



**Biological and Commercial Catch Statistics  
from the Chippewa Inter-Tribal Gill Net Fishery  
within Michigan Waters of Lake Superior  
During 2002**

by

William P. Mattes

Great Lakes Indian Fish & Wildlife Commission

Matthew J. Symbal

Red Cliff Fisheries Department

Red Cliff Band of Lake Superior Chippewa Indians

P.O. Box 529

Bayfield, WI 54814

Michael Donofrio

Keweenaw Bay Natural Resources Department

Keweenaw Bay Indian Community

P.O. Box 10

L'Anse, MI 49946

Administrative Report 03-11

June 2003

**GREAT LAKES INDIAN FISH  
& WILDLIFE COMMISSION**

Biological Services Division

P.O. Box 9

Odanah, WI 54861

(715) 682-6619

## ABSTRACT

The 2002 commercial inter-tribal fishery in the 1842 treaty-ceded waters of Michigan consisted of six (6) large boats and 15 small boats, representing 21 tribal licensees from the Keweenaw Bay, Bad River and Red Cliff Bands of Lake Superior Chippewa. Gill nets were the primary gear used in the fishery. For the second year, trap nets were also fished.

The fishing season for whitefish and laké trout was closed from November 1 through November 27 and commercial fishing was prohibited during October in eight seasonal refuges. Target fishing for lean lake trout (fishing in water < 35 fathoms) in areas outside the refuges was prohibited during October to reduce the impact of fishing on spawning stocks of lake trout. The Keweenaw Bay tribe managed their lake herring fishery through a quota system.

Fishermen reported fishing 5.6 million feet of gill net, 110 nights of trap nets, and harvesting 529,022 dressed pounds (633,832 round pounds) of fish. Whitefish was the primary target species, making up 61% of the total, followed by lake trout (28%), siscowet (7%), lake herring (4%), and salmon (<0.1%).

## TABLE OF CONTENTS

	<u>PAGE</u>
FIGURES .....	iii
TABLES .....	iv
ACKNOWLEDGMENTS .....	vi
INTRODUCTION .....	1
Description of the Fishery .....	1
Quota Management System .....	2
METHODS .....	3
RESULTS AND DISCUSSION .....	4
Commercial Catch and Effort Statistics .....	4
Unit MI-2 .....	4
Unit MI-3 .....	5
Unit MI-4 .....	6
Unit MI-5 .....	7
Biological Statistics .....	8
Lake Trout MI-2 .....	8
Lake Trout MI-3 .....	8
Lake Trout MI-4 .....	8
Lake Trout MI-5 .....	9
Whitefish MI-2 .....	9
Whitefish MI-3 .....	9
Whitefish MI-4 .....	9
Whitefish MI-5 .....	9
Siscowet .....	10
Lake Herring and Menominee Whitefish .....	10
Coho and Chinook Salmon .....	10
REFERENCES CITED .....	11

## FIGURES

### PAGE

Figure 1.	Management units and statistical grids in the 1842 ceded area within Michigan waters of Lake Superior . . . . .	12
Figure 2.	Proportion of 4 ½ inch mesh and total tribal large mesh gill net effort composed of 4 ½ inch and larger mesh by management unit 1986 to 2002 . . . . .	13
Figure 3.	Trends in average length (inches) of hatchery and wild lake trout (ages 7 to 10) in Michigan management units MI-3 and MI-4, from 1985-2002 . . . . .	14
Figure 4.	Trends in average length (inches) of whitefish (ages 7 to 10) in Michigan management units MI-3 and MI-4 from 1985-2002 . . . . .	15

