana commercial fish, but with the exception of three operators currently engaged in fishing, all have failed in their efforts. While catching fish was comparatively simple, disposition of the catch at prices sufficiently high to permit survival of the enterprise proved to be impossible.

Incompetence has also played a part in the failure of earlier efforts. One individual, bemused by a school of carp in a shallow bay, obtained a commercial fishing permit, bought nets and other equipment, and caught a boat-load of fish. Only after the fish were ashore in the August sun did he realize that he had made no provision for disposal of his catch. If the social and economic costs of such failures are to be minimized and the prospects for a successful Montana fishing industry improved, a considerable amount of information is needed by fishermen, resource managers, and prospective processors and handlers. The purpose of this research was to provide such needed information.

Study Objectives

1. To identify existing markets and marketing systems for selected classes of commercial fish.
2. To determine the costs and requirements associated with the utilization of these markets and marketing systems.
3. To determine the competitive position of Montana fisheries in relation to present and future demand.
4. To identify possible alternative products or uses for the commerical fishery resource.
5. To determine the economic and technical feasibility of producing selected products by various methods.
6. To estimate future demand trends for selected commercial fishery products.

Procedures

Fisheries and resource management personnel in Montana and wholesalers and retailers in Chicago and Los Angeles were the principle sources interviewed to obtain data on marketing channels, institutions, and requirements, and to determine Montana's competitive position as a producer of commercial fish. Library sources were consulted to establish past and present marketings of selected species of commercial fish and to aid in projecting future demand.

Field and library data were analyzed to identify alternative uses of fish products for human consumption, animal nutrition, and industrial purposes. Those products showing promise were studied further to determine the technical and economic feasibility of production. Aspects of economic size of operations, cost and availability of necessary equipment and facilities, and processing techniques were studied to determine technical feasibility. Population and income data prices of fish and competing products, and income and other economic data were used to determine economic feasibility at present and in the future.

The general working hypothesis held throughout the study was that Montana has a valuable and largely untapped asset in its fishery resource, and that this asset could be put to productive use if only the right combination of product, process, and marketing were identified and employed. Following this approach, each fish product or use was investigated until sufficient evidence was accumulated to show whether or not it is technically and economically feasible in Montana at this time.

Montana Fisheries Potential

Commercial fishing activities in Montana are limited to four man-made reservoirs east of the Continental Divide. These lakes and their surface areas are shown in Table 1.

Table 1

MONTANA LAKES SUPPORTING COMMERCIAL FISHERIES

Lake	Surface Area (Acres)
Canyon Ferry	35,200
Fort Peck	245,000
Lake Helena	2,100
Nelson	4,560
Total area	286,860

Source: The Montana Almanac, 1959-60, p. 38, Bureau of Business and Economic Research, University of Montana, Missoula.

The lakes contain a wide variety of both game fish and commercial species. Fort Peck Reservoir has the largest variety with the twenty species shown in Table 2. The Montana species considered to have commercial value because of their numbers and consumer demand are carp, buffalofish, and goldeye. Individual members of other species may be included in fish sales, but they are of no economic significance.

Game fish, as defined by Montana law, are "all species of the family Salmonidae (chars, trout, salmon, grayling, and whitefish); all species of the genus stizostedion (sand pike, or sauger, and walleyed pike or yellow pikeperch); all species of the genus esox (northern pike, pickerel, and

Table 2

FISH SPECIES FOUND IN FORT PECK RESERVOIR

Sauger	Carp
Yellow Pikeperch (Walleye)	Freshwater Drum
Yellow Perch	Paddlefish
Goldeye (Mooneye)	Sucker (Several species)
Trout (Rainbow & Brown)	Flathead Chub
Lake Trout	Black Bullhead
Kakanee	Channel Catfish
Shovelnose Sturgeon	Largemouth Black Bass
Burbot	Shortnose Gar
Black Crappie	Buffalofish

Source: A Three Year Fishery Investigation, Fort Peck Reservoir, Montana, 1948-1950, United States Department of the Interior, Fish and Wildlife Service, p. 23.

muskellunge); all species of the genus micropeterus (bass); and all species of the genus polyodon (paddlefish)."[1] Game fish may not be caught or sold by commercial fisherman.

There are practically no restrictions on entrance into Montana commercial fishing. Licenses are free to anyone who has not had a license revoked in another state and has some way of disposing of the fish caught. Nominal fees are charged for the catch: 5 percent of net receipts for goldeye and catfish; $2.00 per ton for carp, white carp, suckers, and sheepshead; and $5.00 per ton for buffalofish. There are no restrictions on the amount that can be caught. Considering the profitability of fishing operations in Montana, there appears to be little chance that the number of participants will become excessive or that overfishing will occur, at least to the de-

1 Montana Fish and Game Laws, Revised for years 1965-1967, State Fish and Game Department, Helena, Montana, p. 34.

gree necessary to exacerbate current conditions. However, if market prices should rise, or technology improve enough to increase profits substantially, a reassessment of regulations may be in order if the fishermen are to remain economically viable. The state's interest in doing this is twofold: one, to avoid the social and economic waste of needless failures, which would more likely occur in the absence of adequate regulation; and, secondly, to keep at least a few participating in an industry which performs a fairly valuable service to the state--that of trash-fish removal--and which does generate at least a modicum of income.

Preliminary estimates of sustained yield possibilities for several commercial species have been made by Montana Fish and Game Department biologists for Fort Peck Reservoir. These estimates are shown in Table 3. Estimates for the three smaller impoundments are not available, but experience has shown that Nelson Reservoir can be fished out easily in one season. The same is certainly true for very small Lake Helena and perhaps true for Canyon Ferry.

Table 3

ESTIMATED RANGE OF SUSTAINED ANNUAL YIELD FROM FORT PECK RESERVOIR

Species	Minimum (Pounds)	Maximum (Pounds)
Buffalofish	1,250,000	2,500,000
Carp	3,750,000	5,000,000
Goldeye	500,000	1,000,000
Suckers	500,000	500,000
Totals	6,000,000	9,000,000

Source: Robert Needham, Biologist, Montana Fish and Game Department.

The concept of sustained yield, however, is somewhat contradictory when applied to commerical species in Montana. These are fish that usually are considered a nuisance and rivals of the sport fishes for food. Because of the importance of sport fishing in the state, both as a tourist attraction and as a source of recreation for residents, some would consider the complete removal of such species as carp to be desirable. Such removal can be accomplished by draining or poisoning smaller lakes and ponds or, in large bodies of water, by seining, trapping or drawing-down of reservoirs.

Removal programs, the most frequent alternative to commercial fishing, can be expensive when accomplished by state crews. State crews in Nebraska removed 553,000 pounds of rough fish in 1963 at the cost of 4.9 cents per pound. Of that total, 342,000 pounds were sold at 1.75 cents per pound. The net cost of removal was 3.1 cents per pound.[2] By contrast, Montana received commercial fishing fees of $1,168.72 on 675,663 pounds of rough fish sold by commercial fisheries in 1966. Using the Nebraska experience as a guide, removal of this quantity of fish by state crews would have required a net expenditure of $20,275, without seriously touching the breeding stock. Since complete removal of rough fish is either impractical or prohibitively expensive in many lakes, the Montana Fish and Game Department has chosen to control rough fish numbers by commercial fishing rather than to seek complete removal.

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2 John K. Sullivan, Some Economic Considerations Involved in Rough Fish Removal, paper presented at the 27th Midwest Fish and Wildlife Conference, December 7, 1965, Lansing, Michigan.

Fishing Ventures

State Fish and Game Department records indicate that commercial fishing was begun in Montana in 1954. Two men from Oregon, working in partnership, fished Fort Peck Reservoir from 1954 to 1956. Although they caught and sold some fish, using seining equipment, the venture was unsuccessful and the partners split up and stopped fishing. A second enterprise, headed by a Minnesotan, began seining in Fort Peck in 1956 and went out of business in 1957.

A native of the Fort Peck area attempted the use of fish traps during 1957 and 1958. Although he sold some fish to the Stoller Fish Company of Spirit Lake, Iowa, and some to a nearby Hutterite community, he too was unsuccessful.

The fourth attempt, made in 1958, survived, and this enterprise is one of those currently operating in the state. With the aid of a large family of sons, this fisherman has been successful and has built a processing house in Lewistown, Montana.

During 1966 there were two commercial fishing enterprises licensed in Montana. These enterprises do not operate exclusively in Montana, but sometimes move into North Dakota and Washington when fishing in those states appears more profitable. In 1967 a third enterprise began operations in the state. Total catch and receipts by species are shown in Table 4. Most of the carp and buffalofish were shipped west to California, Idaho and Washington. Most of the goldeye were shipped to buyers in Winnipeg, Canada, where they are smoked and considerd a great delicacy, selling at prices from $1.50 per pound to $1.95 per pound at retail and $3.50 per plate and higher in restaurants.

Table 4

COMMERCIAL SALES OF MONTANA FISH 1963-1968

Year	Species	Pounds	Value
1963	Buffalofish	218,000	$27,000
	Carp[1]	2,000	-------
	Catfish & Bullheads	13,000	3,000
	Quillback	33,000	2,000
	Sheepshead[1]	1,000	-------
	Suckers[1]	1,000	-------
	Total	268,000	$32,000
1964	Buffalofish	121,000	$13,000
	Carp	110,000	2,000
	Catfish & Bullheads	4,000	1,000
	Sheepshead[1]	1,000	-------
	Suckers[1]	1,000	-------
	Total	237,000	$16,000
1965	Buffalofish	168,000	$24,000
	Carp	173,000	4,000
	Catfish & Bullheads	12,000	4,000
	Goldeye[1] (Mooneye)	-------	-------
	Sheepshead	1,000	-------
	Suckers[1]	-------	-------
	Total	354,000	$32,000

Year	Species	Pounds	Price Per Pound	Value
1966	Buffalofish	196,470	---------	$32,535
	Carp	447,450	---------	19,373
	Catfish	6,748	---------	2,024
	Sheepshead	1,325	---------	-------
	Goldeye	18,650	---------	4,035
	Suckers	5,050	---------	-------
	Total	675,663		$50,780
1967	Buffalofish	262,615	20¢	$52,523
	Carp	927,975	2¢	18,560
	Catfish	7,653	30¢	2,296
	Sheepshead[1]	3,210	2¢	-------
	Goldeye	62,856	25¢	15,613
	Suckers[1]	10,935	2¢	-------
	Total	1,275,244		$90,000

[1]Less than 500 pounds or $500.

Source: 1963-1965 Fishery Statistics of the United States, United States Department of the Interior, Fish and Wildlife Service, Bureau of Commercial Fisheries, Washington, D. C.; 1966-67, Montana Fish and Game Department, Helena, Montana.

CHAPTER II

DEMAND FOR EDIBLE FISHERY PRODUCTS

Abundant information on the demand for fishery products is presented in the many publications of the Bureau of Commercial Fisheries. Demand in this sense is a record of quantities purchased at current price levels. However, there is so much data covering so many years that a reader is hard pressed to come to useful conclusions from it. In order to make it immediately useful for one interested in Montana fisheries, the Bureau's data was combined with data from other sources, organized, and then examined with Montana conditions in mind.

World Demand

At a time when the world population is growing rapidly, when starvation threatens in several areas, and when the American conscience is troubled by plenty among such evident human suffering, it is easy to see in Montana's fish a source of food for some of the world's hungry. Table 5 shows United Nations estimates for a world population of over four billion people by 1980. Naturally, since effective demand requires not only people, but purchasing power, few foreign sales of Montana fish can be expected in the absence of government subsidies.

From 1950 to 1965 United States imports of edible fishery products has doubled from 640 million pounds to 1,300 million pounds. United States exports of fishery products have fallen from 122 million pounds to 96 million pounds in the same period. Far from feeding a hungry world, the United States is being supplied seafood by that world. At a time when our maritime

fisheries, with the abundance of the sea to draw upon, cannot compete successfully for world markets, it seems unlikely that fisheries located on small, relatively unproductive impoundments far from population centers can do so.

Table 5

WORLD POPULATION ESTIMATES

Year	Population
1920	1,857,892,000
1930	2,068,629,000
1940	2,295,033,000
1950	2,515,425,000
1960	2,998,180,000
1965	3,280,522,000
1970	3,591,773,000
1980	4,330,037,000

Source: World Population Prospects, Department of Economic and Social Affairs, Population Studies, No. 41, United Nations; New York, 1966, pp. 133-134.

United States Demand

The demand for fishery products, like most consumer nondurables, is closely related to the level of personal income, the prices of fish and competing products, the size of the population, and consumer tastes and preferences.

Income and Price Effects

Although fish consumption measured in pounds per person per year has remained stable for many years, fluctuating about an average of 10.7 pounds per year as shown in Table 6, income and price do have minor effects upon demand.

Brandow estimates that the income elasticity of demand for fish is .42. That is, an increase in per capita real income of one percent will result in increased consumption of fish products of .42 percent.[3]

On the other hand, fish in general, along with many other food items, display an inelastic response to changes in price..."demand for fish appears to be inelastic in terms of price in most instances, at least in the short run; within the usual range of prices, a moderate price change of, say, 10 percent in the price of fillets, will not induce a proportionate or more than proportionate (opposite) change in consumer expenditures for the product."[4]

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3 G. E. Brandow, Interrelations Among Demands for Farm Products and Implications for Control of Market Supply, Pennsylvania State University Agricultural Experiment Station; University Park, Pennsylvania; p. 17.

4 Harold C. Frick, Economic Aspects of the Great Lakes Fisheries of Ontario, Fisheries Research Board of Canada, Ottowa, 1965, p. 30.

Table 6

PER CAPITA CONSUMPTION
OF COMMERCIALLY CAUGHT FISH

Year	Per Capita Consumption (Pounds)	Year	Per Capita Consumption (Pounds)
1920	11.8	1945	9.9
1	10.5	6	10.8
2	11.3	7	10.3
3	10.7	8	11.1
4	11.0	9	10.9
1925	11.1	1950	11.8
6	11.4	1	11.5
7	12.2	2	11.0
8	12.1	3	10.8
9	11.9	4	10.7
1930	10.2	1955	10.2
1	8.8	6	10.2
2	8.4	7	10.2
3	8.7	8	10.4
4	9.2	9	10.7
1935	10.5	1960	10.3
6	11.7	1	10.7
7	11.8	2	10.7
8	10.8	3	10.6
9	10.7	4	10.5
1940	11.0	1965	11.0
1	11.2		
2	8.7		
3	7.9		
4	8.7		

Source: Fishery Statistics of the U.S. 1920 to 1965, U.S. Department of the Interior, Fish and Wildlife Service, Bureau of Commercial Fisheries, Washington, D. C.

Table 7

PER CAPITA CONSUMPTION OF COMMERCIALLY CAUGHT FISH, AND PER CAPITA PERSONAL INCOME (UNADJUSTED AND ADJUSTED)

Year	Per Capita Fish Consumption (Pounds)	Per Capita Shrimp Consumption (Pounds)	Unadjusted Per Capita Income	Consumer* Price Index	Real Per Capita Income
1950	11.5	.78	$1,496	83.8	$1,785
1951	11.5	.93	1,652	90.5	1,825
1952	11.0	.98	1,733	92.5	1,873
1953	10.8	.98	1,804	93.2	1,935
1954	10.7	.99	1,785	93.6	1,907
1955	10.2	1.03	1,876	93.3	2,010
1956	10.2	.99	1,975	94.7	2,085
1957	10.2	.88	2,045	98.0	2,086
1958	10.4	.96	2,068	100.7	2,053
1959	10.7	1.15	2,161	101.5	2,129
1960	10.3	1.20	2,215	103.1	2,148
1961	10.7	1.12	2,264	104.2	2,172
1962	10.7	1.04	2,368	105.4	2,246
1963	10.6	1.14	2,455	106.7	2,301
1964	10.5	1.18	2,586	108.1	2,392
1965	11.0	1.27	2,760	109.9	2,511
1966	NA	NA	2,963	113.1	2,620

* 1957-1959 = 100

Sources: Per Capita Fish Consumption--Found in the general reviews of Fishery Statistics of the U.S., for years 1950-1964.

Per Capita Income--Survey of Current Business, Office of Business Statistics, Department of Commerce, April, 1968, p. 14.

Consumer Price Index--Statistical Abstract of the United States, 1967, p. 356.

Per Capita Shrimp Consumption--Fisheries of the United States, 1965, C. F. S. No. 4100, p. 47.

Brandow estimates this price inelasticity to be -.65; that is, a one percent increase in the price of fish would result in a decrease in consumption of .65 percent. The price elasticities of some competing meat products are beef -.95, veal -1.6, pork -.75, chicken -1.2, and turkey -1.4. The comparatively low elasticity of fish indicates a rather secure market position which will be only slightly affected by small price changes. It also indicates that fish consumption cannot be increased by price cuts without decreasing total revenue significantly.

