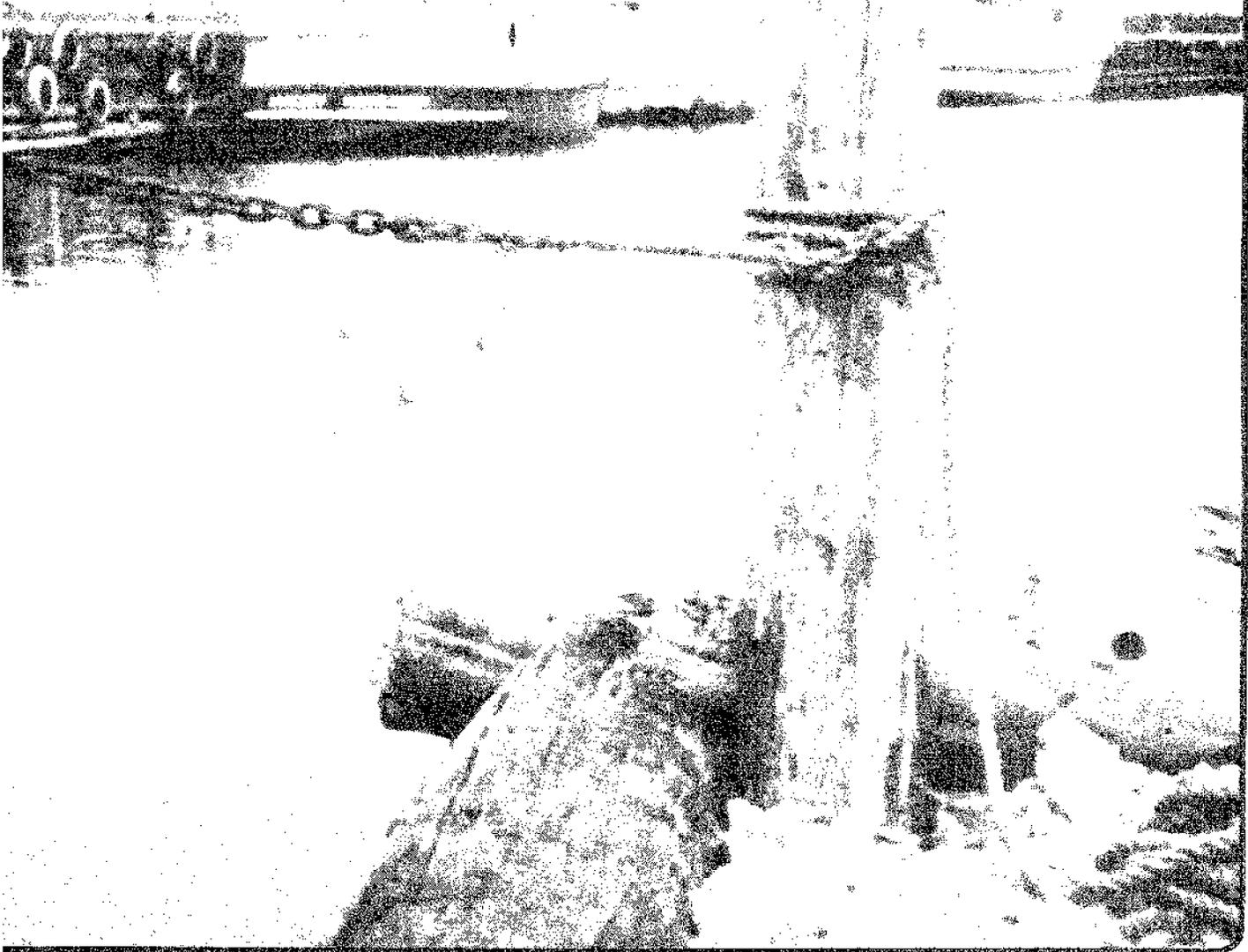


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Sea Grant University Wisconsin's Lake Michigan and Green Bay
Commercial Fisheries - A Statistical Overview



Richard C. Bishop, Daniel L. Vogel, Glenn G. Stevenson and Ramona Weakland

WISCONSIN'S LAKE MICHIGAN

AND

GREEN BAY

COMMERCIAL FISHERIES:

A STATISTICAL OVERVIEW

by

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INTRODUCTION

INTRODUCTION

Siltation of spawning streams; DDT; increasing fishing pressure; sea lampreys; PCBs; declines in lake herring, chubs, and yellow perch; mushrooming populations of alewife; complex regulations; large-scale stocking of salmonids; and a whole host of other factors have given Wisconsin's fishing industry a turbulent history, yet the industry has survived. In 1976, it produced fish with a dockside value of \$2.6 million and included nearly 300 licensed fishers and 600 crewmembers. Furthermore, except for continuing concern about PCBs and other microcontaminants, the outlook for commercial fishing in Wisconsin looks bright.

Whitefish have increased greatly in the middle and late 1970's and seem to be holding their own. The alewife curse has been turned into a 35 million pound per year commercial fishery with prospects for expansion. While the population of yellow perch is still small in comparison to the 1950's and early 1960's, the situation has at least stabilized and it continues to produce around 400,000 pounds per year. Chubs were so scarce in the mid-1970's that the DNR finally closed the fishery because of fear that continued fishing might prevent recovery. Now, however, substantial recovery is occurring and at least a limited commercial catch may soon be feasible.

Perhaps as important as all these trends are recent events in the Wisconsin Legislature. A recently passed bill has been signed into law by the Governor which clarifies the regulatory authority of the DNR and gives the fishers greater say in how they are regulated through the establishment of Commercial Fishing Boards for both Lake Michigan and Lake Superior. While this bill may not be all that the industry had hoped for, it does commit the State of Wisconsin to the continued existence of an economically

viable, stable fishery in Lake Michigan.

This report is a statistical overview of the commercial fisheries of Wisconsin's Lake Michigan and Green Bay as they stood in 1976. Except as otherwise noted, the numbers have been gleaned from the files of the Wisconsin Department of Natural Resources. For a number of years, license holders have completed applications that include detailed questions about vessel, gear, crew members and other aspects of their operations. Additional data were accumulated from records which originate as monthly catch reports filed by the fishers and from various management reports. We gratefully acknowledge the cooperation of the Wisconsin Department of Natural Resources and particularly Ronald J. Poff. Examples of both report forms appear in the Appendix.

The body of the report consists of four sets of tables. Part I is about the fishers themselves. Nearly one-third of the licensees are located in Door County with the rest scattered along the shoreline between Marinette County and Kenosha County (Table 1). A minority of fishers are employed full-time in fishing. More than half the licensees (54.8%) and crew members (68.6%) consider fishing to be a part-time occupation (Table 2). Out of a total of 297 licensees only 213 reported any catch at all and more than half of these fished less than 50 days in 1976 (Table 3). The age distribution of licensees and crew members are given along with comparable figures for farm operators and farm laborers, respectively (Tables 4 and 5).

Part II describes the vessels, gear, and real estate employed in fishing. Total investment in vessels, gear, and real estate amounted to \$13.8 million, with real estate alone accounting for nearly \$10 million

of this total (Table 6). A total of 270 vessels are described in Table 7, ranging from rowboats without motors to diesel powered ships in excess of 40 feet in length, with average values in excess of \$40,000 each. Additional tables (8 and 9) report more details about length and tonnage of vessels. Gill nets in a variety of mesh sizes were the most popular gear, with 7.6 million feet valued at \$1.2 million licensed in 1976. Also licensed were nearly \$900,000 worth of pound nets, trap nets, fyke nets, trawls, and other gear (Table 10). If anything, this underestimates total investment, for some licensees do not include gear that they do not fish or do not report their gear's value.

By far the most detailed statistics currently available relate to the catch and these are summarized in Part III. More than 95% of the \$2.6 million catch value in 1976 was made up of five species, whitefish (54.8% of value), yellow perch (16.9%), alewife (15.9%), chubs (8.3%), and smelt (1.2%). The average price received by the fishers ranged from over \$1 per pound for chubs to 1.2 cents for alewives (Table 11). Recently tabulated catch data for 1977 are also presented and can be found in Table 11A. 1976 production figures for major species can be viewed in a time perspective by referring to trends from 1940 to 1976 as reported in Table 12. Lake trout, which were once very important, were only a minor contributor in 1976, because of closure of the fishery dating to 1962 following loss of naturally reproducing stocks to the sea lamprey and complete curtailment of sales of even incidental catches in mid-1976 as a result of the PCB problem. The chub fishery was but a shadow of its former self due to collapse of the stocks. This fishery was also closed during part of 1976 and remains closed at present except for a DNR sponsored contract fishery for stock

assessment. This fishery may be reopened on a limited basis in the near future. No such recovery appears in the offing for the lake herring fishery that once produced millions of pounds per year. Similar observations could be made about yellow perch were it not for occasional strong year classes. On the other hand, whitefish are doing very well for the present and the alewife fishery has displayed more or less steady growth since the late 1950's although low prices have caused stabilization of production at least for the time being.

As in other U.S. commercial fisheries, a relatively small number of operators produce a very large share of the catch. The top 10% of the licensees (decile #1 in Table 13) caught 55.5% of the fish in dollar terms. The top 40% of the licensees (first four deciles in the table) caught 94% of the fish.

Geographically, the most prolific area is lower Green Bay (Management District 1) which is responsible for 81% of the perch, 53% of the alewife, 13% of the whitefish, 46% of the smelt, and virtually all of the carp, bullheads, suckers and burbot. The whitefish industry is concentrated around the Door Peninsula, with 29% of the catch coming from upper Green Bay (District 2) and 58% from northern Lake Michigan proper (District 3). Interestingly, outside of lower Green Bay, the most important perch producing area was the most southern portion of Lake Michigan (District 6), an area that has also been a major chub producing area. North central Lake Michigan (District 4) is a major alewife producing area with 41% of the catch in 1976. About 60% of the chub catch comes from south central Lake Michigan (District 5) (see Tables 14-20).

Table 21 shows that Wisconsin's fishers have significant production

in all months of the year. In fact, there were 31 individuals in 1976 who were licensed to fish only under the ice. Still production does tend to be concentrated in the warmer months.

Additional evidence of the importance of gill nets appears in the catch statistics (Tables 22-29). Over 64% of the total catch measured in dollars in 1976 was caught by gill nets. Gill nets were important in the whitefish, yellow perch, chub, smelt, carp, and other segments of the industry. Pound nets were substantial contributors to the whitefish and alewife catches, although in the latter case pound nets were far less important than trawls. Fyke nets contributed substantial catches to the yellow perch harvest.

The PCB problem has been alluded to previously and Part IV presents some recent findings from Wisconsin DNR's PCB testing program. Among commercially caught species, carp have been particularly hard hit although a small fishery continues to exist based on catches of smaller, less mature carp. Of particular concern for Wisconsin is a proposal by the U.S. Food and Drug Administration to lower the permitted level of PCBs in commercially caught fish from the current 5 ppm to 2 ppm. Table 30 shows that whitefish, particularly in larger sizes, often do contain PCBs in excess of 2 ppm. Not shown in the table is the observation that the highest concentrations of PCBs tend to be found in fish from upper and lower Green Bay. Looking back to Table 14, we can see that 42% of the whitefish catch in 1976 came from these two districts. This would be the portion of catch that would be most affected by a shift to 2 ppm. Table 30 also raises concerns about the potential impact of the reduced tolerance on the chub fishery and hopes for using alewives in human food. Table 31

shows results of PCB tests on Wisconsin Lake Michigan salmonids. The apparent decline in PCBs in lake trout between 1972 and 1976 does hold hope that the problem is decreasing, but should be regarded as tentative. Scientists believe that PCBs are very persistent. If they are correct, the apparent trend for lake trout may simply be a statistical illusion.

Like all statistical reports this one is a long way from perfect. The reader should bear in mind that there were some missing data, particularly from the license application forms. For example, data on the fishing fleet include only those vessels described on the forms. Most forms had complete information in this regard but some did not. Thus, such numbers must be regarded as lower bounds. Furthermore, all dollar values in this report are the estimates of the licensees themselves. No attempt was made by us to verify the accuracy of dollar values given for vessels, gear, real estate, or catch.

While errors no doubt have crept in, the figures in this report will still give the reader a basic idea of what Wisconsin's Lake Michigan and Green Bay commercial fisheries are all about. Actually the statistics discussed here were only the first step in a more ambitious effort to understand the economics of commercial fishing in Wisconsin. Personal interviews are now (March, 1978) in progress that will begin where the present report leaves off. If Wisconsin citizens and public officials become better informed about the fisheries and if this leads to public policies reflecting increased understanding of the industry our goals will have been achieved.

PART I

CHARACTERISTICS OF THE FISHERS

LAKE SUPERIOR

MICHIGAN

NONRESIDENTS
10



LAKE MICHIGAN

TABLE 1

Location of Lake Michigan commercial fishing license holders by County of Home Port; 1976

Table 2. Full Time/Part Time Classification of Licensees
and Crew, 1975-76

	<u>Licensees</u>	<u>Crew</u>
Full Time	130	203
Part Time	154	443
Total Reporting	284	646
% Full Time	45.8	31.4
% Part Time	54.2	68.6

Table 3. Distribution of Days Fished, 1976

<u>Days Fished</u>	<u>No. of Licensees*</u>	<u>% of Licensees*</u>	<u>Cumulative % of Licensees*</u>
0-10	45	21.1	21.1
11-25	41	19.2	40.4
26-50	35	16.4	56.8
51-75	23	10.8	67.6
76-100	26	12.2	79.8
101-150	23	10.8	90.6
151-200	11	5.2	95.8
201-250	7	3.3	99.1
251-300	1	0.5	99.5
300 +	1	0.5	100.0

*Numbers and percentages of licensees actually recording a catch in 1976.

Table 4. Age Distribution of Lake Michigan Licensees (1975-76) and of Wisconsin Farmers and Farm Managers (1970).

<u>Age</u>	<u>No. of Licensees^a</u>	<u>% of Total Licensees</u>	<u>No. of Farmers & Farm Managers^b</u>	<u>% of Total Farmers & Farm Managers</u>
24 & under	23	8.2	3,646	5.3
25-34	39	13.8	8,874	12.9
35-44	51	18.1	14,078	20.5
45-54	65	23.0	18,374	26.7
55-64	57	20.2	15,530	22.6
65 +	<u>47</u>	<u>16.7</u>	<u>8,278</u>	<u>12.0</u>
	282 ^c	100.0	68,780	100.0

^aSix licensees gave no response.