Population

In the absence of substantial changes in consumer tastes or supplies of fish, the evidence suggests that consumption will continue at approximately the same per capita level yielding the total quantities shown in Table 8. According to current population estimates, the 1980 United States demand for edible fish should be in excess of 2.5 billion pounds per year, a 39 percent increase over the 1960 consumption of 1.9 billion pounds shown in Table 9.

Consumer Preferences

In a society changing as rapidly as that of the United States, no economic sector is immune to the effects of change upon consumer tastes and preferences. Increasing discretionary purchasing power beyond the basic necessities permits the housewife the privilege of choosing more tasty, more attractive, and more easily prepared foods. Not too long ago the housewife bought fish products packed and shipped unprocessed in ice, or cured or canned. Today forms of fishery products such as frozen fillets, fish sticks,

Table 8

THE EFFECTS OF POPULATION GROWTH ON DEMAND FOR FISH

Year	United States Population	Per Capita Fish Consumption (Pounds)	Total Fish Consumption (Millions of Pounds)
1950	152,271,000	11.5	1,750
1960	180,684,000	10.3	1,860
1970 (Estimated)	206,345,000	10.7	2,210
1980 (Estimated)	242,311,000	10.7	2,590

Sources: Population Estimates, Series P-25, No. 368, Bureau of the Census, U. S. Department of Commerce, U. S. Government Printing Office, Washington, D. C. , June 27, 1967, p. 12.

Population Estimates, Series P-25, No. 362, Bureau of the Census, U. S. Department of Commerce, March 7, 1967, p. 4.

Fishery Statistics of the United States, 1950 and 1960. (per capita fish consumption found in general review)

portions, and other convenience products are being marketed with great success.

Fresh fish are those that have not been frozen solid but have been packed in ice for a short period of time (three to four days) to prevent spoiling. The fish can be delivered fresh to a retail store by a fishery or a wholesaler in just about any form. The form depends on the "keeping" qualities of the particular species of fish. The various forms of marketing fresh fish are:

1. In the round. The product goes directly from the producer without going through any form of processing.

2. Dressed or gutted. Some buffalofish and a very high percentage of the game fish caught in the upper midwest and Canada are shipped in this form.

3. Skinned and dressed. Bullheads are usually shipped in this form, although the form in which they are marketed is very dependent upon the climatic conditions during the season of the year the fish are shipped.

4. Fillets. There appears to be quite a small market for this form of fresh fish, although it is increasing more every year, due to the fact that most consumers do not want to bother with dressing, skinning, and scaling fish.

5. Fleeced. Head, tail, entrails, and outer skin and scales are removed. Montana buffalofish are prepared this way.

Table 9 shows the changing composition of consumer fish purchases from 1954 to 1964. Further analysis of these data are presented in Table 10.

Further examination of Table 9 shows the housewife's desire for more convenience foods. Table 11 illustrates this desire by showing the growing importance of breaded ready-to-cook fishery products.

In accordance with the trend to greater convenience the specialities

Table 9

DOMESTIC EDIBLE MANUFACTURED FISHERY PRODUCTS

Item	1954 Quantity (000 lbs)	1954 Value ($000)	1959 Quantity (000 lbs)	1959 Value ($000)	1964 Quantity (000 lbs)	1964 Value ($000)
Packaged Products, Fresh & Frozen						
Fish:						
Not Breaded - Fillets, Steaks, etc.	173,636	$ 47,126	153,533	$ 47,608	172,410	$ 59,991
Breaded - Sticks, Fillets, & Portions	57,005	29,782	98,333	41,987	182,990	68,359
Shellfish:						
Not Breaded	182,425	111,384	172,355	119,702	214,007	180,500
Breaded	29,341	21,114	82,610	56,960	103,327	73,570
Specialties, Fish and Shellfish	8,321	6,543	20,776	14,353	35,758	27,946
	450,728	$215,949	527,607	$280,610	708,492	$410,366
Canned:						
Fish & Shellfish	826,629	331,018	625,591	310,262	742,114	391,026
Cured:						
Salted	48,309	13,064	41,338	16,721	37,015	16,735
Smoked	37,030	20,835	30,962	23,607	28,075	29,962
Dried	985	597	322	291	429	1,086
	86,324	34,496	72,622	40,619	65,519	47,783
TOTAL	1,399,681	$581,463	1,225,820	$631,491	1,516,125	$849,175

Source: Fishery Statistics of the United States, 1954, p. 30; 1959, p. 37; 1964, p. 41. Value and quantity used for industrial products excluded; bait and animal food included when combined with edible food.

Table 10

FORMS OF DOMESTIC EDIBLE FISHERY PRODUCTS*
% OF VALUE

Product	1954	1959	1964
Fresh & Frozen	37	44	48
Canned	57	49	46
Cured	6	7	6

Source: Fishery Statistics of the United States, 1954, p. 30; 1959 p. 37; 1964, p. 41.

*Clearly, fresh and frozen fishery products are increasing in importance at the expense of canned products.

Table 11

TYPES OF DOMESTIC EDIBLE FISHERY PRODUCTS
% OF VALUE

Product	1954	1959	1964
Fresh and Frozen Fish:			
Not Breaded	62	53	47
Breaded	38	47	53
Fresh and Frozen Shellfish:			
Not Breaded	84	67	71
Breaded	16	33	29

Source: Fishing Statistics of the United States, 1954, p. 30; 1959 p. 37; 1964 p. 41.

category doubled in value from 1954 to 1959 and then doubled again from 1959 to 1964 (Table 9). This category is used for many types of prepared products in which fish is combined with other foods and for such items as cocktail snacks.

The fresh water fishery of the central United States is small, representing only three percent of the total United States catch and four percent of value in 1965.[5] As shown in Table 12, its output is also increasingly concentrated in fresh and frozen packaged products as is true of total manufactured fishery products.

Competition from Other Protein Foods

Increased per capita consumption of fish is probably only possible through displacement of other protein foods, such as beef, pork, mutton, poultry, and eggs, in daily consumption patterns. The position of fish relative to these other common protein foods is shown in Table 13. In terms of edible weight, annual per capita fish consumption is comparatively small and has remained generally static at ten to eleven pounds during the period between 1950 to 1965, while the much larger per capita consumption of domestic agricultural products has increased from 220 pounds in 1950 to 240 pounds in 1965.

Table 14 is a listing of the cross elasticities of fish and several meat products indicating the percentage increase in the sales of fish that

5 Fisheries of the United States, 1965, U. S. Department of the Interior, Fish and Wildlife Service, Bureau of Commercial Fisheries, Washington, D. C., pp. 8-9.

would result from a one percent increase in the price of each competing product. It can be seen that there is only a very slight relationship between the prices of other products and the quantities of fish sold. Fish is, therefore, seen to be a unique product in the eyes of the consumer, and not readily interchangeable with meat products.

Because of the low cross elasticities between fish and other products, and because of the obstinacy of eating habits (as opposed to food preparation practices), it seems unlikely that fish products will displace any meaningful amount of demand from other protein foods within the foreseeable future.

The Influence of Demand on Imports

The value of domestic edible fishery production has increased only 46 percent from 1954 to 1964 while imports of the same category have increased 114 percent (Table 15). Recent years have seen more use of the domestic catch of fish for industrial purposes, and less for human food.

High quality fish have comprised the major increases in imports of edible fish. Fishery Statistics of the United States for 1964 shows shrimp as the major item imported with respect to value in that year, accounting for 25 percent of the value of imported edible items. This is consistent with the earlier observation that rising incomes result in a demand for higher priced products.

The Export Market

The United States is not a major exporter of fisheries products. In contrast to 1964 imports of edible and nonedible fisheries products worth

Table 12

SALES OF FRESHWATER FISHERY EDIBLE MANUFACTURED PRODUCTS
FROM GREAT LAKES AND MISSISSIPPI RIVER AREAS
% OF VALUE

Product	1954	1959	1964
Fresh and Frozen Packaged	27	55	75
All Other	73	45	25

Source: Fishery Statistics of the United States, 1954,1959,1964, United States Department of the Interior, Fish & Wildlife Service, Washington, D. C.

Table 13

PER CAPITA CONSUMPTION OF PROTEIN FOODS
(POUNDS)

Food	1950	1955	1960	1963	1964	1965
Meats and Games:						
Beef	50.1	64.0	64.2	69.8	73.8	73.5
Veal	7.3	8.4	5.2	4.1	4.3	4.3
Pork	64.4	62.1	60.3	60.8	60.8	54.6
Lamb & Mutton	3.6	4.1	4.3	4.4	3.7	3.3
Edible offals	10.1	11.0	10.1	10.3	10.5	10.0
Game	2.3	2.6	2.6	2.5	2.5	2.5
Canned Meat	8.7	10.2	10.8	11.8	12.3	11.6
Poultry:						
Chicken	20.6	21.3	28.1	30.8	31.2	33.3
Turkey	4.1	5.0	6.2	6.7	7.2	7.4
Ducks & Geese	.4	.4	.4	.4	.4	.4
Eggs	48.5	46.9	42.4	40.1	39.8	39.1
Total	220.1	236.1	234.4	241.7	247.5	240.0
Fish	11.5	10.2	10.3	10.6	10.5	11.0

Sources: U. S. Food Consumption, Sources of Data & Trends, 1909-63, Supplement for 1965 (Statistical Bulletin No. 364), Economic Research Service, U. S. Department of Agriculture, pp. 5 & 6.

U. S. Food Consumption, Sources of Data and Trends, 1909-63, Economic Research Service, U. S. Department of Agriculture, Washington, D. C., June 1965, pp. 22,25.

Table 14

CROSS ELASTICITIES OF SELECTED PRODUCTS AND FISH
(Percent)

Beef	.02091
Veal	.00311
Pork	.01618
Lamb & Mutton	.00133
Chicken	.00678
Turkey	.00169

Source: G. E. Brandow, op. cit.

Table 15

DOMESTIC PRODUCTION AND IMPORTS OF EDIBLE FISHERY PRODUCTS 1954-1964

Year	Population	Domestic Quantity (Millions of lbs)	Value ($ millions)	Foreign Quantity (Millions of lbs)	Value ($ millions)	Total Quantity (Millions of lbs)	Value ($ millions)
1954	161,690,000	1,399	$581	803	$203	2,202	$ 784
1955	164,588,000	1,123	543	771	208	1,894	751
1956	167,513,000	1,205	606	778	233	1,983	839
1957	170,571,000	1,198	605	884	251	2,082	856
1958	173,533,000	1,326	673	991	280	2,317	953
1959	176,447,000	1,226	631	1,114	311	2,340	942
1960	179,386,000	1,318	702	1,067	307	2,385	1,009
1961	182,326,000	1,366	762	1,061	336	2,427	1,098
1962	185,333,000	1,467	837	1,223	401	2,690	1,238
1963	188,160,000	1,466	805	1,160	395	2,626	1,200
1964	190,871,000	1,516	849	1,318	434	2,834	1,283

Source: Fishery Statistics of the United States, 1954-1964

$564 million, our exports were valued at only $64 million. This export figure rose to $69 million in 1965. These exports were principally salmon, shrimp, sardines, and fish oils.

Review of U. S. Demand

Historically, the per capita consumption of fishery products in the United States has been small, particularly when compared with 61 pounds in Japan and 45 pounds in Norway and Sweden. In contrast to per capita consumption of meat and poultry products, which, on the basis of retail sales weight, has increased from 220 pounds in 1950 to 240 pounds in 1965, annual per capita consumption of fishery products has remained generally static at 10 to 11 pounds on an edible weight basis. The U. S. population has increased from 152 million to 193 million in the same 15 year period. Thus, there has been an increased total demand for fish even though per capita consumption has not changed.

Rising real personal incomes have resulted in an increased demand for higher quality fish and processed fish products. This increased demand is being met largely from sharply increased imports, which have risen 114 percent since 1950.

Housewives are buying their unchanging quantity of higher priced fish in ever more advanced stages of preparation as evidenced by rapidly increasing use of breaded products and specialties.

Export demand is small and offers little market for present supplies of low quality fish, since sales are concentrated in higher value species such as shrimp and salmon.

Montana and Regional Demand

Montana, Idaho, Wyoming, Utah, and North and South Dakota constitute a regional market that could be expected to absorb a share of Montana fish. There are no large fisheries in this region and all these states are distant from supplies of marine fish. While this situation in no sense suggests a monopoly of the market for Montana fish, it does suggest that Montana fish may have some competitive advantage in this region.

Demand Determinants

As summarized in the previous section of this chapter, population increases represent the only major cause of increases in total fish demand. The level of personal income, the prices of fish and competing products, and consumer tastes and preferences, have little influence in changing per capita consumption, although these determinants have had an effect on the total value spent for fishery products.

According to current population estimates of the states within the region, the 1980 demand for edible fish should be in excess of 52 million pounds, a 30 percent increase over 1960 consumption of approximately 40 million pounds shown in Table 16. This percentage increase is less than the United States average percentage increase of 39 percent. Because the same per capita consumption figures were used, the smaller percentage increase for this region is due to a slower population growth rate.

Although the United States per capita consumption figures were used, these figures may not be representative of the region. Until ten or fifteen years ago, relatively little fish was sold in Montana and other states

Table 16

THE EFFECTS OF POPULATION GROWTH
ON REGIONAL DEMAND FOR FISH

Year	Regional Population	Assumed Per Capita Fish Consumption (Pounds)	Total Fish Consumption (Pounds)
1950	3,431,000	11.5	39,456,000
1960	3,876,000	10.3	39,923,000
1970 (estimated)	4,223,000	10.7	45,186,000
1980 (estimated)	4,369,000	10.7	52,098,000

Source: World Population Prospects, Department of Economic and Social Affairs, Population Studies, no. 41, United Nations; New York, 1966.

located in the interior of our country and not close to a large supply of fish. Because of earlier transportation problems, residents of these states had an established food habit of eating less commercially caught fish than the United States average.

It appears that this condition continues today. A pilot study to determine consumer fish-eating habits and attitudes toward various species of fish was conducted in Missoula during the summer of 1968. Although a pilot study of 100 consumers in only one city is not conclusive, it can be suggestive of the probable results of a more thorough study. In this case Missoula residents reported the following frequency of fish consumption:

Table 17

FREQUENCY OF FISH CONSUMPTION[6]

Frequency	Percent Reporting
At Least Once Each Week	19
At Least Twice Each Month	46
At Least Twice Each Year	32
Once a Year or Less	3
	100

These findings can be contrasted to a far more thorough survey of consumer fish buying habits conducted in several major seaport cities.[7] In these cities: "...more than nine out of ten homemakers serve fish and

6 A complete report on this study is included as Appendix 2.

7 "Research Indicates Fish, Seafood Sales Will Expand Despite Lifting of Church Ban," Marketing Insights, January 23, 1967, p. 4.

seafood to their families...about two-thirds of them serve it once, or more times weekly." By contrasting these two studies it appears that families in Missoula, Montana may be eating fish less than one third as often as families in major seaport cities.

Montana fish production is small, even when compared to the limited consumption in the region. Data from the Montana Department of Fish and Game would indicate a 1967 catch of 1,275,000 pounds valued at $90,000. This estimate is based upon fish caught between April and September 1967.

The wide fluctuations in the Montana catch shown in Table 18 is explained by the fishing practices in the area. When carp and buffalofish are in short supply in the Midwest or on the West Coast, fisherman and buyers move into Montana to meet their needs. When supplies nearer their markets are adequate they stop drawing upon Montana supplies.

In view of the foregoing evidence, the demand for Montana fish for human consumption can be characterized as light and irregular. Fish consumption in the United States is moving in the direction of more completely prepared items made from expensive marine fish and shellfish--frozen breaded fish, fish sticks and shrimp are two examples. Even if Montana fish could be prepared as convenience foods, research discussed in Chapters 4 and 5 suggests that Montana fish would not be generally acceptable to most housewives in the United States.

Table 18

FISH CAUGHT BY COMMERCIAL FISHERIES IN MONTANA

Year	Quantity (pounds)	Value
1956	14,000	$ 1,000
1957	41,000	5,000
1958	141,000	10,000
1959	74,000	5,000
1960	21,000	2,000
1961	17,000	1,000
1962	86,000	9,000
1963	268,000	32,000
1964	237,000	16,000
1965	354,000	32,000
1966	692,000	51,000
1967	1,275,000	90,000

Source: Fishery Statistics of the United States, 1956-1967, U. S. Department of the Interior, Fish and Wildlife Service, Bureau of Commercial Fisheries, Washington, D. C., and State Fish and Game Department, Helena, Montana.

CHAPTER III

PRESENT MARKETING CHANNELS

A substantial part of the following analysis is derived from data obtained from randomly sampled fishermen, wholesalers, and retailers located in Minnesota, Wisconsin, South Dakota and Iowa.[8] The balance was obtained through interviews with Montana fishermen, processors, and Fish and Game Department employees.

Commercial Fishery

Most inland fisheries are faced with conditions creating risks which are analogous to farming. A commercial fisherman is at the mercy of the weather. In some cases, such as Montana's Fort Peck Reservoir, prevailing weather conditions and water level management practices will eliminate spawning seasons for years at a time. It is mandatory that the right kind of weather conditions prevail in order to harvest. During the spring, summer, and fall, high winds and rough waters often make it impossible for the fishermen to get on the water with small craft. Large nets of several varieties are difficult to handle in rough water. The Montana season starts in April and extends into November.

One study of Great Lakes fishing found that for small, part-time enterprises expenses ranged up to 80 percent of gross sales, not including returns to the labor and capital of the owner-manager.[9] The amount of hired labor used in the average fishery in each state was in direct proportion to

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8 Laurance Gene Bloufuss, Commercial Markets for North Dakota Fish, an unpublished thesis, North Dakota State University, Fargo, North Dakota, 1968.

9 Harold C. Frick, Economic Aspects of the Great Lakes Fisheries of Ontario, Fisheries Board of Canada, Ottowa, 1965, p. 84.

the average annual gross income earned. There were some exceptions to this in Wisconsin where operators were substituting capital for labor at a greater rate than in other states. (See Table 19.)

As would be expected, where labor was difficult to obtain, hourly wages were high. Where it appeared labor was easily available, labor rates were low. This would explain why capital substitution in Wisconsin is greater than in the other states. One Montana enterprise operating a fish cleaning house in Lewistown reported the necessity of hiring women for its operations. Men were said to be unwilling to work in the fish "slime." It is possible that the $1.50 per hour wage offered also has an influence on the number of men willing to undertake this work.

A variety of species of fish are caught in each state. The average wholesale price per pound received by the fishermen interviewed was based on prices received from only those fishermen in the state that harvested that particular species of fish (Table 20).

The wholesale price of buffalofish, bullheads, and carp had a tendency to increase at harvesting points closer to the Chicago market (Table 20). This variation in price could be attributed to lower transportation costs for fish caught closer to the Chicago market. An exception to the rule was South Dakota. The wholesale prices paid to a small percentage (25 percent) of the fishermen interviewed in that state were higher than average. The reason was that they were selling buffalofish and carp in the gutted form, and as a result received a higher price per pound in the Chicago market.

The Montana enterprise operating the fish house in Lewistown was also able to obtain a higher-than-average price, both because the fish were

Table 19 BUSINESS CONDITIONS OF THE FISHERIES IN MINNESOTA, WISCONSIN, SOUTH DAKOTA, AND IOWA, 1966.

State	Number of fisheries interviewed	Labor used in business		Have trougle getting help?		Wage rate		Plan to expand		
		Average number of full time men[a]	Average number of part time men[b]	Yes	No	Full time ($/hr.)	Part time ($/hr.)	Yes	No	Undecided
Minnesota	17	.77	3.7	5	10	2.06	1.77	2	12	3
Wisconsin	11	.54	2.0	6	3	2.75	2.00	4	7	--
South Dakota	8	5.20	7.6	1	7	1.93	1.69	2	4	2
Iowa	9	--	.33	--	2	----	1.67	1	8	--
All States	45	1.40	3.3	12[c]	22[c]	2.18[d]	1.78[e]	9	31	5

[a] Fishing every day of the fishing season
[b] Only work during periods of high production
[c] The total Yes and No answers do not equal the number of fisheries interviewed because some fisheries do not require additional labor
[d] Twelve fisheries
[e] Twenty-two fisheries

Source: Bloufuss, op. cit.

Table 20 AVERAGE FISH PRICES FISHERMEN RECEIVED FOR THEIR FISH IN MINNESOTA, WISCONSIN, SOUTH DAKOTA, AND IOWA, 1966,[a] AND MONTANA 1967.[c]

State	Number of fisheries interviewed	Alewives	Buffalofish	Bullheads	Carp	Catfish[b]	Perch	Sheepshead	Suckers	Goldeye	Fish used for mink feed	Fish used for fish meal (cattle feed)
						(cents per pound)						
Montana	3	--	20.0	--	2.0	30.0	--	2.0	2.0	25.0	--	--
Minnesota	17	--	7.9	8.0	2.6	---	10.5	4.5	---	----	3.5	--
Wisconsin	11	.95	13.5	10.5	3.3	23.0	16.3	6.0	2.8	----	--	.80
South Dakota	8	--	10.0	9.3	3.1	23.0	--	4.5	---	----	2.5	---
Iowa	9	--	13.3	13.8	3.7	27.0	--	8.6	3.0	----	---	---

[a]Chicago wholesale market price less transportation costs.
[b]All prices are for catfish sold in the round
[c]Prices reported to Montana Fish and Game Department, West Coast prices less transportation costs.

Source: Bloufuss, op. cit.

partially processed and because they were sold direct to fish retailers.

A small percentage (20 percent) of the fishermen interviewed in Wisconsin and Iowa were selling buffalofish and bullheads directly to wholesalers on the Chicago market, and therefore were receiving full wholesale market prices for their fish, but were also arranging for and paying the costs of transporting them to market.

An interesting relationship was found in the North Dakota study between the prices of carp and buffalofish. When the quantity of buffalofish reaching the Chicago market increased, its price fell. This is the relationship that would normally be expected. Conversely, increases in the supply of carp were accompanied by rising prices for carp. This apparently contradictory situation can best be explained by considering buffalofish the price setter. When the supply of buffalofish diminished, the price rose. In the face of rising prices some consumers switched their purchases from the higher priced buffalofish to lower priced carp. This in turn caused the price of carp to rise and stimulated production of carp.

The transportation cost of commercially harvested fish was generally absorbed by the fisherman who harvested the fish. The price that he received from the buyer was the Chicago or Los Angeles wholesale price less transportation and commission costs. Most of the fishermen in Iowa and two or three in Wisconsin, however, handled transportation arrangements for fish sold in the Chicago market. The harvest was generally handled by a specialized trucking firm which has specific weekly routes. Nearly all of the fish marketed were moved by motor carrier. A small percentage of the Minnesota harvest moves by rail. During the harvest period, fish are shipped about three times per week.

The largest percentage (estimated 70 percent) of the fish from the upper midwest states were shipped to Illinois and Iowa. There are large wholesale fish markets located in these two states (Chicago and Spirit Lake, respectively). The remainder of the fish were shipped to southern states. A large percentage (estimated 35 to 40 percent) of the fish shipped to southern states were shipped live to be planted in fish ponds for public fishing. As mentioned in Chapter 2, most Montana fish are now shipped west. Buffalofish are shipped to the San Francisco Bay area for sale to fish retailers. Some carp and suckers are also sold on the coast. One Montana fisherman has been supplying carp and suckers to a trout farm in Southern Idaho. All Goldeye are shipped to Winnipeg. Montana fishermen have found that selling in the Chicago market puts them in direct competition with fishermen located in much nearer midwest states. When they sell on the west coast they are the nearest supplier of these particular species and therefore have a cost advantage.

The average cost of shipping to Chicago ranged from 2.5 cents per pound from Iowa to 5.3 cents per pound from Minnesota to 8 cents per pound from Montana. The difference in transportation costs can be attributed to distance from the wholesale market. Some fisheries incurred costs of processing prior to shipment. This cost ranged from one cent to one and one-third cents per pound.

Chicago Fish Markets

Chicago is considered the major fish marketing city in the United States. Fish price quotations from the Chicago market affect virtually all other major and minor fish markets throughout the United States.

A daily fish marketing report is compiled by the Bureau of Commercial Fisheries from data collected from wholesale fish markets in the Chicago area. Unless otherwise noted, the fish prices quoted in this report represent an average price for fish paid by all major fish wholesalers in the Chicago area. Wholesalers often pay a wide range of prices in a given day for the same quality fish. As a result, the price listings that appear in the daily market report may not be representative of any one particular transaction that might have taken place during a day of trading.

The quantity of each particular species of fish marketed in one day is also included in these daily reports, but is not necessarily correct. Fish wholesalers are not required to report their total daily volume of purchases if they do not choose to do so. This provides wholesalers the opportunity to withhold information from the market in an effort to maintain a false market atmosphere concerning supply of specific species of fish during a given market day or week. It is reported they use this technique as a means of holding the price of fish up when the market becomes flooded. A prominent fish wholesaler in Chicago stated that the main objective of these daily reports was to give fishermen and fish wholesalers a little idea of what was going on in the fish business.

During this investigation it became apparent that, with some exceptions, the level of business ethics practiced throughout the fish trade is very low. Fishermen report that they are victimized, both in Winnipeg and Chicago by wholesalers who cheated them on weight, price, or were slow to pay. A marginal fisherman who arrives at the market with a truck load of fresh fish is in no position to bargain effectively with wholesalers. There are

reports by fishermen of suckers being sold in urban markets as northern pike and of badly deteriorated fish being sold for fresh. Nor are the fishermen themselves above suspicion. There are indications that they at times understate their sales to reduce the fees paid the state.

The situation faced by Canadian fishermen selling in the Chicago market is described by Frick.[10]

> A number of freshwater fish wholesale houses and brokers have, over long years in the business, established reputations for honesty and dependability, but one cannot fail to be impressed with the low standard of ethics that becomes manifest all too often in the trade, apart from the evidences of collusion (for example, of tacit agreement on buying and selling prices and allocation of supplies) that one would expect from dealers where an oligopolistic structure of distribution exists. According to allegations recited during the course of our field surveys, shippers have been defrauded through false or excessive claims for quality deterioration or non-delivery of fish shipments, through non-settlement or delayed settlement for fish received and through a number of other artful practices, including the device of contrived bankruptcy not unfamiliar in the garment industry and in some other types of wholesale and retail operations. Deceitful methods have been used, also, to circumvent the efforts of the Inspection service of the Department of Fisheries of Canada and the United States Food and Drug Administration to ensure good quality in the food products reaching the consumer; whitefish for export rejected by inspectors have been, for instance, mislabelled as to origin or species or mixed with other fish and presented for inspection at another port of exit.

A significant percentage (estimated 30 percent) of commercial fish that was once channeled through the Chicago wholesale market is now marketed directly to large chain stores. These chain stores have facilities for preparing fish for sale on the retail fresh fish market. This practice of shipping directly to chain stores from small town wholesalers and fishermen seems to be developing as a trend in the fish business. This change has caused the elimination of many of Chicago's wholesale and retail fish firms.

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10 Frick, op, cit. p. 48.

The few wholesale fish firms that are left in the city of Chicago ship most of their fish in and out by truck. There seems to be no pattern during a given day when trucks will haul fresh fish into the market and when trucks will haul fresh fish out of the market to numerous points throughout the United States. Fresh fish arrive at the plant in various forms. Some are ready for immediate shipment directly to retail markets. Most fish require further processing, such as gutting, scaling, or heading, before they are packed for shipment to a retail market.

Each wholesale firm has cooling facilities for holding fresh fish. When the fish are brought into the plant, they are usually packed in ice and stacked in wooden boxes in a large cooler. After they are processed into a marketable form, they are packedin special boxes for shipping to a retail market outlet.

Although most of the fresh fish leaving the Chicago wholesale markets are shipped by truck, some are distributed in the upper midwest by railway express. Special shipments sometimes move by air transport to the east or west coast.

There are no daily price quotations posted by a fish wholesaler as are found in a grain elevator or a livestock marketing center because no two fishermen may get the same price for their fish (regardless of quality) during a given market day. Wholesalers base their prices paid on the number of pounds of fish offered by the individual fisherman during that particular day, the dependability and regularity of the fisherman throughout the year, demand for the particular species of fish, as well as the quality of fish.

The quantity and quality of a particular species that has already reached the market during that particular market day or week is also of major importance.

When climatic conditions are unfavorable for commercial fishing operations in a certain area, the particular species of fish harvested becomes scarce. The price of that species is then bid up. The fact that fresh fish can be stored for only short periods before spoilage eliminates the possibility of building up a reserve supply of fish to take care of periods when supply becomes short.

Local Fish Markets

Not all fish caught in a commercial fishing area reach wholesale markets, such as those existing in Chicago, New York, or St. Louis. A significant percentage of commercially harvested fish is marketed through local retail fish markets. There is a considerable variation in the size of these local retail fish marketing firms throughout the upper midwest. Most of the firms are proprietorships.

The volume of fish that each firm handles depends on the original purpose underlying the creation of the market. Some local retail fish markets are organized to market lots of fish that are too small to be shipped to a large wholesale market, such as Chicago or New York. Some are organized to supply tourist trade in an area where a particular species of fish is harvested. Others are organized by individual fishermen and are used as a means of diversifying their business enterprises. These usually operate on a part-time basis. They sell fresh or smoked fish in small backyard markets.

There are also a few full-time retailers of fresh fish and fish products (prepared fish).[11] These firms are organized to handle a wide variety of fish and generally do not limit their stock of fresh fish to the particular species caught in their area. They also ship in fish and shellfish from various parts of the United States and Canada. These firms will sometimes have processing facilities to handle those fish that come in to the market directly from the producer.[12]

Interviews with a few of these full-time retailers indicated that the processed forms of fish being demanded today are considerably different from those of five or six years ago. Consumer demand for fish that are not scaled and headed is dropping. Consumers are willing to pay considerably more (per pound) for a fillet even though the fillet may not possess the quality (taste) that fish marketed in the round possess.

The bulk (estimated 75 percent) of the fish caught by those fishermen who were interviewed in the North Dakota study were for human consumption. The largest share (estimated 85 percent) of the fish marketed for human consumption were shipped in the round. The next most popular form that they

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11 It is believed by some fresh fish retailers that much of the fresh fish that is sold in various retail market outlets is frozen before it is shipped, thawed by the retailer upon delivery, iced, and displayed and sold as fresh fish.

12 A good example of a full-time fish retailer is a particular fish retailer located in North Dakota. He receives his supply of marine products from three different geographical areas. His fresh fish, such as lake trout and pike, comes from Canada. His ocean fish, such as salmon and halibut, comes from Alaska via west coast wholesale fish distributors. The remainder of his marine products, such as oysters and shrimp, he receives from the east coast. He buys very little off the Chicago wholesale markets because he has closer wholesale markets from which to buy (namely the Winnipeg markets).

were shipped in was the gutted form. A small percentage (about 10 percent) of the fisheries sold fish directly to smokers who either retailed the processed product or sold smoked fish to retailers.

The North Dakota fish reach the final consumer in many different forms. Most of the fisheries that were interviewed were uncertain as to the final form and destination. There were instances when fishermen knew the final destination of their fish because the wholesaler to whom they sold their fish marketed fish in only one or two forms. An example is Chicago's fresh fish markets where close to 100 percent are marketed fresh or fresh frozen. On the other hand, markets such as the one located in Spirit Lake Iowa, have numerous outlets for these fish, such as (1) marketing fresh in the round or gutted form, (2) processing for fish sticks, (3) processing for pet foods, and (4) processing for cattle feed. Montana fishermen reported that all their fish were shipped fresh; carp and suckers in the round, goldeye gutted, and buffalofish either gutted or fleeced. To the best of their knowledge it was all sold fresh at retail outlets.

Goldeye Market

The wholesale market for goldeye[13] is for the most part located in Winnipeg, Manitoba, Canada. The demand for goldeye in the Winnipeg wholesale market has in the past been largely satisfied by the harvest of the province of Manitoba. Recently the supply area has expanded to various states in the central part of the United States (Table 21). Price data

13 Also known as mooneye and toothed herring.

TABLE 21 GOLDEYE MARKETED IN WINNIPEG FROM HARVESTS IN THE UNITED STATES AND CANADA, 1961 THROUGH AUGUST, 1967.

Province of Origin	1961	1962	1963	1964	1965	1966 [a]	1967 [b]
	Pounds of Fish						
Alberta	7,900	13,500	6,900	1,400	400	---	---
Manitoba	56,000	43,000	53,000	70,000	132,000	---	---
Ontario	24,000	34,000	20,000	28,000	19,000	---	---
State of Origin							
Minnesota	---	---	3,508	5,540	9,954	4,469	---
North Dakota	---	---	---	---	---	1,100	---
Iowa	---	---	---	---	---	39,870	37,610[b]
Tennessee	---	---	---	---	---	---	28,190[b]
South Dakota	---	---	---	---	---	---	11,783[b]
Montana	---	---	---	---	---	---	41,213[b]

[a]Canadian catch data were not available for the years 1966 and 1967.
[b]Pounds of fish caught from January 1 to September 1, 1967.

Source: Department of Fisheries, Central Region, Winnipeg, Manitoba, Canada. From Bloufuss, op. cit.

on prices paid to fishermen were not available because records of these prices were not kept by the Canadian Department of Fisheries. Information that was available indicated that retail prices on the Winnipeg market ranged from $1.50 to $1.95 per pound.