^bTaken from the 1970 U.S. Census of Population.

^cWhile 297 persons held licenses, data were unavailable for 15 of them.

Table 5. Age Distribution of Lake Michigan and Green Bay Crew (1975-76) and of Wisconsin Farm Laborers and Foremen (1970)

<u>Age</u>	<u>No. of Lake Michigan Crew</u>	<u>% of Total Crew</u>	<u>No. of Farm Laborers and Foremen^a</u>	<u>% of Farm Laborers, etc.</u>
24 & under	161	26.8	10,115	55.7
25-34	117	19.5	2,223	12.3
35-44	104	17.3	1,365	7.5
45-54	107	17.8	1,441	7.9
55-64	67	11.1	1,617	8.9
65 +	<u>45</u>	<u>7.5</u>	<u>1,375</u>	<u>7.6</u>
Totals	601	100.0	18,136	99.9

^aFrom 1970 U.S. Census of Population.

PART II

VESSEL, GEAR, AND REAL ESTATE USED IN THE FISHERY

Table 6. Value of Gear, Vessels, and Real Estate, 1975-76

GEAR	\$2,077,500
VESSELS	1,713,000
REAL ESTATE	<u>9,967,000</u>
TOTAL	\$13,757,500

Table 7. Description of Vessels, 1975-76

Engine Type	Vessels 25 ft. or less			Vessels 26-40 ft.			Vessels Greater than 40 ft.			Ttl. Vess. by Engn. Type		
	No.	Avg. Act. Lgth.	Average Value (\$)	No.	Avg. Act. Lgth.	Avg. Gr. Tons	Average Value (\$)	No.	Avg. Act. Lgth.		Avg. Gr. Tons	Average Value (\$)
Rowboat, no motor	5	14	1,000	0	---	---	---	0	---	---	---	5
Rowboat, with motor	101	16	1,370	3	29	11	1,500	0	---	---	---	104
Inboard gasoline	33	21	3,000	40	30	10	4,315	1	42	a	a	74
Inboard diesel	1	25	6,000	40	36	17	10,026	46	48	29	47,977	87
Total Vessel by Size	140			83				47				270

^aNot reported to protect privacy of this individual.

Table 8. Actual Length of Vessels

<u>Length (feet)</u>	<u>No. of Vessels</u>	<u>% of Total Vessels*</u>	<u>Cumulative % of Total Vessels</u>
0-14	40	14.3	14.3
15-19	62	22.2	36.6
20-29	66	23.7	60.2
30-39	47	16.8	77.1
40-49	44	15.8	92.8
50-59	15	5.4	98.2
60-69	<u>5</u>	<u>1.8</u>	<u>100.0</u>
Total*	279	100.0	

* Excludes approximately 20 vessels for which no response was given.

Table 9. Gross Tonnage of Vessels

<u>Gross Tons</u>	<u>No. of Reporting Vessels*</u>	<u>% of Reporting Vessels</u>	<u>Cumulative % of Reporting Vessels</u>	<u>Total Tonnage</u>	<u>% of Total Tonnage</u>	<u>Cumulative % of Total Tonnage</u>
1-5	28	20.1	20.1	74	3.1	3.1
6-10	17	12.2	32.4	146	6.1	9.2
11-15	24	17.3	49.6	310	13.0	22.2
16-20	23	16.5	66.2	413	17.3	39.5
21-25	14	10.1	76.3	324	13.6	53.1
26-30	11	7.9	84.2	304	12.7	65.8
31-35	11	7.9	92.1	353	14.8	80.6
36-40	3	2.2	94.2	119	5.0	85.6
41-45	<u>8</u>	<u>5.8</u>	<u>100.0</u>	<u>344</u>	<u>14.4</u>	<u>100.0</u>
Total	139	100.0		2,387	100.0	

*There are over 270 vessels on Lake Michigan; only 139 are included in this figure as "reporting vessels" because most licensees with rowboats do not have a sufficient gross tonnage to report--i.e., the gross tonnage is less than 1 ton.

Table 10. Description of Fishing Gear and Its Value, 1975-76

<u>Gear Type</u>	<u>No. of Licensees</u>	<u>Total length(gill nets)</u>		<u>Total Value(\$)</u>
		<u>No. of nets</u>	<u>(other gear)</u>	
Gill Nets, 1 3/8"-1 1/2"	55		429,710 ft.	\$ 72,000
Gill Nets, 2 1/4"-2 3/4"	152		1,900,590	296,200
Gill Nets, 2 1/2"-2 3/4"	140		2,598,610	380,300
Gill Nets, 4" +	173		2,626,880	462,000
Gill Nets, Subtotal	^a		7,555,790	\$1,210,500
Pound Nets	56		575	\$ 473,300
Submarine Trap Nets	16		110	47,200
Fyke Nets	28		153	66,300
Drop Nets	39		796	220,400
Seines	13		18	41,900
Trawls	3		15	17,900
Other Gear, Subtotal				\$ 867,000

^aA total of 255 licensees indicated owning some gill nets of at least one size. Many have gill nets of more than one size. Thus, a subtotal here would not be particularly meaningful.

PART III

THE CATCH

Table 11. Production and Value for Wisconsin's Lake Michigan and Green Bay, 1976

<u>Species</u>	<u>Pounds Produced</u>	<u>% of Total Pounds</u>	<u>Average Value/lb. (¢)</u>	<u>Total Value (\$)</u>	<u>% of Total Value</u>	<u>Cumulative % of Total Value</u>
Whitefish	1,612,491	4.2	89.6	1,445,577	54.8	54.8
Yellow Perch	448,688	1.2	99.6	446,866	16.9	71.7
Alewife	34,589,768	90.1	1.2	419,124	15.9	87.6
Chubs ^a	214,859	0.56	101.5	218,123	8.3	95.9
Smelt	204,333	0.53	15.8	32,345	1.2	97.1
Carp	748,407	1.95	3.4	25,697	0.97	98.1
Bullheads	119,875	0.31	13.0	15,633	0.59	98.7
Menominee	19,655	0.05	48.3	9,486	0.36	99.1
Suckers ^b	281,097	0.73	2.5	6,994	0.27	99.3
Burbot	130,254	0.34	4.2	5,507	0.21	99.5
Walleye	5,913	0.02	83.0	4,910	0.19	99.7
Northern Pike	15,659	0.04	17.9	2,803	0.11	99.8
Lake Trout	3,690	0.010	45.2	1,669	0.06	99.9
White Bass	4,165	0.011	39.6	1,648	0.06	99.96
Lake Herring	1,599	0.004	58.7	938	0.04	99.99
Catfish	353	0.0009	36.5	129	0.005	99.996
Sheepshead	1,292	0.0034	8.6	111	0.004	100.00
Bowfin	25	0.00007	--	0	0.0	100.00
Gizzard Shad	11	0.00003	--	0	0.0	100.00
Buffalo Fish	6	0.00002	--	0	0.0	100.00
TOTAL	38,402,140	100		2,637,560	100	100

^aIncludes both #1 and #2 chubs.

^bAn additional 406,250 pounds of suckers valued at \$10,190 originated in Green Bay and were caught in tributary streams.

Table 11A. Production and Value for Wisconsin's Lake Michigan and Green Bay, 1977

<u>Species</u>	<u>Pounds Produced</u>	<u>% of Total Pounds</u>	<u>Average Value/lb. (¢)</u>	<u>Total Value (\$)</u>	<u>% of Total Value</u>	<u>Cumulative % of Total Value</u>
Whitefish	1,554,396	3.30	94.0	1,460,478	49.5	49.5
Alewife	43,929,276	92.30	1.6	695,845	23.6	73.1
Yellow Perch	622,293	1.30	70.5	438,988	14.9	88.0
Chubs ^a	259,033	.50	96.6	250,204	8.5	96.5
Bullheads	118,240	.20	30.1	35,556	1.2	97.7
Smelt	119,405	.30	22.4	26,750	.90	98.6
Carp	526,598	1.10	1.8	9,237	.30	98.9
Menominee	19,273	.04	47.3	9,108	.30	99.2
Walleye	10,947	.02	80.0	8,754	.30	99.5
Suckers	204,050	.40	2.2	4,501	.20	99.7
Burbot	189,231	.40	2.3	4,309	.10	99.8
Northern Pike	16,295	.03	18.0	2,934	.10	99.9
Whitebass	1,869	.004	35.3	660	.02	99.92
Catfish	886	.002	37.8	335	.01	99.93
Lake Herring	825	.002	27.0	223	.008	99.938
Sheephead	568	.001	9.9	56	.002	99.940
Lake Trout Lean	5	.00001		0		100.00
TOTAL	47,573,191	100.		2,947,938	100.	100.

^aIncludes both #1 and #2 chubs.

Table 12. Production Trends in Pounds for the Major Lake Michigan and Green Bay Fisheries, 1940-1976

Year	Lake Trout	Whitefish	Chubs	Herring	Perch	Smelt	Alewife
1940	2,508,550	199,196	817,689	1,205,865	1,771,065	1,790,098	0
1941	2,742,868	400,217	943,301	1,105,904	1,551,411	1,755,044	0
1942	2,692,696	279,336	1,030,205	693,606	1,865,643	1,116,708	0
1943	2,824,277	253,835	1,251,414	1,024,395	2,617,814	497,002	0
1944	2,851,642	343,061	1,647,310	712,193	2,475,717	4,344	0
1945	2,515,075	330,893	2,379,013	1,528,089	857,385	57,698	0
1946	1,648,408	734,044	2,607,865	3,001,913	935,191	201,044	0
1947	1,177,321	1,806,174	2,519,667	3,654,850	816,482	449,815	0
1948	540,101	984,390	2,507,137	5,100,334	1,003,574	504,321	0
1949	107,715	484,308	3,672,554	4,336,990	824,443	487,974	0
1950	16,768	258,836	5,604,296	4,045,951	747,307	791,900	0
1951	2,710	242,254	6,578,057	3,392,840	854,726	954,978	0
1952	596	289,435	6,775,125	5,959,117	1,247,648	1,072,206	0
1953	140	187,861	6,329,762	3,616,366	1,457,336	1,014,731	0
1954	56	196,676	5,885,738	3,775,757	1,476,615	1,040,706	0
1955	0	97,213	5,895,099	3,257,871	2,177,932	539,898	0
1956	0	18,295	5,723,846	3,070,398	2,161,627	1,472,460	0
1957	0	12,272	5,561,554	2,091,032	2,093,486	1,627,880	299,725
1958	0	9,219	5,353,509	1,318,153	2,308,826	2,933,230	950,221
1959	0	19,524	3,833,465	720,196	1,218,731	2,106,022	762,529
1960	0	67,784	3,809,063	147,579	1,793,836	1,060,417	691,076
1961	16	143,436	4,071,997	97,788	3,248,363	911,483	2,113,171
1962	64	79,112	3,721,625	60,941	2,782,046	458,266	3,347,493
1963	426	42,300	2,324,033	16,906	3,573,599	234,474	3,815,386
1964	117	192,931	2,233,616	13,282	2,839,493	166,253	8,409,986
1965	174	162,785	3,871,460	18,902	396,200	225,222	10,868,679
1966	97	141,201	3,983,302	19,824	241,258	91,457	23,930,726
1967	7,227	97,306	4,758,220	5,657	731,152	123,952	27,831,099
1968	4,837	65,824	6,222,572	20,194	271,249	129,556	18,156,290
1969	2,686	205,880	5,337,816	15,267	336,464	417,732	21,757,813
1970	3,403	304,649	5,007,124	10,318	425,961	276,224	27,478,679
1971	2,933	470,666	3,107,938	5,765	273,336	213,485	26,148,095
1972	3,318	696,810	2,245,358	2,209	324,909	88,091	25,824,662
1973	2,363	719,708	1,849,222	2,752	308,468	162,085	28,930,620
1974	23,347	1,174,208	1,251,978	6,112	834,924	336,483	39,725,524
1975	24,640	1,267,270	343,273	3,180	548,304	159,245	31,498,462
1976	3,690	1,586,372	201,264	1,599	446,192	204,281	34,589,133

Table 13. Distribution of Catch among Wisconsin Lake Michigan Commercial Fishermen, 1976*

<u>Decile #</u>	<u>Total Value of Catch (\$)</u>	<u>Average Value (\$)</u>	<u>Range in Values (\$)</u>	<u>% of Total Value</u>	<u>Cumulative % of Total Value</u>
1	1,463,765	69,703	36,200- 100,000+	55.5	55.5
2	532,195	25,343	18,476- 35,038	20.2	75.7
3	317,663	15,127	11,554- 18,382	12.0	87.7
4	172,723	8,225	5,626- 11,505	6.5	94.3
5	85,244	4,059	3,044- 5,370	3.2	97.5
6	40,648	1,936	1,067- 2,880	1.5	99.0
7	16,229	773	555- 1,029	0.6	99.7
8	7,312	348	162- 570	0.3	99.93
9	1,649	79	23- 160	0.1	99.99
10	132	6	0- 21	0.005	100.00
Total	2,637,560				

*This table is based strictly on the value of catch reported by 213 fishermen active during calendar year 1976. Any fisherman licensed for the 1975-76 or 1976-77 license year who did not report a catch is excluded. There are 21 fishermen per decile in the table.