The major portion of the goldeye harvest sold in the Winnipeg wholesale market is dressed and needs little processing before it is smoked and sold on the retail market.[14] Each processor-wholesaler of goldeye has specilized customers for his product. Some retail outlets require 9 to 10 ounce smoked goldeyes, whereas others require a much larger finished product (12 or 13 ounces). Prices paid to fishermen on the wholesale market are very dependent on the quality and size of fish that the particular retail outlets are demanding during that particular week or month of the year. The major retail outlets for goldeye are restaurants and railroad dining cars.

In the early 1960's, the supply of goldeye from Canadian sources decreased rapidly. This made it difficult for wholesalers of goldeye to maintain fringe markets and at the same time guarantee supply to major principal retail markets in the Winnipeg area. During the past two years, however, supply has exceeded the demand for goldeye at current prices. Wholesalers of smoked goldeye have been attempting to expand their retail market outlets because of optimism concerning the future supply of goldeye.

An estimated 400,000 pounds of goldeye was held in Winnipeg's cold storage warehouses in September, 1967. Because of this apparently sufficient supply, some wholesalers refused to buy for the remainder of the year

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14 Goldeye is generally sold in the retail market as a smoked fish.

except at extremely low prices. The prices (summer 1967) paid fishermen for 14 to 15 ounces goldeye (green weight)[15] ranged from 45 cents to 50 cents per pound. Goldeye harvested during the fall of 1967 were believed to have been sold by fishermen for as low as 17 cents per pound (dressed) to local wholesalers. The change in supply that occurred was small relative to the total supply of goldeye previously sold on the Winnipeg market.

It appears that a relatively small change in the quantity supplied caused a large proportionate change in price. This was due to the fact that the retail market for goldeye in Winnipeg could not be expanded in the short-run. This would also indicate, however, that a relatively small decline in the quantity marketed would cause a large increase in price.

Further information on the Canadian market for smoked goldeye was gained from a survey of market conditions in Calgary, a western Canadian city of about 350,000 people.

Though three fish wholesalers operate in Calgary, only one handles the distribution of goldeye,[16] probably because of the low volume of sales. Total sales, both to ultimate consumers and to restaurants, amount to between 4,000 and 4,500 pounds per year. Almost all of this is purchased from one Winnipeg firm, which the wholesaler believes controls the market. Prices paid by the Calgary wholesalers for smoked goldeye have ranged from 75 cents per pound to 95 cents. The price at the time of the interview, July 1968, was 80 cents per pound.

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15 Green weight is defined as the weight of the gutted goldeye before smoking.

16 All information, except where noted, is from an interview with Mr. Hubert Plemming, Manager, Billingsgate Fish Co. Ltd., Calgary, Alberta, July 25, 1968.

The large majority of sales is made to the better restaurants in Calgary, where the goldeye is regarded as being in the same class as highpriced seafoods, such as shrimp, oysters, lobster, etc. Menu prices reflect this classification. At one restaurant the price for a meal of smoked goldeye ranged from $4.75 to $6.00;[17] at another, the price was $4.00.[18]

Only a small amount of goldeye is sold on the retail market, partly because there is only one retail outlet, owned and operated by the wholesaler. The price to the consumer varies, but on the day of the interview it was $1.50 per pound.

Though sales volume is presently low, there are indications that it could be increased somewhat, even within the existing marketing structure. The wholesaler stated that he was not pushing goldeye because of the high price, the "woody" flesh of the fish from Winnipeg, and the unreliability of the source. If these difficulties could be overcome, the manager indicated that he would be willing to push smoked goldeye to restaurants and consumers and that he could do this successfully, though he would not estimate by how much he could increase sales.

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17 From an interview with the maitre d', Petroleum Club, Calgary, Alberta, July 25, 1968.

18 From an interview with the maitre d', Palliser Hotel, Calgary, Alberta, July 25, 1968.

Many Canadians are cognizant of smoked goldeye and hold it in high regard as a delicacy, even to the extent that some prefer goldeye, when properly prepared, to steak.[19] Thus there exists a small but ready market that needs only to be exploited.

Information from the Department of National Revenue at Ottawa discloses that either fresh or smoked goldeye can be shipped into Canada subject to a duty of ½ cent per pound. Fish are exempt from the sales tax. The only other relevant regulations, as explained in a letter from the Canadian Department of Fisheries, are: "...the Canadian Fish Inspection Regulations requires that any fish imported into Canada that are found to be tainted, decomposed or unwholesome shall be disposed of in such a way as to prevent the possibility of the fish being marketed or sold for human consumption...also section B.21.025 of the Canadian Food and Drug Regulations states that: 'no person shall sell smoked fish or a smoked fish product packed in a container that has been sealed to exclude air unless it (a) has been heat-processed after sealing at a temperature and for a time sufficient to destroy all spores of the species clostridium botulinum; or (b) contains not less than 9 percent salt, as determined by the official method; or (c) is customarily cooked before eating.'"

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19 The most popular way of preparing goldeye, both in restaurants and at home, seems to be according to the following recipe: Wipe fish with damp cloth. Season fish with salt and pepper. Measure thickness of fish. Wrap fish tightly in an envelope of greased aluminum foil. Make double folds in foil and pinch folds to make steam tight. Place package on baking sheet and bake in hot oven (450°F). Allow 10 minutes cooking time for fresh fish and 20 minutes per inch thickness for frozen fish plus additional cooking time for heat to penetrate foil and fish. An extra 5 minutes for fresh fish, 10 minutes for frozen fish, is recommended. Department of Fisheries, Canadian Fish Cook Book (Ottawa, Ontario: Queen's Printer, 1964) p. 17.

In addition, it should be noted that no fish may be imported into Canada unless they have been consigned to a Canadian broker. Thus it is not possible to drive a truckload of fish to Winnipeg in the hope of finding a buyer after arrival; arrangements must be made beforehand.

It can be seen that the organized markets for Montana fish species are centered in Chicago, Winnipeg, and major west coast cities. Fishermen selling in these markets are subject not only to fluctuating demand and prices, but also to unethical treatment by middlemen. As a consequence, Montana fishermen have diverted as much as possible of their catch around these markets and direct to retail outlets. Because of legal requirements this diversion does not appear feasible in the case of goldeye shipped into Canada.

CHAPTER 4

SURVEY OF BUYERS' ATTITUDES TOWARD MONTANA FISH

Between July 25 and August 13, 1968, a total of fourteen interviews in depth were conducted with freshwater fish buyers in Chicago, Illinois, and Los Angeles, California. Three leading retailers and four important brokers, or wholesalers, were interviewed in each of these cities, which--together with New York--constitute the major freshwater fish markets in the U.S.A. New York was omitted because of its greater distance from Montana, which was felt to limit its potential as a market for Montana fish.

The interviews were conducted by a professional interviewer with extensive experience in market research and psycho-social investigations. Most of the interviews were recorded on tape to provide a complete record and to facilitate analysis of the material.

A discussion outline covering the three major areas of interest--respondents' attitudes toward freshwater fish in general, toward Montana as a source, and toward buffalofish, carp, sucker, and goldeye specifically--was prepared to guide the interviewer. Because of the exploratory nature of the study, the interviews were not rigidly structured but were, instead, conducted in a manner that encouraged each respondent to approach and develop the subject matter as it related to his individual experiences and point of view.

In addition to these depth interviews with buyers, the interviewer made on-the-spot price checks in three Los Angeles retail stores, including the Grand Central Public Market, a leading chain store, and a leading fish and

sea food specialty shop. In Chicago, the interviewer conducted brief telephone interviews with two chain stores and six retail fish markets located in Negro or Jewish neighborhoods, and/or advertising fresh fish in the classified telephone directory for the city.

Sample

The six retail buyers who were interviewed represented two major grocery chains and one independent retail fish market in each city. The chain stores were selected on the basis of their large sales volumes and acknowledged importance as leaders in the retail grocery market. The independent fish markets were selected by the interviewer on the basis of their central locations and accessibility to a diverse consumer population and their reputations as leading fish stores of good quality.

The names of the wholesalers who participated in this survey were obtained from two sources: (1) personal recommendations from the retail chain store buyers and wholesalers who were interviewed and (2) advertisements and listings in the classified telephone directories for the two survey cities.

Attitudes Toward and Experiences With Freshwater Fish

Since respondents were selected for this study partially on the basis of their dealing in freshwater fish, it is not surprising that 100 percent of them did, indeed, purchase freshwater fish from time to time. However, only 2 of the 14 indicated that more than 10 percent of their business involved freshwater fish. For most respondents, freshwater fish was, in the words of one Los Angeles retailer, "so insignificant a part of our business that we don't even think of it."

The types of freshwater fish most frequently carried by buyers in both cities were:

Species	Number of Buyers
Trout	(12)
Catfish and/or Bullheads	(9)
Whitefish	(11)
Pike and/or Pickerel	(9)
Buffalofish	(10)
Carp	(10)
Suckers	(4)

All of the retail chain store buyers, and a majority of the other dealers reported carrying a larger volume of frozen freshwater fish than fresh.

The most frequently mentioned source from which Chicago buyers purchased freshwater varieties was Canada. All of the Chicagoans indicated that Canadian producers were, year-around, their biggest suppliers of freshwater fish. Los Angeles buyers indicated that their chief sources were either Chicago or Louisiana, depending upon the extent to which they carried "Eastern" as opposed to "Southern species."

Rocky Mountain Fish

Although the Rocky Mountain states were not the chief source of fish for any dealer in this study, all of them immediately associated this area primarily with frozen trout. In fact, almost all of the interviewees reported having purchased frozen "rainbow trout" within the past year from Idaho, and/or Utah, and specifically from Buhl and/or "the Snake River."[20]

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20 The Snake River Trout Ranch, Buhl, Idaho. Throughout this chapter minor misstatements of fact or confusion about geography have been retained to help demonstrate "big city" attitudes toward Montana.

Rocky Mountain trout was favorably regarded by all of the buyers in terms of its "excellent quality," "flavor," "fast overnight delivery by air," and "smart promotional activities," including advertising in a number of trade publications as well as a few consumer publications like Reader's Digest.

The only complaint made about Rocky Mountain trout was in reference to price. A few buyers said they bought most of their trout from foreign sources--especially from Denmark and Japan--because it was cheaper than the domestic product. As one Chicago wholesaler explained:

"We haven't done a whole lot with the brook trout out of these states ...their prices have been high. Their quality, while admittedly, perhaps, better, is not that much better to make us buy it...Our customers will not pay the premium for the domestic product. Overall, they seem content with the imported products that compete with it...The Danish trout and Japanese trout have not been so far inferior as to be unacceptable...Imported products sell as much as 40¢ per pound cheaper--60¢ per pound as opposed to $1.00 per pound."

In addition to brook trout, three dealers in Los Angeles and two, in Chicago spontaneously identified the Rocky Mountain area as a source of buffalofish, carp, and/or suckers. All five had purchased this type of fish from Utah, Idaho, and/or Montana in the past, and the three Los Angeles buyers had done so during the past year.

Attitudes Toward, and Experiences With, Fish From Montana

Almost two-thirds (9 out of 14) of the buyers interviewed had never purchased fish from Montana. (One of these thought he might have gotten some trout from "Buhl, Montana," however.) To a man, they agreed that the chief reason why they had not done so was "Nobody's ever offered me any." Some of them were not quite sure where Montana was located; nor were they

aware of the types of fish Montana produces. Typical comments were:

"I had no idea they might have anything resembling commercial fisheries ...I don't picture Montana as the water reservoir of this country...or do you have a lot of lakes in Montana?"

(Chicago Wholesaler)

"I can't visualize the state of Montana producing enough to be economically feasible unless they're doing fish farming or something... Most of the fish in Montana--to my knowledge--are game fish, which you can't fish for commercially."

(Chicago Retailer)

"To be truthful about it, I didn't know they had fish in Montana...

(Los Angeles Retailer)

Most of these "never buyers" were open-minded about Montana fish, indicating that they had "no reason to believe their fish wouldn't be up to standard" and that they "assumed that it would be competitively priced." As one Chicago wholesaler noted,

"I'd say their prices would be about the same. You'd have to make a comparison to Colorado, and I think the shipping would be about the same... probably a penny or two more."

"I would say that from the Rocky Mountain states we experience very high standards...Our products coming from there are usually excellent... because of the intelligence of the people out there and its being a fairly new business out there. They saw what mistakes everyone else made and what a bind they put themselves into and why people don't want to eat this fish, and they said 'let's not do it ourselves; let's do it right'...They control their hatcheries...They make sure the water's clear. They control the size of the fish. They watch the death rate, diseases."

Accordingly, most of the "never buyers" indicated that they would be at least mildly interested in learning more about Montana's potential as a source of freshwater fish. As one Los Angeles wholesaler remarked, "I'm in the fish business, and I'm interested in any good fish produced any place in the world--including Montana!"

Buyers Experienced With Montana Fish

Two wholesalers in each city and one retailer in Los Angeles reported having purchased buffalofish and/or catfish from Montana at some time in the past. Neither of the Chicagoans had done so during the past year, but two of the Los Angeles dealers had received some during 1968 and the third continued to make regular purchases of carp and suckers from the neighboring states of Utah and Idaho.

All of these men regarded buffalofish from Montana as inferior to that which they obtained from their main source--Louisiana--other sources such as "the Northern states" or "the Midwest," specifically Minnesota, Iowa, Wisconsin, and Illinois.

They complained that the buffalofish they got from Montana was:

...too lean, not as "meaty," "rich," or "plump"
...not always of good quality
...not supplied in a regular, dependable manner during the summer and not available at all during the winter.
...not dressed or graded
...not properly iced or transported quickly enough to arrive in satisfactory condition
...more expensive (in Chicago) than comparable fish obtained from Midwestern states.

To let the buyers speak for themselves:

"Ten years ago I bought from Montana--from a supplier who didn't take proper care of them...He left the guts in too long...He didn't ice them properly...They arrived spoiled...You take the carp and suckers I get from Idaho and Utah...same thing...The truckers don't want to carry wet fish so the only thing they can do is just to sprinkle a little ice on it...and by the time they get here, the ice is melted and it's already turning--already getting bad so I have to move it that one day...They should make a better contract on trucking [so] the fish would have more ice on them...The fish that come from L. A.--they all come in boxes in ice. That comes in pretty good...In L. A., it's private haulers."

(Los Angeles Wholesaler)

"About two years ago...we bought catfish and buffalo from a supplier in Montana...[stopped because]...they were producing enough catfish and buffalo in Wisconsin again...and that's all year round...and you know they can only produce in Montana during the summer. Its too cold...up there in the winter. It freezes over and they can't get the fish out...The cost of transportation was too high for him to bring them in from Montana. We could get them cheaper from Wisconsin...It adds about 5-6¢ a pound to truck them from Montana...Buffalofish out of Montana are a good type...but they're leaner than most...they're not as rich as fish from...those states where the Mississippi River flows...Mississippi River fish are richer, plumper, better."

(Chicago Wholesaler)

"We get buffalo from Montana and carp out of that area at certain times of the year...by October, November, it gets too cold up there, and it freezes so they're out of production...I haven't bought any for a couple of months...primarily because they have production problems...I would say he's probably having trouble getting help.

...In Montana they don't have any facilities or any buildings to dress them...In L. A., they're prepared for dressing them...(Prefer) fully dressed, i.e. scales off, entrails out, and heads off...(Because) you have to have capable experienced manpower to dress them and that's an extra expense because our labor in this market here is an awful lot higher than it would be in Montana...The fish out of L. A. has a fatter meat than the fish out of Montana...I don't know why unless its what they feed them...(Consumers) prefer the fatter fish...That fish out of Montana is not as good as the fish out of L. A. By good, I mean the public--the people that eat this fish--prefer a L. A. fish. Therefore, if it comes in from Montana, you just can't get the money out of it that you can for L. A. fish, so I have to pay less for it."

(Los Angeles Wholesaler)

Attitudes Toward and Experience With Goldeye

None of the buyers interviewed carried goldeye; indeed, almost none of them even knew what a goldeye was. Only two Chicagoans (one retail buyer and one broker) and one Los Angeles retailer had any knowledge of this species, but none of them associated it with Montana. Instead, all three identified goldeye as a Canadian fish, excellent for smoking.

The Chicago retailer made some additional comments about goldeye at the end of the interview which probably should be taken into consideration

in evaluating the market potential for this species. He confided:

"I didn't want to say it on tape, but they've been having trouble with goldeye. They're coming out of infested lakes in Canada...When you cut them, they have maggots or grubs in the flesh...That's why I said the quality would have to be right to establish a market for them in this country outside of New York."

Attitudes Toward, and Experience With, Buffalofish, Carp, and Suckers

All of the buyers were at least vaguely familiar with all three of these species, which they unanimously regarded as "inferior," "cheap," "rough," "scavenger" fish for "low-class" people or "ethnic markets" composed chiefly of Negroes and Jews.

Even though some of these men had built profitable businesses dealing in this type of fish, not even one of them indicated that he had ever eaten any of these fish himself. On the contrary most of the buyers spontaneously proclaimed with pride that they had not tried these fish. Those men who did not deal in these fish seemed similarly proud when they informed the interviewer that such fish were "not in our class."

When pressed, respondents were able to make some distinctions among these three species of fish in regards to their quality, consumption patterns and marketability.

Suckers--were the least favorably regarded of the three species especially by Chicago buyers, none of whom carried this species. As one wholesaler noted, "Nobody wants sucker, it's full of bones." In Los Angeles, one retail chain buyer said that sucker was carried "by a few stores in colored neighborhoods, @ 59¢ per pound." Three of the four Los Angeles wholesalers carried suckers "sometimes" or "twice a year for the Jewish holidays."

Only two of the fourteen respondents were sufficiently familiar with suckers to discuss consumers' preferences for size. One Los Angeles wholesaler said "They want a fair-sized sucker--probably four to five pounds." Another commented that he could sell "all sizes--some customers like them small, some medium, and some large."

The Los Angeles dealers generally depicted suckers as--

..."strictly for the Kosher trade," "sold in the round" to be ground up for gefilte fish--a rapidly declining market being replaced by commercially prepared gefilte fish.
...very "cheap-priced"
..."too bony"
..."from the East," i.e.,Chicago or from the Rocky Mountain states.

Respondents' facial expressions and descriptions of suckers suggested the possibility that the name itself may have heightened their negative reactions to the species by stimulating thoughts of the fish's feeding habits. A Chicago wholesaler commented, "Sucker! They suck up the debris on the bottom of the lake...they don't have any teeth...they suck up the muck... waste materials...all that filth...I wouldn't touch them myself."

One wholesaler who had purchased suckers (and carp) from Utah and from Burley, Idaho reported that deliveries were becoming increasingly irregular and poorer in quality.

Carp--buyers in both cities seemed to be more familiar with carp than suckers, and even though none of the respondents regarded carp as a "big-item," five out of seven in each city reported that they handled carp at least occasionally.

In Chicago, one of the four wholesalers in the study reported buying carp fairly regularly, while a second did so "very, very seldom." Both

chain stores carried carp "in season, in a few inner-city (Negro) stores," and the independent retailer had "Some around the holidays as an accommodation for our Jewish customers." Only one of the seven fish stores surveyed about prices had carp in stock (@ 25¢ per pound) at the time of the call; two others said they handled it "occasionally" (@ 49¢ per pound) or "in the winter" (@ 19-29¢ per pound).

The pattern was similar in Los Angeles, where one of the four wholesalers interviewed carried carp "when it comes in" and two others "bought it twice a year for the Jewish holidays." Like their counterparts in Chicago, the Los Angeles chain store buyers limited their traffic in this species to "a few stores in ethnic neighborhoods," @ 49¢ per pound. Carp was available at the Grand Central Farmer's Market in that city @ 45¢ per pound cleaned and 59¢ per pound cleaned and sliced.

The few respondents who were knowledgeable about consumer's size preferences all agreed that customers wanted a "large" carp. As one noted,

> "Carp's a fairly cheap item. I'd say 5-8 pounds gutted is the most preferred size (in Negro neighborhoods)...On the spiegel carp that goes into Jewish area, they all want bigger fish...12-15 pounds and up."

Most of the buyers regarded carp as a "low-priced" (but not as "cheap" as sucker) "low-class" fish sold "fresh" to one or both of two distinct ethnic groups: Jews and "the lower economic class" or "the colored people."

The Jewish market was viewed as the larger of the two, but as one that was rapidly declining except during "the two holiday periods," when families were more likely to use carp for gefilte fish. One Los Angeles wholesaler commented:

"Demand has fallen way off in the past 20 years. The younger Jewish people wouldn't even think of making gefilte fish (of putting all that work in it) maybe 1 in 1,000 young women might do it today...the others are going to buy the pies."

Other wholesalers echoed,

"Usually you can sell all of it that you can get during the holidays... These Jewish fish actually go up during the holidays they have...the wholesaler price actually goes up 50-70¢ a pound-up to $1.00 a pound...but you're talking about a market that represents maybe ½ of 1/10 of 1% of our business."

(Los Angeles)

"It's only big around the holidays...and during the holidays, it's fine and dandy, but other than that, no...It's not a year-around deal."

(Chicago)

Those familiar with the demands of Jewish customers indicated that these customers wanted to buy as large a carp as possible (12 lbs. and over), and one that was dressed or "gutted" with the head left on. Indeed, as one Chicago retailer explained, "...actually they prefer to have it alive, but they can't always get it that way...they will tend to go to speciality markets to buy it (rather than to a chain store) because there are certain religious specifications that they look for."

The second ethnic group associated with carp was "the colored market," euphemistically referred to as "the lower economic class" or "the Southern market." Buyers were not as familiar with the demands of Negro consumers, but tended to speculate that carp was purchased by this group chiefly because it was inexpensive and to a lesser extent, because "people from the South were brought up and raised with that kind of fish...it's what they got used to."

Most buyers indicated that they had "no idea what the colored trade does with them;" others guessed that they fried or baked them. A couple suggested that carp was purchased by Negro customers in slices or pieces, cut by the fish dealer from a whole carp, gutted and sometimes, headless.

Since, ostensibly, none of the buyers had ever eaten carp, it was difficult for them to specify the characteristics that made it an inferior fish. Most frequently mentioned were aspects of--

texture--(not "flaky," "delicate," "tender," but instead "coarse-grained" or "soft.")
flavor--("muddy," "oily," "fishy," "not tasty," or "too dry--not rich tasting")
and boniness--("too bony")

A majority of the respondents were of the opinion that carp were intrinsically low-quality fish and could probably not be successfully promoted to sell to the broader consumer market.

"They're cheap because they're a lower quality fish--especially in texture...Generally speaking, there's a fair price ratio on these various items that would indicate their acceptability to the majority of the trade."

(Chicago retailer)

"I don't believe that a carp (or a buffalo) are good enough that any promotion will necessarily help their usage...It's not acceptable to most people...who really don't want a fishy fish...I think you'll have to find new uses for it--for instance a chowder."

(Chicago wholesaler)

Buffalofish--were the most favorably regarded of the three species. One Chicago wholesaler and two of his counterparts in Los Angeles specialize in "Southern" fish, including catfish, sheepsheads and buffalofish; one other distributor in each city carried buffalofish "once in a while."

Most of the retailers interviewed carried buffalofish "in season for our Negro customers" or "in a few stores in colored neighborhoods." In Chicago five out of the seven fish markets in Negro neighborhoods that were checked for prices, reported carrying buffalofish regularly or on weekends. Prices ranged from 30 cents per pound to 59 cents. One retailer explained that he usually got 39 cents-49 cents per pound for buffalofish but was currently charging 50 cents because "too much rain and flooding" had resulted in a short supply. All three stores checked in Los Angeles were selling buffalofish @ 79 cents per pound and one charged 89 cents per pound for "Jumbo" sized buffalo weighing 7 pounds and over, which he special-ordered for customers who preferred it because "the bones are larger so it's easier to de-bone."

None of the Chicagoans interviewed were familiar enough with buffalo to specify size requirements, but three Los Angeles buyers were able to do so. They agreed that there were three to four size grades for buffalo:

"small" - up to 2 or 2½ pounds
"medium" - from 2-3 pounds up to 4-5 pounds
"large" - 4-5 pounds and up
and "jumbo" - 7 pounds and up

The concensus was that customers generally preferred the large size.

In contrast to suckers and carp, buffalo was regarded as a "medium" to "fairly high-priced" fish sold mostly to Negro markets and, only in smaller amounts, to "Southern whites" and Jews. Cultural heritage, rather than low price was the most frequently mentioned reason given for Negro demand for this type of fish.

"The colored like buffalo (and catfish and sheepshead). They like fresh fish, and these are fresh...They're raised to eat theee...These fish are native to the Mississippi, and most of your colored have been raised along the Mississippi in the South...It might be part economic, but your buffalo and catfish aren't a cheap fish any more."

(Chicago Wholesaler)

"We carry most of our Southern fish for the colored. They buy 99 percent of our buffalo and catfish...All kinds of people have certain types of fish that they desire...This is the kind of fish they've been bred upon... They know of this type of fish...In ghetto areas these people have been taught to buy this type of fish...It's related to ghettos...economics... family training...When they move out of ghettos, you lose the ethnic market...The style changes...The children aren't brought up with the idea that you must buy this type of fish."

(Los Angeles Retailer)

Most of the buyers seemed to regard buffalofish as having the same basic shortcomings as suckers and carp, i.e., unappealing in flavor and texture and "too bony," "too muddy" or "fishy tasting" and "tough" or "coarse," though perhaps not to as great a degree as the other two. A couple considered buffalofish to be superior to the other two species, particularly in regard to appearance. As one Los Angeles wholesaler explained:

"The buffalo to me has eye-appealing meat. It's white and flaky and the red is nice bright red...I have seen buffalo that was...fat right down to the tail...so that I would almost say if I was hungry enough and had it around often enough, I'd try it...But a regular carp has an orange or reddish type of meat that...does not look good."

Most dealers reported selling buffalo either "HSD"--headless, scaled, and dressed or "gutted" with head left on or "in the round." Some commented that Jews liked to buy "large buffalo in the round" to grind up for gefilte fish. Negroes were said to like both round and dressed fish, which they and Southern whites probably deep-fried in corn meal or baked. However, none of

the buyers gave any evidence of having any direct sources of information regarding the "southern" consumers' preference.

Buyers' Reactions to Six Ideas for Fish Products from Montana

Near the end of the interview, each buyer was presented with a card listing six fish products that might be produced in Montana:

Fish Sausage from Montana

Smoked Goldeye from Montana

Frozen Fish Sticks from Montana (Breaded and Unbreaded)

Frozen Fish Fillets from Montana (Breaded and Unbreaded)

Frozen Fish Portions from Montana (Breaded and Unbreaded)

Pond-raised Frozen Trout from Montana

He was asked for his personal reactions to each and, also, for his opinions as to how consumers might accept each.

Summaries of the buyers' responses follow:

Pond-raised Frozen Trout from Montana--Frozen trout from Montana was the most favorably received of the suggested products. Most of the Chicago buyers displayed some degree of positive reaction, ranging from "that might be all right" to "Definitely so. It's an expanding market. Pond-raising of all types of fish is proving to be very successful."

In contrast, most of the Los Angeles dealers indicated what while they were "interested" in the product, they were currently quite satisfied with the trout they purchased from Idaho and not in the market for a new source. As one wholesaler commented, "I don't see any reason for wanting to have it, the only thing being that Montana would have to explain to me why I would want to buy Montana trout over the trout that I've been with for 35 years."

Smoked Goldeye from Montana--The three respondents who had some previous knowledge of goldeye were mildly positive in evaluating the possible marketing potential for this product.

In contrast, none of the 11 respondents who were not familiar with the species expressed positive opinions. Instead, they were about evenly divided among those who had no opinion and those who were negative about the fish's potential. Buyers in Los Angeles seemed to hold more strongly negative views than their counterparts in Chicago, chiefly because of their feeling that local West Coast smoked chubs were plentiful, satisfactory in quality, and low enough in price to preclude the need for importing a competitive product from some other area.

Other pertinent observations made by respondents were as follows:

a. There is only a small market for smoked fish in this country outside of New York City. (By implication, the greatest consumer market for smoked fish in the U. S. would seem to be found within the Jewish population.)
b. Smoked fish are usually not purchased in the smoked form in the area where they are caught. The normal pattern is for a fish smoker to buy fresh fish, which he proceeds to process locally for local distributors, chiefly to delicatessens.
c. The smoked fish industry and the freshwater fish industry are almost totally separate and distinct institutions. To obtain knowledgeable views on the marketing potential of a smoked fish product, it would be advisable to consult people within the smoked fish industry.

Frozen Fish Fillets from Montana--Most of the buyers in both cities felt that there was a good market for fish fillets; they (sometimes scornfully) referred to "the housewife's" increasing demand "for a boneless, pan-ready piece of fish." However, the respondents--to a man--indicated that their reactions to frozen fish fillets from Montana would primarily depend upon the type and quality of fish used and the price. "Yes! if they've

got good fish," and "I just don't know...I'd have to see what they're talking about--taste it--look at it...smell it" were typical comments.

When asked about their opinions of frozen fish fillets made from buffalofish, carp or suckers, most buyers reacted negatively. Their objections were based on the grounds that these fish--

...were too bony to be filleted
...were not sufficiently flavorful or tender to appeal to most consumers
...were not sufficiently well-known outside the South to sell to most consumers

A couple of them thought that fillet of buffalofish "might sell to colored people if you could get the bones out," but most agreed with the Chicago dealers who said, "If they're talking about carp or buffalo, I wouldn't buy them...I'm not interested in that kind of fish." said a wholesaler. It might go in Negro areas, but the area we cover wouldn't be interested at all under any circumstances...Our customers wouldn't use it...It doesn't have the sex appeal or glamour to it that a fish has to have...or an acceptable name from the point of view of the consumer...sole has a sexy name...Fillet of sole always sells." said a retailer.

Frozen Fish Sticks and Frozen Fish Portions from Montana--Frozen fish sticks and fish portions from Montana evoked similar reactions from buyers in both cities. Although some of them did not personally carry sticks or portions in their businesses, they all agreed that there was a sizable and progressively growing consumer demand for these "convenience" items. As one Los Angeles wholesaler exclaimed: "The country's gone portion-control conscious. Everybody wants something 3 1/2 oz. breaded and frozen that you don't have to do anything to it...you don't have to be a cook or a chef... just throw it into a frying pan or a french fryer."

A majority of the buyers interviewed objected to the idea of fish sticks and portions from Montana because they did not think that the state had an adequate supply of suitable fish to be able to produce competitively priced products. Some of them were so accustomed to thinking of fish sticks and portions as being made of cod and other ocean fish, that they objected on the grounds that Montana could not economically import ocean fish and produce competitively priced products. A typical comment:

"There might be a big business in it, but all you're doing is competing with a world-wide cheap market. The fish stick operators seem to have to sell to the bidding-type institution--like the hamburger stand operator-- and you're fighting off the bottom of the deck. They take any world-wide fish that they can fillet, make boneless and freeze into a block and cut up into sticks."

(Los Angeles wholesaler)

When asked about their opinions of frozen fish sticks and/or portions made from buffalo, carp or sucker, most interviewees responded negatively. Their objections were similar to those expressed in relation to fillets. They did not think that these fish...

...could be adequately de-boned
...were sufficiently flavorful or tender to make a satisfactory product
...were known or accepted outside of Negro ghettos

As one Los Angeles wholesaler remarked, "What fish? That's what's important. (Buffalo, carp, suckers)...might sell in colored areas. Otherwise, no. They're too bony, don't taste that good, not known or liked by the general public and they wouldn't try a new fish, because a customer would come in and say 'what the heck is a buffalo? Does it have horns on it or something?'...It's not a familiar fish. Most people won't know about it...and they don't look appealing."

Fish Sausage from Montana--Fish sausage failed to evoke a positive reaction from any of the buyers interviewed. Their chief objections were that fish sausage lacked consumer appeal. Several commented that this type of product had been tried in the past and had not "gone over."

"It's been tried on a number of occasions and has never been successful."

(Los Angeles wholesaler)

"There's a fish bologna by someone in Iowa who raises rough fish of some kind...carp...we tried that and it was not successful."

(Chicago retailer)

"There have been other fish sausages from other sources made out of your cheaper buffalo, carp and so on...there have been several of these on the market...when there was a Friday abstinence, you theoretically could envision going down to, say Notre Dame University and on a Friday selling them a jillion fish hot dogs...but now I don't know exactly what their usage would be...you'd have to sell them on the basis that they are healthier or higher protein or something and that's a pretty hard thing to sell."

(Chicago wholesaler)

"Forget it! Over seven or eight years ago, I was instrumental in trying to develop a fish hot dog...we tested this out with children and they said swell!...We made them out of tuna...but the housewife wouldn't even try them to see how good they were."

(Chicago wholesaler)

Summary of Chief Findings and Impressions

1. Most of the retail and wholesale buyers interviewed in this study purchased a wide variety of fish and seafoods among which freshwater varieties constituted at most, less than 10 percent of their total volume and probably an even smaller percentage of their total profits. They displayed a commensurate low degree of interest in, and knowledge about, the subject of freshwater fish.

2. All of these men regarded buffalofish, carp and suckers as relatively low-priced, low-quality species. The chief factor behind their negative assessment seemed related to the species' mode of eating. These fishes' reputation as "bottom feeders"seemed to evoke unpleasant connotations of their ingesting "debris" and "filth" from "polluted waters."