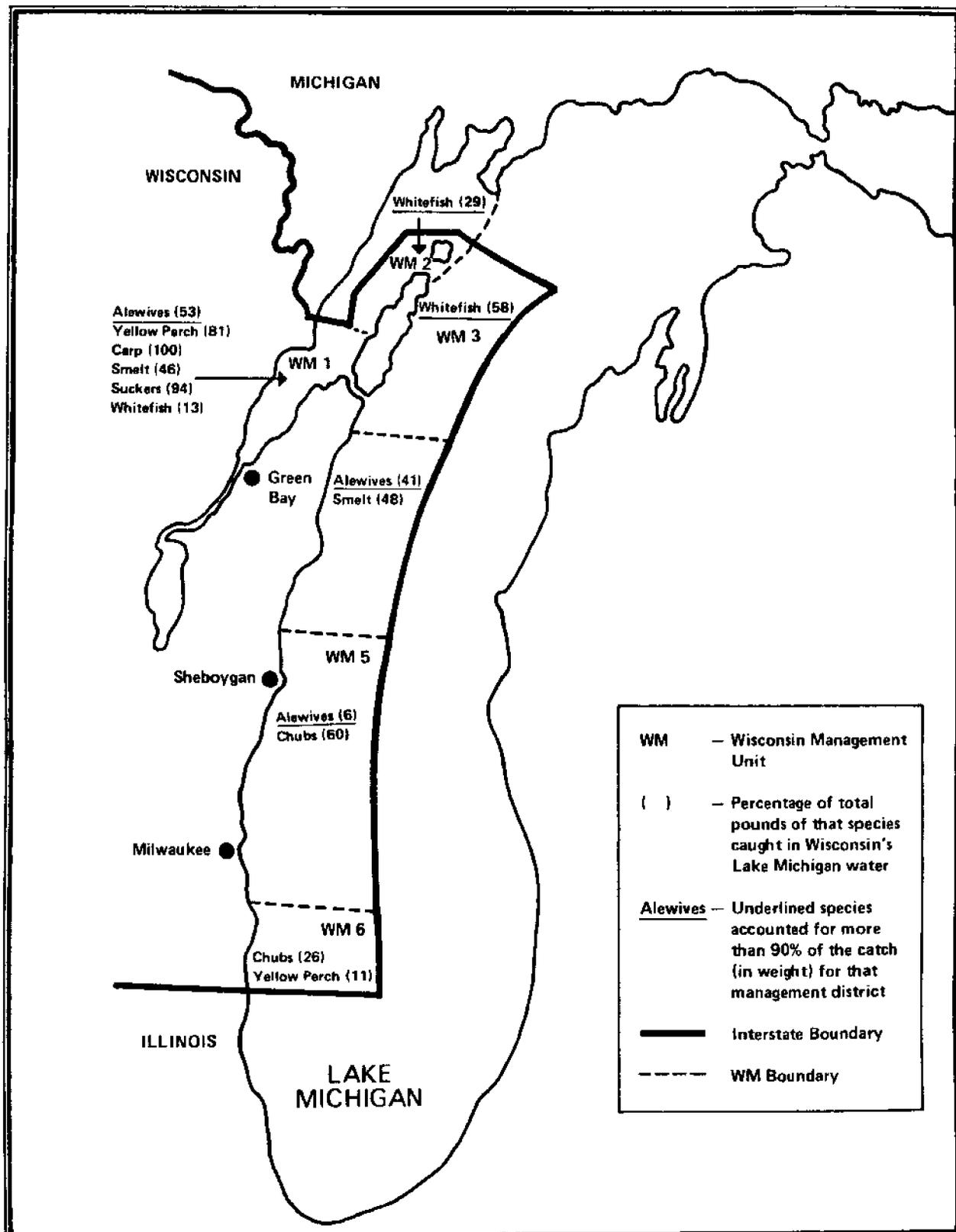


TABLE 14

Location of Wisconsin's Important Lake Michigan and Green Bay Fisheries—1976 Catch Figures

Table 15. Production and Value of Catch from Lower Green Bay
(Management District 1), 1976

<u>Species</u>	<u>Pounds</u>	<u>% of Dist. Total lbs.</u>	<u>% of Species Total for L. Mich.</u>	<u>Value</u>	<u>% of Dist. Total Value</u>
White fish	206,083	1.0	12.8	\$184,751	21.8
Yellow Perch	362,594	1.8	80.8	361,122	42.7
Alewife	18,328,411	90.5	53.0	222,085	26.3
Chub	0	0	0	0	0
Smelt	94,073	0.5	46.0	14,891	1.8
Carp	747,207	3.7	99.8	25,656	3.0
Bullhead	119,839	0.6	100.0	15,628	1.8
Sucker	263,375	1.3	93.7	6,553	0.8
Burbot	109,000	0.5	83.7	4,608	0.5
Others	<u>28,860</u>	<u>0.1</u>	<u>54.6</u>	<u>10,431</u>	<u>1.2</u>
TOTAL	20,259,442	100.0	52.8	845,725	100.0

Table 16. Production and Value of Catch from Upper Green Bay
(Management District 2), 1976

<u>Species</u>	<u>Pounds</u>	<u>% of Dist. Total lbs.</u>	<u>% of Species Total for L. Mich.</u>	<u>Value</u>	<u>% of Dist. Total Value</u>
Whitefish	467,284	91.8	29.0	\$418,914	99.2
Yellow Perch	80	0.0	0.0	80	0.0
Alewife	966	0.2	0.0	12	0.0
Chubs	0	0.0	0.0	0	0.0
Smelt	5,011	1.0	2.5	793	0.2
Carp	691	0.1	0.1	24	0.0
Bullhead	0	0.0	0.0	0	0.0
Sucker	11,214	2.2	4.0	279	0.1
Burbot	20,478	4.0	15.7	866	0.2
Others	<u>3,128</u>	<u>0.6</u>	<u>5.9</u>	<u>1,463</u>	<u>0.3</u>
TOTAL	508,852	100.0	1.3	\$422,431	100.0

Table 17. Production and Value of Catch from Northern Lake Michigan
(Management District 3), 1976

<u>Species</u>	<u>Pounds</u>	<u>% of Dist. Total lbs.</u>	<u>% of Species Total for L. Mich.</u>	<u>Value</u>	<u>% of Dist. Total Value</u>
Whitefish	938,629	95.2	58.2	\$841,468	96.3
Yellow Perch	5,544	0.6	1.2	5,521	0.6
Alewife	1,261	0.1	0.0	15	0.0
Chubs	17,427	1.8	8.1	17,692	2.0
Smelt	2,027	0.2	1.0	321	0.0
Carp	500	0.1	0.1	17	0.0
Bullhead	32	0.0	0.0	4	0.0
Sucker	1,151	0.1	0.4	29	0.0
Burbot	664	0.1	0.5	28	0.0
Others	<u>18,596</u>	<u>1.9</u>	<u>35.2</u>	<u>8,799</u>	<u>1.0</u>
TOTAL	985,831	100.0	2.6	\$873,894	100.0

Table 18. Production and Value of Catch from North Central Lake Michigan (Management District 4), 1976

<u>Species</u>	<u>Pounds</u>	<u>% of Dist. Total lbs.</u>	<u>% of Species Total for L. Mich.</u>	<u>Value</u>	<u>% of Dist. Total Value</u>
Whitefish	472	0.0	0.0	\$ 423	0.2
Yellow Perch	18,037	0.1	4.0	17,964	8.2
Alewife	14,192,127	99.1	41.0	171,966	78.3
Chubs	12,373	0.1	5.8	12,561	5.7
Smelt	98,573	0.7	48.2	15,604	7.1
Carp	9	0.0	0.0	0	0.0
Bullhead	4	0.0	0.0	1	0.0
Sucker	4,252	0.0	1.5	106	0.1
Burbot	0	0.0	0.0	0	0.0
Others	<u>1,795</u>	<u>0.0</u>	<u>3.4</u>	<u>865</u>	<u>0.4</u>
TOTAL	14,327,642	100.0	37.3	\$219,490	100.0

Table 19. Production and Value of Catch from South Central Lake Michigan (Management District 5), 1976