3. Carp and suckers were primarily regarded as fish "for the kosher trade," the members of which were said to want fresh whole or gutted larged-sized types for gefilte fish. It was thought that the most important type of retail outlet consisted of small independent stores that catered to the Jewish trade. This market was viewed as extremely busy "during the two holiday seasons," at which time most of the dealers interviewed reported carrying at least a few of these species "to accommodate our Jewish customers." The year-around market for these fish was, on the other hand, viewed as declining--or at least changing from one for wholesalers to one for processors--due to the rapid growth in usage of prepared gefilte fish.

4. Buffalofish were primarily regarded as fish for "the colored market," with a few going to "Southern whites" and Jews. Negroes were thought to prefer to buy their buffalofish fresh, dressed, headless, scaled and sliced for frying. Though buyers did not think buffalofish was "a good enough fish" to promote for sale to other groups of consumers, they were in general agreement that the demand for buffalofish exceeded the current supply and showed no signs of declining. Most of the wholesalers carried it from time to time. However, the bulk of the supply in both cities seemed to be handled by a small number of wholesalers who specialized in "Southern" or "freshwater" fish of "that type."

5. These buyers who were most experienced in purchasing buffalofish considered Louisiana buffalofish to be far more satisfactory than buffalofish from Montana. They reported that the Southern consumers preferred the "fatter, richer" L. A. fish to its leaner counterpart from Montana and were, therefore, willing to pay more for the fish from L. A. More important, they complained--to a man--that Montana buffalofish, were not adequately dressed or graded, were not iced properly for transport, were not shipped regularly, and/or arrived in poor quality.

6. Almost two-thirds of the respondents have never purchased fish from Montana because, "nobody every tried to sell me any." They were not aware of what types of fish products Montana suppliers might have to offer and were open-minded on the subject, that is, they had no strong predispositions to view Montana fish either positively or negatively and were inclined to suppose that fish from this state would be "up to standard" and "competively priced" unless and until they found out differently.

7. The type of fish which buyers most frequently associated with "the Rocky Mountain States" was brook trout from Idaho or Utah. Almost all of the interviewees had purchased this fish and were very pleased with its quality, flavor and rapid transport. They reacted positively to the idea of frozen trout from Montana, although a few thought that Rocky Mountain trout was too high-priced in comparison to that from Denmark and Japan.

8. Respondents did not react favorably to the idea of buffalofish, carp and suckers in processed forms such as sausage, fish sticks, portions or fillets. Their major objections were that these fish were "too bony" to

process and not sufficiently flavorful, tender or familiar to consumers to have much appeal outside of Negro ghettos.

9. Few of the buyers were familiar with goldeye or with the smoked fish market in general. They advised contacting smoked fish processors for assessment of the potential for smoked goldeye from Montana.

CHAPTER V

ALTERNATIVE USES FOR MONTANA FISH

Past and present attempts at commercial use of Montana fish have not been outstandingly successful. As shown in Table 4 (page 12) gross sales by Montana fisheries in 1967 were about $90,000. Buffalofish, with a sales value exceeding $50,000 was the most important Montana species in 1967. Too few catfish were caught to have any economic significance, and the price--2¢ per pound--was too low to make carp, suckers, and sheepshead important. Goldeye are a potentially valuable species, but the 1967 sales of the one individual fishing for them were only $15,613 so he did not fish at all in 1968, but instead obtained a construction job and made arrangements to sell the goldeye caught by two inexperienced young men who bought his equipment. This arrangement was not successful because by early August, 1968, they had caught only one load of fish.

Using Montana Fish and Game Department minimum estimates as a basis, the future for buffalofish looks moderately promising. Table 3 (page 8, Chapter 1) shows a minimum sustained yield estimate of 1,250,000 pounds annually. If Montana fishermen could sell this quantity for the present price of 20 cents per pound, sales would be $250,000. The error in this sort of projection lies in the price/quantity relationship. The bulk of buffalofish is now being sold fleeced, directly to west coast retailers by the fishermen. By selling in this way, fishermen are receiving payment not only for the fish but for some processing and for performing the wholesaling function as well.

If it were necessary to sell in Midwest wholesale markets, a substantially lower price would be realized and costs would be reduced slightly. The September 3, 1968 Chicago wholesale market report on buffalofish was "Supply light, demand light to moderate, market about steady. Round: native: jumbo (8 pounds and over) 18-20, number 1 (4-8 pounds) 15-17, medium (2-4 pounds) 10-12."[21] Of course, transportation costs of some 8 cents per pound must be subtracted from these prices to determine the price the Montana fishermen would receive. As an example, if the Montana fisherman sold Number 1 fish at 16 cents per pound and then subtracted the transportation cost he would receive a net price of 8 cents per pound. If 1,250,000 pounds were sold, net sales would be $100,000. In view of both quantity and price, buffalofish remains the Montana commercial species with the greatest fresh fish potential.

Sustained yield estimates for goldeye are especially hazardous because so little is known about this species in Montana waters. If the minimum estimate of 500,000 pounds annually could be caught by experienced fishermen and the current average price of 25 cents per pound is accepted, the market potential for this fish would reach $125,000. A brief review of Chapter 3, especially Table 1 shows that at no time in the near future would 500,000 pounds of Montana fish be absorbed by the Winnipeg market without serious results to the goldeye price structure. In 1967, when Canada imported 119,000 pounds from the United States, stocks on hand reached 400,000 pounds and Canadian middlemen refused to buy more from the United States.

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21 Fishery Products Report C-172, U. S. Department of the Interior, Bureau of Commercial Fisheries, Division of Economics, Market News Service, p. 1.

Montana fish must compete in this market not only with Canadian fish, but also with fish from several Midwestern states. The extent of this Midwestern competition is hard to judge at this time because of reports that South Dakota goldeye have proven to be too oily for Canadian tastes. In time, the Canadian demand might be expanded, but market expansion efforts are very costly and risky, a subject discussed in more detail below.

If 100,000 pounds of Montana goldeye could be sold in Canada annually, gross sales would be $25,000, if the price remained 25 cents per pound. If fish produced in other states prove unsatisfactory to Canadian buyers and if Canada fails to increase its own production, the price might return to the 50 cents per pound level of the early 1960's. In this case, Montana fishermen could expect far larger dollar sales.

The minimum sustained yield estimate of 4,250,000 pounds of carp and suckers would probably stagger the imaginations of most Montanans. However, when the price received by the fishermen is only 2 cents per pound, this quantity of fish represents only $85,000 of gross revenue, hardly enough to start an economic revival.

In an effort to find higher value uses for these low priced fish, several other intermediate and end products were considered and investigated. These products were divided into two broad categories--those for human consumption and all others lumped together as industrial. Some of the problems of developing new consumer and industrial products in Montana were considered by Cameron.[22] His conclusions were that barring hostile action,

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22 James B. Cameron, Industrial Growth in Montana, Montana State University, Bozeman, 1967. An unpublished doctoral dissertation, p. 206.

or increasing threats of such, against the United States that would lead to governmental decrees for industry to disperse and decentralize, the greatest hope for industrial development of Montana would be in the finding, developing and processing of natural and agricultural resources found within the state.

Market-oriented firms have had,and are expected to continue to have problems in a Montana location. Some development can be expected in small firms that have few or no economies of scale. These firms produce for a small and slowly expanding Montana market. They occupy something of a quasi-monopolistic position because of their locations, but by the nature of this position they will continue to remain small.

From the previous discussion it can be seen that the manufacturing of products for sale in major population centers is unlikely to be a practical alternative for Montana fisheries. Economies of scale are very real in marketing, with large firms holding a dominant position in the production and sale of most food store items. For example, the United States Supreme Court ruled in 1967 that Proctor & Gamble must sell its Clorox Chemical Company which it acquired in 1957.[23] The court ruled that because of its great marketing and advertising power Proctor & Gamble would effectively monopolize the laundry bleach field.

Further evidence of the difficulty of introducing new consumer products is contained in the following statements by Augustine R. Morusi, President of the Borden Company, a major producer of nationally distributed food products. "For about 30% to 40% of the product ideas, consumers tell us bluntly,

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23 87 Supreme Court 1224 (1967).

'Forget it'," Mr. Morusi said. "About 10% to 15% of the ideas are welcomed enthusiastically. The remaining 50% fall into a grey area--well worth pursuing further, but needing careful testing at each succeeding stage..."[24]

Borden conducts some 16,000 taste tests alone in its Consumer Testing Laboratory each year, and many products are tested over and over again. Borden's Swiss Style, fruit-flavored yogurt, for example, went through the taste-test mill nine times before the company was satisfied that it had a product the consumer would be satisfied with. So far as the company is concerned, the process of getting a new product to the market is "long, painstaking, risky, and costly," Mr. Morusi said.

An additional problem in the use of carp and suckers in the making of higher priced food products is an expected negative consumer reaction to these species as illustrated in the Missoula pilot study described later in this chapter. Subterfuge is not a legal way out of this situation since the United States Food and Drug Administration requires that "labels must bear the common or usual name of the fish."[25] Further, "food labels or labeling (circulars, etc.) must not be false or misleading in any particular (403(a))," and "a food must not be sold under the name of another food (403(b)). Example: canned bonito fish misbranded as tuna fish."[26]

Two products considered possible at the beginning of this study were rejected not only because of the foregoing considerations, but also because

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24 Marketing Insights, May 6, 1968, p. 21.

25 Requirements of the United States Food, Drug, and Cosmetics Act, Food and Drug Administration, U. S. Department of Health, Education, and Welfare, Publication No. 2/Revised September 1967, p. 20.

26 Ibid, p. 2.

interviews with people in the trade indicated a belief in strong consumer resistance. The first of these products was fish sausage, which has been tried and failed to sell well in this country. The second was smoked fish, which was in considerable consumer disfavor following several deaths due to botulism poisoning traced to smoked Great Lakes fish containing the organism clostridium botulinum type E.[27] Other possible uses of Montana fish are considered in the following pages.

Fish Protein Concentrate

"It may be the greatest boon to mankind in helping to give him a sound body and a sound mind since, I guess, the beginning of time."

Vice President Hubert Humphrey[28]

Such laudatory statements about the merits of fish protein concentrate (FPC) or fish flour have been quite common in recent years. In addition to providing a protein-starved world with the nutrients necessary to reduce starvation, birth defects, and retarded mental development, FPC is expected to help revitalize the languishing U. S. fishing industry.[29] The foundation upon which this transformation is to be built is the utilization of cheap but abundant fish--fish that have previously been labeled as unfit for human consumption by the American public. Since the species being commercially fished in Montana fit into this category, at least generally, it is necessary

27 UIR/Research Newsletter, the University of Wisconsin, November 1966, p. 9.

28 Time, March 17, 1967, p. 68.

29 U. S. Department of the Interior, Bureau of Commercial Fisheries, Commercial Fisheries Review, February, 1967, p. 1.

to consider the possible effects of FPC production on Montana fisheries.

Fish flour in various forms has been produced and consumed by inhabitants of several Asian countries for centuries.[30] However, it has only been within the last few years that a process has been developed which results in an odorless and tasteless product supposedly adaptable to existing diets. This process, developed by the U.S. Bureau of Commercial Fisheries, is one of two methods that has U.S. Food and Drug Administration approval; and it marks a significant step forward in the production of a palatable fish flour.

These processes must be conducted under carefully controlled conditions in order to comply with rather exacting FDA specifications and standards. The FPC must be made from "whole, wholesome hake and hakelike species handled expeditiously and under sanitary conditions..." In order to reduce the fluorides, an excess of which may mottle the teeth of children, partial removal of the bone is necessary. Extraction of fats and moisture can be accomplished only with isopropyl alcohol or with ethylene dichloride followed by isopropyl alcohol. Protein content must not be less than 75 percent by weight, moisture content must not be over 10 percent, and fat content cannot be above .05 percent. Nor must the final product have "more than a faint characteristic fish odor and taste."[31]

After the process was approved by the FDA in February 1967, the

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30 C. J. Bottemanne, Principles of Fisheries Development (Amsterdam: North-Holland Publishing Co., 1959), pp. 248-49.

31 U.S. Department of the Interior, Bureau of Commercial Fisheries, Commercial Fisheries Review, March, 1967, p. 57.

Bureau of Commercial Fisheries was granted approval to build an experimental plant in the Pacific Northwest to determine bases for estimating the cost and optimal size of commercial plants.[32] No plant was scheduled to begin operations until the spring of 1968; consequently, no data on costs are available at this time.[33] Preliminary information suggests that FPC can be produced in the United States for a cost to the consumer of about 24 cents per pound, based on a fish to flour conversion ratio of 6 to 1.[34] This cost may be unrealistic because even if hake can be bought for 5 cents per pound--the average price of Atlantic hake in 1965[35]--the cost of whole fish per pound of FPC would be 30 cents; that is, the basic raw material would cost more than the projected price of the finished product. Unless Pacific hake can be harvested more cheaply than Atlantic hake has been--for no more than 3 cents per pound--a more accurate estimate of cost to the consumer may be in the neighborhood of 32 cents per pound, which was the price being charged by a Swedish producer of FPC in 1967.[36] Yet even made from fish worth only 2 cents per pound, FPC costs from twice to three times as much as other protein concentrates, such as that derived from oil seed, when calculated on a per unit of protein basis.[37]

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32 Ibid., April, 1967, p. 9.

33 Ibid., June, 1967, p. 1.

34 Ibid., February, 1967, p. 1.

35 U.S. Department of the Interior, Bureau of Commercial Fisheries, Fisheries of the United States-1965, C.F.S. No.4100 (March, 1966), p. 3.

36 Commercial Fisheries Review, October, 1967, p. 63.

37 Ibid., July, 1967, p. 6.

But more and more experts are beginning to agree that the major problem for all protein concentrates has little to do with the costs or technology of production. Instead, the greatest difficulty lies in obtaining consumer acceptance of concentrates as part of the daily diet.[38] Those who are aware of the need usually prefer, and can afford to demand, high quality sources of protein, primarily meat and fresh or frozen seafoods. A number of attempts are being made to overcome this difficulty through the introduction of protein concentrates into fairly universal confections, such as soft drinks and candy, but more work will have to be done in this area if success is to be achieved.

Turning to Montana, it is fairly obvious that our capacity to compete with marine fisheries in the production of FPC is almost nonexistent. Presumably the production and marketing of FPC from carp for other than experimental purposes would be illegal. Experiments are now being conducted on the feasibility of using other fish in the production of FPC, and FDA approval may eventually be forthcoming. Even if this does happen and species common to Montana may be used, the state's competitive position will be little changed from the present. The large scale of operations being contemplated, presumably necessary for efficient production, will utilize whole fish at a rate simply unavailable from Montana waters. The experimental plant being built by the Bureau of Commercial Fisheries will be able to process 50 tons of raw fish every 24 hours,[39] as will a new plant being built in Morocco.[40] In all likelihood, the tendency will be toward even larger plants if problems of consumer acceptance can be solved.

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38 Ibid., p. 5.
39 Ibid., June, 1967, p. 1.
40 Ibid., June, 1965, p. 65

Institutional Use

It has been proposed that an additional market for Montana fish might be found in the state's educational and custodial institutions. The proposition was put in terms of why students at Montana colleges and inmates of the institutions should not eat Montana fish.

To help determine the feasibility of developing this market, telephone calls were made to food service directors or food buyers at ten of the state's eighteen educational and custodial institutions. They were asked their opinion of carp, buffalofish, and suckers as food, their opinions about whether such fish would be acceptable to diners at their institutions and whether they and their assistants would be willing to prepare and serve such fish.

None of the food service directors interviewed in the educational institutions were willing to accept such fish. Their stated opinion was that students were paying for high quality food and would not accept so-called rough fish. Mr. Robert Blakely, Food Service Director at the University of Montana, added that menus were prepared well in advance and publicized, not only to the students, but also to their parents. He also reported that food service employees dislike working with fresh fish--preferring frozen fish sticks, a product nct now made from Montana fish.

The attitudes of food service directors at the custodial institutions were similar even though they are serving a captive market. They were somewhat more favorable but not willing to endorse the idea completely. An additional problem was encountered at the State Training School (for mentally

retarded children) and at the Center for the Aged. Many inmates in these institutions are unable to cope with fish bones and so must be served fish sticks or other boneless items.

The economic futility of trying to sell to the few institutions that might accept Montana rough fish is shown by the Center for the Aged at Lewistown. Here the food service director reported 145 residents and 23 employees eating 435 meals per day and eating fish two times a week. The total consumed was only ninety pounds per month or 22½ pounds per week--surely not enough to justify setting up any sort of special distribution system. It would also be far too little to make any economic difference to the state's fisheries. To illustrate the small size of this market, the number of inmates and employees at custodial institutions is shown in Table 22, estimates of University System enrollment, Autumn 1968 are shown in Table 23.