<u>Species</u>	<u>Pounds</u>	<u>% of Dist. Total lbs.</u>	<u>% of Species Total for L. Mich.</u>	<u>Value</u>	<u>% of Dist. Total Value</u>
Whitefish	23	0.0	0.0	\$ 21	0.0
Yellow Perch	11,735	0.5	2.6	11,687	7.0
Alewife	2,065,974	93.4	6.0	25,033	14.9
Chubs	128,527	5.8	59.8	130,479	77.7
Smelt	3,971	0.2	1.9	629	0.4
Carp	0	0.0	0.0	0	0.0
Bullhead	0	0.0	0.0	0	0.0
Sucker	1,092	0.1	0.4	27	0.0
Burbot	112	0.0	0.1	5	0.0
Others	<u>472</u>	<u>0.0</u>	<u>0.9</u>	<u>126</u>	<u>0.1</u>
TOTAL	2,211,906	100.0	5.8	\$168,007	100.0

Table 20. Production and Value of Catch from Southern Lake Michigan
(Management District 6), 1976

<u>Species</u>	<u>Pounds</u>	<u>% of Dist. Total lbs.</u>	<u>% of Species Total for L. Mich.</u>	<u>Value</u>	<u>% of Dist. Total Value</u>
Whitefish	0	0.0	0.0	\$ 0	0.0
Yellow Perch	50,698	46.5	11.3	50,492	46.7
Alewife	1,029	0.9	0.0	13	0.0
Chubs	56,532	51.9	26.3	57,391	53.1
Smelt	678	0.6	0.3	107	0.1
Carp	0	0.0	0.0	0	0.0
Bullhead	0	0.0	0.0	0	0.0
Sucker	13	0.0	0.0	0	0.0
Burbot	0	0.0	0.0	0	0.0
Others	<u>23</u>	<u>0.0</u>	<u>0.0</u>	<u>10</u>	<u>0.0</u>
TOTAL	108,973	100.0	0.3	\$108,013	100.0

Table 21. Production in Pounds by Month and Species, 1976

	<u>Whitefish</u>	<u>Yellow Perch</u>	<u>Alewife</u>	<u>Chubs</u>	<u>Smelt</u>	<u>Carp</u>	<u>Bull- heads</u>	<u>Suckers</u>	<u>Burbot</u>	<u>Others</u>	<u>Total</u>
Jan.	70,453	5,019	986	55,424	1,072	33,761	245	1,337	18,436	1,626	188,359
Feb.	107,727	2,627	1,070	67,251	18,776	38,285	65	1,193	15,701	1,763	254,458
Mar.	54,787	661	0	210	21,573	37,695	27	4,377	17,339	1,134	137,803
Apr.	147,119	2,871	1,315,922	15,320	128,332	6,255	55	70,675	15,188	2,282	1,704,019
May	209,665	23,607	6,796,336	5,485	7,760	157,725	3,228	50,945	2,241	5,341	7,262,333
Jun.	172,011	29,793	11,996,975	0	4,374	134,915	22,498	77,529	5,539	6,164	12,449,798
Jul.	161,092	31,180	6,590,285	0	2,249	85,179	31,223	15,607	2,900	8,136	6,927,851
Aug.	111,151	53,804	2,291,602	14,942	9,347	97,425	32,407	14,867	8,035	8,977	2,642,557
Sep.	170,102	118,306	1,998,330	33,822	2,133	79,503	16,232	18,705	15,327	9,110	2,461,570
Oct.	344,894	136,502	1,437,191	5,920	3,874	17,013	9,781	21,659	19,462	4,585	2,000,881
Nov.	2	40,381	2,159,755	8,075	4,380	161	3,680	2,269	9,223	1,751	2,229,677
Dec.	63,488	3,937	1,316	8,410	463	60,490	434	1,934	863	1,499	142,834
Total	1,612,491	448,688	34,589,768	214,859	204,333	748,407	119,875	281,097	130,254	52,368	38,402,140

Table 22. Production in Dollars by Gear and Species, 1976

Gear ^a	Yellow										Totals	
	Whitefish	Perch	Alewives	Chubs	Smelt	Carp	Bull- heads	Suck- ers	Bur- bot	Others	Value	Percent
1 inch gill net	250	21	1,969	0	11,171	0	0	0	0	69	13,480	0.5
2 inch gill net	33	230,602	132	212,142	810	0	245	396	50	9,296	453,706	17.2
4 inch gill net	1,211,938	8	4	5,966	832	37	0	1,570	1,339	3,894	1,225,588	46.5
7 inch gill net	0	0	0	0	0	13,407	0	0	37	0	13,444	0.5
Pound net	209,253	517	77,296	0	9,206	0	0	77	0	529	296,878	11.3
Deep trap net	18,398	0	0	0	0	0	0	10	0	8	18,416	0.7
Submarine trap net	5,692	0	0	0	0	0	0	0	0	0	5,692	0.2
Fyke net	0	215,657	727	0	955	907	15,388	2,916	4,034	7,893	248,477	9.4
Seines	0	0	0	0	0	10,558	0	0	0	0	10,558	0.4
Trawls	13	61	338,996	15	9,371	788	0	2,025	47	5	351,321	13.3
Totals	1,445,577	446,866	419,124	218,123	32,345	25,697	15,633	6,994	5,507	21,694	2,637,560	100.0

^aGill net size designations indicate minimum size for that category. For example, the 1 inch designation refers to net from 1 inch up to less than 2 inches, 2 inch nets are between 2 inches and 4 inches, and so on.

Table 23. Species Production in Pounds by Gear, 1976

Gear ^a	Whitefish	Yellow Perch	Alewives	Chubs	Smelt	Carp	Bull-heads	Suckers	Burbot	Others	Totals	
											Pounds	%
1 inch gill net	250	42	179,090	0	35,105	0	0	65	15	115	214,682	.06
2 inch gill net	43	228,624	25,046	208,568	3,936	216	2,136	13,107	2,025	19,476	503,177	1.30
4 inch gill net	1,299,421	12	1,737	6,274	7,842	1,259	0	51,616	70,197	9,567	1,447,925	3.80
7 inch gill net	0	0	0	0	0	170,487	0	0	146	0	170,633	0.40
Pound net	277,633	586	6,696,602	0	101,160	0	0	5,272	0	1,186	7,082,439	18.40
Deep trap net	25,630	0	0	0	0	0	0	206	0	12	25,848	0.10
Submarine trap net	9,486	0	0	0	0	0	0	0	0	0	9,486	0.0
Fyke net	0	219,365	102,898	0	8,760	43,200	117,739	103,855	50,185	22,004	668,006	1.7
Seines	0	0	0	0	0	484,600	0	0	0	0	484,600	1.3
Trawls	28	59	27,584,395	17	47,530	48,645	0	106,976	7,686	8	27,795,344	72.4
TOTALS	1,612,491	448,688	34,589,768	214,859	204,333	748,407	119,875	281,097	130,254	52,368	38,402,140	100.0

^aFor explanation of size designations see note to Table 23.