In addition to telephone interviews with food service directors, a pilot study was conducted in Missoula, Montana, to determine the public attitude toward the use of rough fish at home and in public institutions. While such a pilot study with only 100 subjects interviewed in one city is not intended to be conclusive, it is suggestive. Several conclusions drawn from this preliminary study are interesting:

Respondents were rather consistent in their approval and disapproval of the sale and consumption of the various types of fish studied. For example, between 31 percent to 39 percent of the respondents objected to family consumption of carp, public sale, or use in state institutions. The range of objections for suckers was 52 percent to 61 percent. Interestingly, while rather massive indifference exists toward carp and suckers as indicated in the survey of attitudes, a majority of respondents objected to sale and consumption of suckers; a third indicated disapproval of the sale and consumption of carp. Overall, it would appear that both fish would encounter strong rejection from those persons surveyed.

The complete study report is presented in Appendix 1.

These preliminary findings, when combined with the comments of food service food buyers and considerations of the small quantities of fish consumed in many state institutions, lead to the conclusion that efforts to increase in-state institutional consumption of Montana rough fish would not be economically advisable.

Table 22

Inmates and Employees of Montana Custodial Institutions
1967

Institution	Inmates	Employees	Total
Veterans Home	57	18	75
State Hospital, Warm Springs	1,381	617	1,998
State Prison	524	193	717
State Hospital, Galen	208	196	404
Montana Center for the Aged	145	23	168
State Industrial School	146	97	243
State Training School & Hospital, Boulder (1966)	860	290	1,150
Montana Childrens Center	135	59	194
State Vocational School for Girls	64	48	112
Swan River Youth Forest Camp (July 1, 1968)	30	24	54
TOTALS	3,550	1,565	5,115

Source: State Department of Institutions, Helena, Montana.

Table 23

ANTICIPATED UNIVERSITY SYSTEM ENROLLMENT
AUTUMN 1968

School	Enrollment
Montana State University, Bozeman	7,200
University of Montana, Missoula	6,700
Eastern Montana College, Billings	3,350
Northern Montana College, Havre	1,365
Western Montana College, Dillon	950
Montana Tech, Butte	650
Total	20,215

Source: "6-Unit Enrollment May Top 20,000," The Missoulian, September 12, 1968, p. 1.

Pet Food

Despite the increasing demand for fish as a basic ingredient of pet foods,[41] there is little chance that a viable pet food plant could be established in Montana. As with the production of FPC, the limited supply of fish precludes operations on a scale comparable to pet food plants on marine coasts. For instance, pet food plants along the coast of the Gulf of Mexico require 6,000 to 7,500 tons of fish per year, which is the year-around production of about 42 shrimp trawlers.[42] Moreover, since these are trash fish, caught incidental to the main operation of a fishing vessel, they can be harvested and sold for no more than 1 cent per pound,[43] which is only one-half the price necessary to provide Montana fishermen with a subsistence income. This low price also makes it impossible to deliver Montana fish to marine coast plants at competitive rates. Transportation costs alone would drive the price well above the 1 cent per pound maximum paid for marine fish. Further, pet food is manufactured and sold by very large firms with substantial advertising budgets. The difficulty of breaking into this market would be tremendous.

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41 The Potential Use of Trash Fish Caught by Shrimp Trawlers, Small Business Management Research Reports (Miami: University of Miami, May, 1963), p. 18.

42 Ibid., p. 19.

43 Ibid., p. 9.

Fish Meal and Oil

Since the most common and valuable use of industrial fish is in the production of fish meal, oil, and solubles (accounting for 86 percent of the catch and 77 percent of the total value in 1965),[44] a seemingly obvious way of utilizing Montana fish is the reduction process. Not quite so obvious are economic conditions in the industry which appear to relegate Montana fisheries to a noncompetitive position.

The production of fish meal has been carried on for centuries. Originally the fish were laid out in the sun to dry before being ground, by mortar and pestle devices, into meal--a method still employed in some underdeveloped countries. Today gigantic plants are in operation throughout the world which use fairly complicated processes and machinery.

An indication of the size of plants in operation can be found in the latest fishery statistics. In 1965 the 33 menhaden meal and oil plants in the United States used about 1,726,000,000 pounds or 863,000 tons of raw fish to produce 175,959 tons of scrap and meal, about 87,601 tons of gil, and 73,180 tons of solubles.[45] It is also interesting to consider the following brief description of an anchovy fishing port in Peru. "About 400 fishing boats leave in the early hours of the morning for a five hour trip to where the fish are. At one letting down of the net a 140 ton boat

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44 Calculated from: U.S. Department of the Interior, Bureau of Commercial Fisheries, Fishery Statistics of the United States, 1965, (Washington, D.C.: Government Printing Office, 1967), p. 38.

45 Fishery Statistics of the United States, 1965, p. 41,73, &75. The figure given for the weight of menhaden used in the fish meal industry is minus a small amount used for bait and canned animal food.

can catch over 132 tons of fish."[46] This is one-third of the carp, sheepshead, and suckers caught in Montana in all of 1967.

Though gigantic meal plants seem to be the rule, there have been numerous attempts to develop a small, efficient, and more flexible plant able to utilize the trash fish and wastes from small operations. One company now has on the market a unit capable of processing 1½ to 4 tons of input every 12 hours by using cyclonic mill dehydration, a variation of the dry-reduction process. The plant is designed to operate on board shrimp trawlers or other small vessels or on shore, and to utilize a variety of raw materials, such as offal, shellfish and crustacea, whole raw fish, and even vegetable matter. Without any accessories, such as an oil press or pelletizer, this, the smallest unit on the market, costs $19,500 f.o.b. Florida.[47] Whether or not these small plants will be able to compete with large plants, and to therefore survive, is a question yet to be answered.

The major use of fish meal in the past was as fertilizer, but today it is primarily and increasingly in demand as an animal feed supplement. Seventy to eighty percent of all fish meal, both domestic and imported, is used in the rations of broiler chicks; consequently the potential demand for fish meal is strongly linked with the number of chicks placed each year.[48] For the past three years this number has remained relatively

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46 Chimbote: "A Port Fed on Fishmeal", Maryknoll, Oct. 1968, p. 36.

47 From a sales brochure: "Fishmeal in Seconds," Vero Beach, Florida.

48 U. S. Department of the Interior, Bureau of Commercial Fisheries, Industrial Fishery Products: Situation and Outlook, April, 1968 Washington, D. C.: Government Printing Office, 1968), p. 20.

constant, yet the demand from the broiler industry has risen considerably. The increase is attributed to a shift from other types of feed to fish meal; that is, fish meal constituted 4.9 to 5.6 percent of broiler rations in 1967 as compared to 3.9 to 4.5 percent in 1966.[49] This in turn is attributed to a decrease in the price of meal and in the ratio between the price of fish meal and the prices of major competing feeds, such as soybean meal. The menhaden catch in 1967 was 11 percent below that of 1966 and the lowest since 1951.[50] Without an adequate raw material source, the Atlantic and Gulf coast industrial fisheries operated, and are operating, well below capacity;[51] and United States production of meal decreased by 12 percent.[52] The high prices expected from a short supply and a strong demand failed to materialize because of the abundant world supply available for import.[53] In fact, the average price of domestic meal fell from $163 per ton in 1966 to $140 per ton in 1967.[54]

As shown in Table 24, the number of chickens on Montana farms and ranches

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49 Ibid., p. 21.

50 Ibid., p. 6.

51 Letter from Edwin B. Joseph, Assistant Director, Virginia Institute of Marine Science, Gloucester Point, Virginia, July 24, 1968.

52 Industry Fishery Products: Situation and Outlook, p. 3.

53 Letter from Edwin B. Joseph.

54 Industrial Fishery Products: Situation and Outlook, p. 4.

has declined substantially since 1956. This suggests that no substantial increase in demand for fish meal should be expected in Montana in the near future.

Fish oils are used in the production of pharmaceuticals, plastics, and chemicals. A large market also exists in the European margarine industry.[55] Since fish oil is produced as a by-product of the fish meal process, supply is inextricably linked to the level of fish meal production. Consequently, the low catch of menhaden, which resulted in a decrease in the production of fish meal, also contributed to the 27 percent decline in the output of fish oil in 1967.[56] Again the short supply could be expected to engender high prices; actually, the average price fell from 9.4 cents per pound in 1966 to 7.0 cents in 1967.[57] The depressed prices can best be explained by the decreased demand from United States industry and, more importantly, from foreign users, and the increased supply available on the world market.

Fish solubles, which are used as an additive for animal feeds, are generally affected by the same factors which influence the fish meal market. In 1967, therefore, supply was down and prices were low when compared with the preceeding year.[58]

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55 U. S. Department of the Interior, Bureau of Commercial Fisheries, Commercial Fisheries Review, July, 1966, (Washington, D. C.: Government Printing Office, 1966), p. 3.

56 Industrial Fishery Products: Situation and Outlook, p. 4.

57 Ibid., p. 5.

58 Ibid., pp. 30-31.

Table 24

ALL CHICKENS ON FARMS AND RANCHES, MONTANA

	Number	Value
1956	1,473,000	$1,841,000
1957	1,431,000	1,789,000
1958	1,364,000	1,705,000
1959	1,361,000	1,701,000
1960	1,235,000	1,420,000
1961	1,170,000	1,462,000
1962	1,163,000	1,396,000
1963	1,129,000	1,411,000
1964	1,052,000	1,210,000
1965	1,042,000	1,146,000
1966	1,034,000	1,292,000
1967	1,169,000	1,344,000

Source: Montana Agricultural Statistics, Vol. XI, Montana Department of Agriculture, Statistical Reporting Service, Helena, Montana, August, 1967, p. 68.

Both these low prices, which continued into 1968, and the relatively small volume of fish available from Montana waters are major barriers to the establishment of a viable fish meal industry in the state, as can be demonstrated by using hypothetical plants operating at different levels. Fishermen are currently receiving about 2 cents per pound for carp (Table 4) and related species on the fresh fish market. It is supposed that this figure roughly approximates opportunity costs; that is, the fishermen would not provide fish for the industrial market at a lower price than they can obtain in the fresh fish market.

Fish to meal conversion ratios can vary somewhat with the species of fish and the particular process being used, but 5:1 is a generally accepted figure.[59] The percentage of recoverable oil varies much more, depending on the process, the species, and even the time of year the fish are caught, which makes the use of any one figure questionable; however, it is likely that oil equal to 7 percent of the weight is the maximum that can be extracted from carp.[60] Using these figures, one ton of whole fish should yield 400 pounds of meal and 140 pounds of oil.

The prices that can be expected from the products are, perhaps, the most difficult to estimate because of fluctuating market conditions. In

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59 Letter from Edwin B. Joseph.

60 Based on a maximum fat content of 12.5 percent. Walter G. Jones, "Potential Production of 'Rough Fish' in Great Lakes Area," Pet Food Industry, April, 1959, as reprinted in U. S. Department of the Interior, Bureau of Commercial Fisheries, Fishery Resources for Animal Food (Washington, D. C.: Government Printing Office, September, 1960), p. 4.

this study it is presumed that oil can be sold for 7 cents per pound or $140 per ton, the average price received on the east coast in 1967,[61] and meal for $10 per hundredweight or $200 per ton, the approximate delivered price in Montana during the first half of 1968.[62] The reason for using the latter figure is that since current consumption of fish meal in Montana is about 500,000 pounds per year,[63] there is a good possibility of selling the meal in Montana at Montana prices. Fish oil, on the other hand, is used in industries which are practically nonexistent in Montana. Thus the local demand is insignificant; and the market price near the point of use minus transportation costs more accurately reflects the price that could be anticipated in Montana, though in this case transportation costs are ignored. No price for solubles need be designated, for plants of the size being contemplated do not process the stickwater into solubles.

Two levels of operation are considered. The first, 430,000 pounds or 210 tons per year, is the average catch of carp, white carp, and suckers for the years 1964-1967 (Table 4). The second, 2,000,000 pounds or 1000 tons per year, is the catch necessary to provide 80 percent of the fish meal purchased by Montanans and to keep the smallest fish meal plant operating full time during the 7 month fishing season. This latter figure

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61 Industrial Fishery Products: Situation and Outlook, p.5.

62 Telephone conversation with Roy Meyers, Montana Flour Mills, Missoula, Montana.

63 Ibid.

does represent a five-fold increase over the 1964-67 average catch, but it is well within the capacity of Montana waters according to a recent estimate (Table 3).

Projected Plant # 1

NET SALES

Tons		Value
42	Meal @$200 ton	$ 8,400
14.7	Oil @$120 ton	1,764
	Total	$10,164

LESS

Tons		Value
210	Carp @$40 ton	$8,400
	GROSS MARGIN	$1,764

GROSS MARGIN as a percentage of Net Sales--approximately 17%.

Projected Plant # 2

NET SALES

Tons		Value
200	Meal @$200 ton	$40,000
70	Oil @$120 ton	8,400
	Total	$48,400

LESS

Tons		Value
1,000	Carp @$40 ton	$40,000
	GROSS MARGIN	$ 8,400

GROSS MARGIN as a percentage of Net Sales--approximately 17%

As can be seen, at either level of production the gross margin is not enough to pay wages, taxes, depreciation, marketing costs, and a capital investment cost of at least $19,500, the price of the most basic processing equipment. Thus it appears that a fish meal plant is economically unfeasible in the state of Montana.

Liquid Fish

Because of the process of enzymatic hydrolysis, auto-lysis, or self-digestion, liquid fish is one of the easiest products to produce from whole fish or scraps. In this process, fish are placed in a container aboard a fishing vessel and enough hydrochloric acid to maintain a pH of 2.0 is added.[64] If small fish or scraps are used no grinding is necessary. Two to six days are necessary for complete hydrolysis to occur. Separation of liquefied fish and indigestible material can be accomplished by decanting and screening.

"The greatest merit of the process is that it permits the collection of small to fairly large quantities of trash fish at a very low cost. No lot of fish is too small to process. In comparison, the fish reduction process for making fish meal and solubles requires quantities of fish close to the limit of the rated capacity of the plant. This method appears to be one way of collecting trash fish on a commercial basis, because ice or costly refrigeration is not needed for preservation."[65]

The liquefied fish, after removal of the indigestible portions, is about 85 percent liquid and 15 percent solids with 1.5 percent nitrogen

64 The Potential Use of Trash Fish Caught by Shrimp Trawlers, The Institute of Marine Science, University of Miami, Miami, Florida, 1963, p. 13.

65 Ibid., p. 13.

and 9 percent protein. The high moisture content effectively removes this product from competition with other sources of nitrogen and proteins. Evaporation of other methods of removal of large quantities of water is expensive and with some species of fish causes the protein molecules to solidify, resulting in a gelatinous mass.

A study of potential users, described in the University of Miami report, revealed no interest in liquid fish on the part of chemical, fertilizer, and pet food companies. Because of its high water content, liquid fish was considered too difficult and expensive to transport and use. The conclusions reached in the Miami study were almost completely negative.

A hitherto uninvestigated market for liquid fish would seem to exist in the house plant and home garden fertilizer field. One advertiser in Organic Gardening, a magazine with over 200,000 subscribers, which specializes in "Natural Gardening" sells fish fertilizer at $6.50 a gallon.[66] This fertilizer is said to contain 5 percent nitrogen, 2 percent phosphorus, and 2 percent potash, a total of 9 percent plant food. Since a gallon of water weighs approximately eight pounds, it can be seen that the buyer will be getting less then 3/4 pound of plant food for $6.50.

Commercial chemical fertilizer containing 16 percent nitrogen and 20 percent phosphorous can be bought at the Western Montana Coop in Missoula for $3.25 per fifty pound bag. Since this contains 36 percent plant food it is possible to buy 36 pounds of plant food in chemical form for the price of 3/4 pound of plant food derived from fish.

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66 Organic Gardening and Farming, Rodale Press Inc., Emmans, Pennsylvania.

Another advertisement in Organic Gardening offers fish meal for sale at 5 pounds for $3.00, six times the price for which it can be purchased in Missoula. The conclusion is obvious. There is a comparatively small group of people willing to pay a very high price for "natural" fertilizer. Perhaps a vaguely remembered history lesson, in which Squanto taught the Pilgrims to bury fish in each hill of corn, has inspired in many people a belief in the efficacy of fish fertilizer. It should be pointed out that fish fertilizer contains traces of many other elements in addition to those listed.

CHAPTER VI

SUMMARY AND CONCLUSIONS

The small amount of commercial fishing in Montana has occurred since the building of artificial reserviors in the Missouri River system. Several early attempts to establish a commercial fishery failed, but now there are three fishing enterprises at work in the state. Two of these have survived a number of years and appear to be rather permanent. The third is still in the formative stage and may--or may not--continue. Sales of fishery products have fluctuated over the years with a long term upward trend. In 1967 sales of 1,275,000 pounds of fish resulted in $90,000 of gross receipts to the fisherman.