Table 24. Catch¹ and Effort² in the Gill Net Fisheries

Year	Chubs		Yellow Perch		Whitefish		Total	
	Catch	Effort	Catch	Effort	Catch	Effort	Catch	Effort
1967	5,064	54.97	437	10.40	51	2.77	5,552	68.14
1968	6,208	55.43	176	7.31	16	1.48	6,400	64.22
1969	5,316	45.57	171	5.50	86	3.50	5,573	54.56
1970	5,180	47.05	227	7.88	171	5.51	5,578	60.43
1971	3,138	36.17	159	7.25	352	10.67	3,649	54.10
1972	2,214	35.36	183	7.26	513	15.01	2,910	57.62
1973	1,866	39.16	153	7.38	639	21.51	2,658	68.05
1974	1,235	38.36	480	12.43	1,030	24.97	2,745	75.76
1975	343	15.17	277	16.17	1,099	37.67	1,719	69.01
1976	209	6.03	229	13.64	1,299	43.66	1,737	63.33

¹Catch in thousands of pounds taken in gill nets.

²Effort in millions of feet of gill net effectively fished.

Source: Poff, R. "Effective Management of Lake Michigan Commercial Fisheries." Wisconsin Department of Natural Resources.

Table 25. Whitefish Production by District and Gear, 1976

Gear	District ^a						Totals	
	1	2	3	4	5	6	Pounds	Percent
1 inch gill net	250	0	0	0	0	0	250	.02
2 inch gill net	2	6	0	35	0	0	43	0.00
4 inch gill net	126,521	422,494	750,406	0	0	0	1,299,421	80.58
Pound net	44,168	44,784	188,223	437	21	0	277,633	17.22
Deep Trap Net	25,630	0	0	0	0	0	25,630	1.59
Submarine Trap Net	9,486	0	0	0	0	0	9,486	0.59
Fyke net	0	0	0	0	0	0	0	0.00
Trawls	26	0	0	0	2	0	28	0.00
TOTALS	206,083	467,284	938,629	472	23	0	1,612,491	100.00

^aSee Table 14 for location of management districts.

Table 26. Yellow Perch Production by District and Gear, 1976

Gear	District ^a						Totals	
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>Pounds</u>	<u>Percent</u>
1 inch gill net	42	0	0	0	0	0	42	0.01
2 inch gill net	142,615	78	5,544	18,037	11,652	50,698	228,624	50.95
4 inch gill net	10	2	0	0	0	0	12	0.00
Pound net	586	0	0	0	0	0	586	0.13
Deep trap net	0	0	0	0	0	0	0	0.00
Submarine trap net	0	0	0	0	0	0	0	0.00
Fyke net	219,282	0	0	0	83	0	219,365	48.89
Trawls	<u>59</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>59</u>	<u>0.01</u>
TOTALS	362,594	80	5,544	18,037	11,735	50,698	448,688	100.00

^a See Table 14 for location of management districts.

Table 27. Alewife Production by District and Gear, 1976

Gear	District ^a						Total	
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	Pounds	Percent
1 inch gill net	179,090	0	0	0	0	0	179,090	0.52
2 inch gill net	20,757	0	1,261	97	1,902	1,029	25,046	0.07
4 inch gill net	771	966	0	0	0	0	1,737	0.01
Pound net	5,072,525	0	0	618,255	1,005,822	0	6,696,602	19.36
Deep trap net	0	0	0	0	0	0	0	0.00
Submarine trap net	0	0	0	0	0	0	0	0.00
Fyke net	102,898	0	0	0	0	0	102,898	0.30
Trawls	<u>12,952,370</u>	<u>0</u>	<u>0</u>	<u>13,573,775</u>	<u>1,058,250</u>	<u>0</u>	<u>27,584,395</u>	<u>79.75</u>
TOTALS	18,328,411	966	1,261	14,192,127	2,065,974	1,029	34,589,768	100.00

^aSee Table 14 for location of management districts.

Table 28. Chub Production by District and Gear, 1976

Gear	District ^a						Totals	
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	Pounds	Percent
1 inch gill net	0	0	0	0	0	0	0	0.00
2 inch gill net	0	0	11,153	12,373	128,510	56,532	208,568	97.07
4 inch gill net	0	0	6,274	0	0	0	6,274	2.92
Pound net	0	0	0	0	0	0	0	0.00
Deep trap net	0	0	0	0	0	0	0	0.00
Submarine trap net	0	0	0	0	0	0	0	0.00
Fyke net	0	0	0	0	0	0	0	0.00
Trawls	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>17</u>	<u>0</u>	<u>17</u>	<u>0.01</u>
TOTALS	0	0	17,427	12,373	128,527	56,532	214,859	100.00

^a See Table 14 for location of management districts.

Table 29. Smelt Production by District and Gear, 1976

Gear	District ^a						Totals	
	1	2	3	4	5	6	Pounds	Percent
1 inch gill net	17,870	0	0	17,235	0	0	35,105	17.18
2 inch gill net	753	0	841	413	1,251	678	3,936	1.93
4 inch gill net	1,645	5,011	1,186	0	0	0	7,842	3.84
Pound net	46,740	0	0	51,700	2,720	0	101,160	49.51
Deep trap net	0	0	0	0	0	0	0	0
Submarine trap net	0	0	0	0	0	0	0	0.0
Fyke net	8,760	0	0	0	0	0	8,760	4.29
Trawls	18,305	0	0	29,225	0	0	47,530	23.26
TOTALS	94,073	5,011	2,027	98,573	3,971	678	204,333	100.00

^aSee Table 14 for location of management districts.

PART IV

PCBs IN COMMERCIALLY CAUGHT SPECIES AND SALMONIDS

Table 30. PCB Levels in Commercially Caught Species from Wisconsin's Lake Michigan and Green Bay, 1975-77^a

Species	Length (inches)	No. of Observations	No.		Range of PCBs (ppm)	Average PCBs (ppm)	Average % Body Fat
			Exceeding 5 ppm	Exceeding 2 ppm			
Whitefish	13.8-17.2	10	1	1	.63- 7.7	2.0	9.7
	17.3-18.1	10	1	4	.91- 5.7	2.0	12.4
	18.2-22.3	16	8	12	1.0 -17.3	5.9	11.5
	22.4-28.7	11	5	9	1.5 -15.2	5.9	21.9
Whitefish totals		47	15	26	.63-17.3	4.2	13.7
Yellow Perch	5.2-14.5	20	1	5	.16- 5.6	1.6	1.0
Alewife	-	10	5	10	2.4 -13.6	6.7	9.1
Chubs	8.6-15.4	31	4	25	.25- 8.8	3.7	16.9
Carp	7.7-30.5	25	21	24	1.2 -51.6	13.7	14.1

^aFish tested were from Wisconsin waters but should not necessarily be considered representative of the commercial catch.

Source: The table covers only fish tested by the Wisconsin Department of Natural Resources.

Table 31. PCB Analysis on Lake Michigan Salmonids from Wisconsin Waters

<u>Species and Year</u>	<u>Number of Fish</u>	<u>Average Length (mm)</u>	<u>Total PCBs (ppm)</u>
LAKE TROUT*			
1971	29	589.3	16.50
1972	10	544.3	22.40
1974	46	569.1	9.42
1975	59	548.6	8.50
1976	33	578.4	7.69
SALMON**			
1974	33	660.1	7.18
1975	3	502.9	3.66
1976	8	704.5	9.48

*Includes a few Brown Trout

**Includes Chinook and Coho

Source: Wisconsin Department of Natural Resources testing program.