This study was an effort to identify and describe present markets for Montana fish, and to estimate future demand for present fisheries' products as well as the demand and production feasibility of selected alternative products. Field data were obtained from fishermen, fish and wildlife specialists, and fish wholesalers in Montana; from wholesalers and retailers in Chicago and Los Angeles; and from a random sample of consumers in Missoula, Montana.

Per capita fish consumption has remained almost constant for many years. Total demand has grown only as fast as population. During recent years, there has been a steady trend of consumer demand away from "fish" and toward shell fish. Accompanying this trend there has been an increase in the consumption of imports (especially shrimp) and a decrease in the consumption of domestic fish. Housewives are turning with increasing frequency to the purchase of convenience foods--frozen and breaded fish, fish sticks, and shrimp--and away from foods requiring home preparation. All these trends are working

against the type of inexpensive fish produced in Montana waters--especially carp, buffalofish, and suckers.

These Montana species are further handicapped by a popular belief--shared by Montana consumers and Chicago and Los Angeles wholesalers and retailers--that they are dirty, coarse, muddy tasting, and bony..

At present, the principal demand for carp, buffalofish, and suckers is in two ethnic markets. Low income Negroes and some whites from the South purchase buffalofish when they are able and carp or suckers at other times. Buffalofish is not cheap, retailing sometimes at 59 cents per pound, so the much less expensive carp and suckers are sometimes purchased. It can be expected that as these groups are more fully absorbed into urban, industrial society, their tastes and purchasing power will more closely resemble the broader, mass market and, as a result, demand for these species will decrease further.

Carp and suckers are also purchased for use in traditional Jewish foods eaten during religious holiday periods. In years past--and to some extent today--these species were bought fresh, or in some cases alive, and prepared in the home. All reports indicate that in this market, too, convenience is becoming of major importance and few younger women are preparing these holiday dishes at home. If Montana fishermen wish to hold some share of this market, it will be necessary to do so by selling to commercial producers of Jewish foods.

Goldeye is sold exclusively in Canada and is considered a very choice food item in the Canadian market. On hotel and restaurant menus, it rivals tenderloin steak and lobster tails in price. There should continue to be a small, but steady demand for this fish for many years to come.

From all accounts, Montana fish find acceptance in the market only when similar species from other sources are not available in adequate quantity. Buyers prefer Louisiana buffalofish and Canadian goldeye. Montana carp are small and, because of high transportation cost and low value, are seldom shipped east.

A number of products not now manufactured in the state were evaluated to determine the economic feasibility of production. Results were generally negative. Industrial products such as fish meal, fish oil, pet food, and FPC (fish flour) were found to require large plants using far more fish than Montana could produce. In these products Montana would be competing with marine trash fish and offal selling for as little as 1/2 cent per pound. Those plants processing marine fish would have the further advantages of cheaper water transportation and large consumer markets nearby.

From the foregoing, it can be concluded that Montana is a very minor producer of several species of fish enjoying a severely limited market. Montana fishermen are at a competitive disadvantage because of their distance from market and the fish species available to them. These species are considered inferior--even unfit to eat--by many people, and the quantity available makes the production of various industrial products unfeasible.

Within the foreseeable future, there will be a continuing demand for limited quantities of Montana fish. This demand can best be served by "poor boy" operations of the present type which do not require a large capital investment and therefore do not have high fixed costs. Preliminary processing should be encouraged so that specialized retail markets can be served and higher prices obtained. The practice of sellling directto retail outlets also permits the fisherman-processor to reduce the problems of dealing with frequently unethical wholesalers in principal markets by performing the wholesale operations themselves.

APPENDIX

ATTITUDES OF PERSONS LIVING IN MISSOULA, MONTANA, ABOUT VARIOUS TYPES OF FISH, AUGUST, 1968[67]

A survey to determine attitudes and habits of Missoula residents relative to their consumption of fish was conducted during August, 1968. Of 108 persons surveyed, 100 or 92.6 percent indicated they consumed fish at least as frequently as once a year.

Purpose

A major objective of the survey was to determine attitudes of consumers about various types of fish including salmon, perch, catfish, trout, suckers, and carp. The survey mostly concerned itself with the latter two types of fish. The survey also sought to determine how attitudes were reflected in respondent behavior as manifest in their consumption of the several types of fish.

Furthermore, the survey attempted to answer the following hypothesis: Consumers possess attitudes about carp and suckers which would prejudice the purchase and consumption of these fish in state institutions.

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67 Thomas O. Kirkpatrick, Unpublished research report. School of Business Administration, University of Montana, Missoula, 1968.

Methodology

A random sampling technique was employed to insure every element within the universe would have a known chance of being selected. The universe was defined as the city of Missoula and contiguous population area. To achieve an acceptable level of statistical and economic efficiency, and, ultimately, net efficiency, which consists of a maximum amount of useable information obtained per dollar of cost, a probability sampling technique known as "simple, two-stage, area sampling," was used in the survey.

It was determined that 100 useable questionnaires from persons eating fish would be needed for the analysis. The sample would have to be large enough to allow for (1) persons not eating fish, (2) refusals to be interviewed, and/or (3) those persons classified as not-at-homes and unavailable for interviewing.

The city of Missoula was divided into approximately 1,400 identified blocks. The area of population both within and immediately outside of the Missoula city limits was included. Boundaries of the contiguous population were: (1) south -- 57th street; (2) west -- Bitterroot River at Maclay bridge; (3) north -- Interstate 90 and the Rattlesnake Creek subdivisions; and (4) east -- East Missoula.

The universe, therefore consisted of approximately 1,400 blocks. It was estimated that well over four households would be found within

the average block, although considerable variations exist in the city of Missoula.

Using a table of random numbers, sufficient numbers of blocks were drawn to permit interviewing four households on each of the drawn blocks. In stage one, 26 blocks were drawn for a sampling ratio of approximately 1 in 54. A reserve of four additional blocks was provided to allow for prescribed interviewer substitutions of households.

In stage two of area sampling, four households were chosen from each of the randomly selected blocks. Instructions for selection of households were: Interview one adult in each of the first four households within the block. Begin at the northeast corner of the block. Proceed clockwise around the block. If there is no northeast corner, start at the north corner. Make one callback for persons not at home.

Additional instructions were given to interviewers for contingencies and exigencies. Interviewers were not permitted to make substitutions other than those allowed in the sampling and interviewing instructions. Therefore, the random status of the sample is considered inviolate and maintains its integrity or representativeness of the universe composed of Missoula's population.

A copy of the questionnaire is attached at the end of the report.

Findings

The following answers are based upon 100 respondents which indicated they ate fish at least with the frequency of once per year:

Respondents were asked about the frequency they ate either fresh or frozen fish. Their answers in Table 1 include:

TABLE 1

FREQUENCY OF FISH CONSUMPTION

Frequency	Percent
At least once each week	19
At least twice each month	46
At least twice each year	32
Once a year or less	3
Total	100

In addition to rates of consumption, respondents were asked to indicate the period in which they last ate fish:

TABLE 2

MOST RECENT CONSUMPTION OF FISH

When Fish Last Eaten	Percent
Within the last week	44
Within the last month	36
Within the last six months	14
Within the last year	3
Don't Know	3
Total	100

It would appear that respondents overstated either the frequency of consumption of fish or the period within which they last ate fish. For example, 19% of the respondents indicated they ate fish at least once each week while 44% stated they ate fish within the last week period during which the survey was conducted. While the difference is great, it is not as large if the first two categories

in each table are combined within the respective tables to form a classification of monthly groups. Therein, 65% of the respondents indicated they ate fish two or more times per month while 80% indicated they had eaten fish within the last month.

Respondents were asked questions about (1) the usual form of preservation of the fish they consumed and (2) the form in which fish was prepared for consumption. Both questions referred to practices within the household.

TABLE 3

METHOD OF PRESERVING FISH

Type of Preservation	Percent
Fresh fish	24
Frozen fish	27
Canned fish	17
Divided between fresh, frozen, and/or canned fish	32
Total	100

TABLE 4

METHOD OF PREPARATION OF FISH

Type of Preparation	Percent
Whole fish	37
Filets	29
Combination between fish sticks, filets, and/or whole fish	18
Canned fish	11
Fish sticks	5
Total	100

Interviewers asked respondents for the type of fish respondents would serve to dinner guests. It was thought that the open-end question would provide information about preferences for specific types of fish as well as indicate status factors associated with the various fish. Of the 100 respondents, 13% indicated they would not serve fish to their guests. The remaining 87% stated if they served fish to guests, their preferences would be as follows:

TABLE 5

PREFERENCES AS TO TYPES OF FISH SERVED GUESTS

Types of Fish Served to Guests	Percent
Trout	52
Salmon	16
Halibut	9
Tunafish	7
Sole	5
Other types, e.g., pike, perch, or catfish	4
Don't know	7
Total	100

Trout appear as the favored fish. Salmon was a weak second choice. It appears the majority of other responses represent purchased fish while trout are likely to be caught by members of the household. No respondent mentioned preference for serving either carp or suckers to guests.

Respondents were questioned about their attitudes toward several factors used to describe fish, e.g., (1) taste or palatability of fish, (2) boniness, (3) nutritious value, and (4) the cost of fish. Their attitudes are found in Table 6, page 7.

TABLE 6

CONSUMER ATTITUDES ABOUT VARIOUS QUALITATIVE CHARACTERISTICS OF SELECTED TYPES OF FISH, IN PERCENTAGES

Characteristics and Attitudes	Type of Fish				
	Salmon	Perch	Catfish	Carp	Sucker
Taste					
Very Tasty	90	33	28	5	6
No Taste	4	7	1	2	3
Unpleasant Taste	2	13	7	21	25
No Opinion	4	47	64	72	66
Total	100	100	100	100	100
Bones					
Few Bones	59	10	11	1	4
Avg. Number of Bones	33	15	12	2	0
Very Bony	0	28	9	24	27
No Opinion	8	47	68	73	69
Total	100	100	100	100	100
Nutritious					
Very Nutritious	86	41	28	14	15
No Food Value	1	2	4	7	7
Harmful to People	0	2	1	2	3
No Opinion	13	55	67	77	75
Total	100	100	100	100	100
Cost					
Very Expensive Food	56	2	1	0	0
Average Cost	25	24	6	2	0
Cheap Food	2	7	15	15	20
No Opinion	17	67	78	83	80
Total	100	100	100	100	100

By far the image of salmon as being a superior fish is evident from Table 6. Both carp and suckers possessed very low scores on positive image factors, e.g., being tasty, nutritious, and expensive

food. The large proportion of "No Opinion" responses for all fish except salmon is also considered important as it is indicative that respondents either do not have attitudes about these fish or their attitudes are essentially neutral.

Finally, respondents were asked to indicate any fish they considered unfit for either family consumption, public sale, or use in state institutions. Their responses appear in Table 7, below:

TABLE 7

REACTIONS OF PERSONS TOWARDS CONSUMPTION AND SALE OF SEVERAL TYPES OF FISH

Fish Unfit for:	Respondents Not Objecting to Consumption or Sale	No Answer	Don't Know	Respondents Disapproving (By Type of Fish)				
				Salmon	Perch	Catfish	Carp	Suckers
Family Consumption	22%	2%	8%	0%	0%	19%	39%	61%
Public Sale	30	4	9	0	2	11	31	52
Use in Institutions	34	1	3	0	2	14	34	57

Note: Answers do not appear as 100% since numerous respondents gave more than one type of fish they considered unfit for one or more types of consumption.

Question: Of these fish we have just talked about, do you think any are unfit for family consumption, or public sale, or should not be used in state institutions such as the prisons, universities, and so forth?

Overall, respondents were rather consistent in indicating their disapproval of catfish, carp, and suckers for family consumption, public sale, or use in state institutions such as prisons or educational establishments. While no persons objected to sale and

consumption of salmon, significantly, objections were raised to the sale and consumption of carp and suckers. Even one-fifth of the respondents objected to the family consumption of catfish.

Table 8 classifies respondents by observed demographic characteristics:

TABLE 8

DEMOGRAPHIC CLASSIFICATION OF RESPONDENTS

Demographic Characteristic	Percent
Sex:	
Female	74
Male	26
Total	100
Age:	
21-30 years	18
31-40 years	32
41-60 years	38
Over 60	12
Total	100
Value of House:	
Under $15,000	49
$15,000-$30,000	38
Over $30,000	12
Unclassified (Apartment)	1
Total	100

Conclusions

Several conclusions appear warranted from the preceding findings. The most important conclusions are as follows:

1. Trout and salmon maintain strong positive consumer images whereas carp and suckers have weak images of a neutral or negative nature. Perch and catfish are in an intermediate position with respect to consumer images. A significant proportion of those consumers interviewed have strong attitudes about trout and salmon--and positive attitudes, at that. On the other hand, a significant proportion of the respondents had no opinions about the taste, bone factor, nutritious qualities, or cost of either catfish, carp, or suckers. Generally, it is easier to create positive attitudes toward a phenomenon when no attitudes, or neutral attitudes, exist than to change negative attitudes to positive ones.

2. Approximately one-fourth of respondents eating fish indicated they believed carp and suckers possessed an unpleasant taste and were bony. About one person in seven considered carp and suckers to be nutritious and a cheap food. If demand creation activities were undertaken for these fish, it would be necessary to change the attitudes of palatability and boniness and, perhaps, use as selling appeals, the factors of nutrition and inexpensive food.

3. Respondents were rather consistent in their approval and disapproval of the sale and consumption of the various types of fish studied. For example, between 31% to 39% of the respondents objected to family consumption of carp, public sale, and use in state institutions. The range of objections for suckers was 52% to 61%. Interestingly, while rather massive indifference exists toward carp and suckers as indicated in the survey of attitudes, a majority of respondents

objected to sale and consumption of suckers; a third indicated disapproval of the sale and consumption of carp. Overall, it would appear that both fish would encounter strong rejection from those persons surveyed.

The hypothesis, consumers possess attitudes about carp and suckers which would prejudice purchase of these fish or support consumption of them in state institutions, appears valid.

FISH CONSUMPTION SURVEY Missoula, Montana August, 1968

Instructions: I am helping conduct interviews with several persons in Missoula to learn more about the consumption of fish in this area. I would like to ask you just a few short questions which should take only two or three minutes of your time.

1. Do you eat either fresh or frozen fish?

___Yes

___No (IF NO, SKIP TO QUESTION 9) ——————————→

2. About how often would you say you eat either fresh or frozen fish: at least once each week, at least twice each month, at least twice each year, or once a year or less?

___At least once each week

___At least twice each month

___At least twice each year

___Once a year or less

___Don't know

3. When was the last time you ate fish? Within the last week, month, the last six months, or year?

___Within the last week

___Within the last month

___Within the last six months

___Within the last year

___Don't know

4. If you eat fish at home, do you usually eat: fresh, frozen, or canned fish?

___Don't eat fish at home

___Fresh fish

___Frozen fish

___Canned fish

___Divided between fresh, frozen, and/or canned fish

___Don't know

 Go to next page ——————→

5. If you eat fish at home, do you usually eat fish sticks, filets, whole fish, or fish in some other form?

___Fish sticks

___Filets

___Whole fish

___Combination between fish sticks, filets, and whole fish

___Other form -- Type: _____

___Don't know

6. If you had friends visiting you and you served them fish for dinner, what kind would you prefer to serve them?

_____ _____

7. Would you give me your opinions about the following types of fish?

Salmon:	A____	B____	C____	D____
Perch:	A____	B____	C____	D____
Carp:	A____	B____	C____	D____
Catfish:	A____	B____	C____	D____
Sucker:	A____	B____	C____	D____
Other:	A____	B____	C____	D____

A (Taste)
1 = Very tasty
2 = No taste
3 = Unpleasant taste
4 = No opinion

B (Bones)
1 = Very boney
2 = Average number of bones
3 = Few bones
4 = No opinion

C (Nutritious)
1 = Very nutritious
2 = No food value
3 = Harmful to people
4 = No opinion

D (Cost)
1 = Very expensive food
2 = Average cost
3 = Cheap food
4 = No opinion

Go to next page ⟶

8. Of these fish we have just talked about, do you think any are unfit for family consumption, or public sale, or should not be used in state institutions such as the prisons, universities, and so forth?

Unfit For:	Type of Fish		
Family consumption	_____	_____	_____
Public sale	_____	_____	_____
State institutions	_____	_____	_____

Record any other related comments: _____

_____

_____

Thank you for your help.

9. ONLY ANSWERED IF NO TO QUESTION #1 -- Is there any particular reason why you don't eat fish?

_____

_____

Thank you for your help.

Classification Information: (Note: Observe, don't ask for answers.)

a. Sex: ___Female ___Male

b. Age: ___21 - 30 ___31 - 40 ___ 41 - 60 ___ Over 60

c. Value of house: ___ Under $15,000 ___ $15,000 - $30,000
___ Over $30,000

d. Street address: _____

Identification:

Name of Interviewer: _____

Time of Interview: _____
(Hour) (Month) (Day) (Year)