APPENDIX

**License Application and
Catch Report Forms**



State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

June 5, 1978

Anthony S. Earl
Secretary

BOX 7921
MADISON, WISCONSIN 53707

IN REPLY REFER TO: 9400

TO: Commercial Fishermen

Enclosed is your application for the renewal of your Wisconsin commercial fishing license which is valid on Lake Michigan and Green Bay. Assembly Bill 1220 which was made into law on May 18, 1978 as part of Chapter 418, Laws of 1977, has affected commercial fishing licensing and operations.

Copies of this law are not available at this time, however, it is hoped that we can forward a copy when you renew your commercial fishing license.

License fees can be determined by using the following scale:

Wisconsin Residents

Ice fishing only, the fee is \$60.00.

Boats not exceeding 25 feet, the license fee is \$60.00 per year.

Boats in excess of 25 feet up to 40 feet, the license fee is \$200.00 per year.

Boats over 40 feet in length, the license fee is \$200.00 plus \$5.00 for each additional foot over 40 feet.

The maximum fee for Wisconsin residents is \$300.00 per year per boat.

Please note that if you intend to fish for rough fish only and take these fish under contract, a special license is available for \$25.00 per boat. The above fees do not apply.

Nonresidents

Boats 25 feet or less, \$300.00 plus \$3.00 per foot of the overall length.

Boats over 25 feet, the fee is \$800.00 plus \$3.00 per foot of overall length.

The maximum fee for a nonresident boat is \$900.00 per year.

TO: Commercial Fishermen

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I also wish to remind you that if you are delinquent in reporting your fishing activities with our Sturgeon Bay Office, your license cannot be renewed.

If you have any further questions regarding the above fees or the new commercial fishing regulations, please feel free to contact this office or your local commercial fishing headquarters and enforcement office.

Sincerely,
Bureau of Finance



Douglas E. Poole, Chief
License Section

DEP:sh

Enc. : Form 9400-22

INSTRUCTIONS FOR PREPARING FORMS

Wisconsin Administrative Code WCD 25.15 requires all who hold a commercial fishing license to report their fishing activity and catches. The law reads, "On or before the tenth day of each month each such licensee shall report for the preceding calendar month to the state conservation commission in writing, on blanks furnished by said commission, the number of his license, the number of pounds of each kind of fish taken, the kind and amount of fishing gear employed, the length of time (number of nights) each unit was fished without being lifted, and such other data as the conservation commission may require to follow the trend of the fisheries. Such reports shall be made each month regardless of whether or not any fish were taken or any fishing done during the preceding month, and if no fish were taken or no fishing done the fact shall be so reported naming the month."

FISHING LICENSE - Enter fishing license number in this space.

BOAT - Registration Number - Enter state boat registration number; or if vessel is over five tons, enter U.S. Coast Guard registration number.
 Vessel Name - Give name of vessel for which license was issued, or if row boat is used, please state.
 Length-Weight - Enter length of boat or vessel (feet) and weight (tons) if more than one ton.

ICE FISHING - If ice fishing, check box.

LAKE - Enter name of lake in which you fished.

PORT - Enter name of port from which fishing is done or if no port, give name of nearest port of post office.

DATE - Enter name of month of operations covered by this report, also year.

LICENSE ISSUED TO - Give name of person or firm to whom fishing license was issued and post office address - do not enter name of person fishing, if other than holder of fishing license.

FISHING DATA - Use a separate line for each day and grid you fished and for each type of gear used, such as gill net, pound net, etc. Also use a separate line for each mesh size of gill net. Fishing for each license and/or with each boat should be reported on separate forms.

DAY OF MONTH - Give complete information on each day of fishing as required under various headings.

GRID - Refer to the lake chart with which you have been provided and determine the grid number where you were fishing. Enter this number in the column headed GRID. If gear extended into more than one grid, such as gill nets or trawling, enter grid where most gear was set or fishing done.

GEAR TYPE - Enter name of gear or number corresponding to type of gear fished, such as 01 for a gill net fished on the bottom or 91 for a floated gill net, etc.

SIZE OF GEAR - Enter in units appropriate to type of gear fished; for gill nets enter the number of feet fished, for a pound net enter the pot depth in feet, etc. If several pots are lifted with different depths, in a given day and grid, enter the range, that is: 40'-50'.

UNIT OF OPERATION - Enter in units appropriate to type of gear fished; for gill nets enter the number of nights out, for pound, trap, fyke or hoop nets enter number of lifts, for seines enter number of hauls, etc.

MESH SIZE - Enter mesh size of gill nets, and mesh size of the pot, bag, or cod of other gear as appropriate; the mesh size to be entered should be stretched measure. If several pots are lifted with different mesh sizes, or gill nets with different mesh sizes, give the range, for example: 2 $\frac{1}{2}$ - 2 $\frac{3}{4}$.

MESH MATERIAL - Enter name or number corresponding to the material of nets; if a nylon net is fished, you can enter 1. If more than one mesh material is used, enter both of them, for example: "nylon-mono" or "1-2."

BOTTOM DEPTH RANGE FISHED - Give the water depth range in which gear was fished (fathoms).

WEIGHT OF CATCH BY KINDS - Under each heading, enter the number of pounds by each kind taken each day - do not enter the number of fish, except for undersized whitefish and laketrout. If kinds of fish are taken which are not covered in the separate headings, blank columns are found at the right; enter name in heading and give weight below. Report all fish killed in your operations, including fish turned in to law enforcement or unsaleable fish such as small suckers and lawyers. Enter average price per pound that you received during the month for each species caught, but if fish are not sold enter "NS." Indicate "R" for species sold round weight and "D" for those sold dressed weight.

REPORTED BY - Enter signature of person filling out catch reporting form.

REMARKS - Any unusual observations or comments can be reported on reverse side. The need for more forms can be noted here.

DAILY REPORT OF COMMERCIAL FISHERIES OF THE GREAT LAKES

WISCONSIN DEPARTMENT OF NATURAL RESOURCES

FISHING LICENSE #	BOAT		reg. no.	name	length	ft	weight	ICE FISHING <input type="checkbox"/>	LAKE		PORT		LICENSE ISSUED TO		name		p.o. address			
	GT 6 ft. - 10 ft. 6 in.	10 ft. 6 in. - 12 ft. 6 in.							LAKE TROUT	WHITEFISH	Memom. line	CHIPS	Hermitg	steele	Alaska	Perch	Suckers	Crab	Lawyer	Northern Pike
Day	1 Gill net - bottom	2 Gill net - surface	3 Dip net	4 Rowing trap	5 Fly net	6 Dip net	7 Dip net	8 Dip net	9 Dip net	10 Dip net	11 Dip net	12 Dip net	13 Dip net	14 Dip net	15 Dip net	16 Dip net	17 Dip net	18 Dip net	19 Dip net	
																				ft. mesh

Note: Report must be submitted promptly at the end of each month. Report will be returned if improperly filled out. Fishermen failing to report will be declared ineligible and new licenses of licensees. Wisconsin Statutes 29.83 (N) possibly per statute.

REPORTED BY _____ SIGNATURE

NATIONAL SEA GRANT PROGRAM
RTE 1, BOX 1000
GRI, NEWINGTON, CONNECTICUT
MIDDLETOWN, CT 06452

RECEIVED
NATIONAL SEA GRANT PROGRAM
SEP 7 1973