## TABLES

	<u>PAGE</u>
Table 1. Total tribal commercial gill net effort (feet) and harvest by management unit and grid from the 1842 ceded area within Michigan waters of Lake Superior in 2002 .....	16
Table 2. Total and target gill net harvest and effort statistics by tribe for lake trout, whitefish, and siscowet in Michigan waters of Lake Superior in 2002 .....	17
Table 3. Tribal commercial harvest by management unit and gill net mesh size from the 1842 ceded area within Michigan waters of Lake Superior in 2002 .....	18
Table 4. Gill net harvest and effort statistics for target species by grid and management unit in Michigan waters of Lake Superior in 2002 .....	19
Table 5. Tribal commercial gill net effort (feet), harvest (dressed pounds), and catch per unit effort (CPE, pounds/1000') statistics for whitefish, lake trout, and siscowet by management unit and year from the 1842 ceded area within Michigan waters of Lake Superior from 1985-2002 .....	20
Table 6. Total tribal commercial trap net effort (1,000 feet=1 trap night) and harvest by management unit and grid from nets fished in the 1842 ceded area within Michigan waters of Lake Superior in 2002 .....	22
Table 7. Age and size composition of hatchery (H) and wild (N) lake trout in tribal commercial harvests from unit MI-2 during 2002 .....	23
Table 8. Lamprey wounding and scarring rates (marks/100 fish) on lake trout, per Lake Superior Technical Committee protocol, captured in the tribal commercial harvests from management units in the 1842 ceded area within Michigan waters of Lake Superior during 2002 .....	24
Table 9. Catch curve mortality and survival rates on lake trout from management units in the 1842 ceded area within Michigan waters of Lake Superior for data collected January-December 1988-2002 .....	25
Table 10. Age and size composition of hatchery (H) and wild (N) lake trout in tribal commercial harvests from unit MI-3 during 2002 .....	26
Table 11. Age and size composition of hatchery (H) and wild (N) lake trout in tribal commercial harvests from unit MI-4 during 2002 .....	27

Table 12.	Age and size composition of whitefish in tribal commercial harvests from management units in the 1842 ceded area within Michigan waters of Lake Superior during 2002 .....	28
Table 13.	Age and size composition of siscowet in tribal commercial harvests from management units in the 1842 ceded area within Michigan waters of Lake Superior during 2002 .....	30
Table 14.	Age and size composition of lake herring in tribal commercial harvests from management units in the 1842 ceded area within Michigan waters of Lake Superior during 2002 .....	31
Table 15.	Age and size composition of menominee in tribal commercial harvests from management units in the 1842 ceded area within Michigan waters of Lake Superior during 2002 .....	32

## ACKNOWLEDGMENTS

The authors would like to thank all tribal commercial fishermen who fished in the 1842 ceded territory within Michigan waters of Lake Superior for submitting harvest and effort information and cooperating with monitors during biological surveys of catches. Appreciation goes to Edward Leoso of the Bad River Natural Resources Department; Gene Mensch, and Evelyn Ravindran of the Keweenaw Bay Natural Resources Department; Michelle Gurnoe and Bryan Bainbridge of the Red Cliff Fisheries Department; and Michael Plucinski, Nate Bigboy, Carrie Cannon, and Jodi Berg for their assistance in data collection, ageing fish and entering and proofing data. We would also thank Neil Kmiecik for editing this report.

## INTRODUCTION

The Red Cliff, Bad River and Keweenaw Bay Bands of Lake Superior Chippewa entered into an agreement to establish an inter-tribal off-reservation assessment fishery in the western Michigan waters of Lake Superior (from the Wisconsin- Michigan state line to the West Entry in the Keweenaw Peninsula) on 23 August 1984. In 1988 tribal off-reservation commercial fishing expanded to include more fishermen and fishing in waters east of the Keweenaw Peninsula. An inter-tribal agreement was developed to manage this expanded fishery. Since 1990 Bad River and Red Cliff have managed their fishery within the guidelines of this inter-tribal agreement, while Keweenaw Bay manages their fishery through a fisheries management plan. Results of the early assessment fishery and the expanded commercial fishery have been reported annually as administrative reports to the Great Lakes Indian Fish and Wildlife Commission Biological Services Division, titled "Biological and commercial catch statistics from the Chippewa inter-tribal gill net fishery within Michigan waters of Lake Superior".

Biological and commercial fishery statistics were summarized for calendar year 2002 from the inter-tribal fishery in the 1842 treaty-ceded territory within Michigan waters of Lake Superior (Figure 1), and compared to those from previous years. Statistics were reported by management unit, grid, and gear type as indicated on individual catch reports.

### Description of the Fishery

The commercial fishery consisted of six (6) large boats and 15 small boats, representing 21 tribal licenses from the Keweenaw Bay, Bad River and Red Cliff Bands. As in previous years, the area south of a line from the East Entry of Keweenaw Peninsula to Point Abbaye (Figure 1) was open only to Keweenaw Bay small boat fishermen. Gill nets were the primary gear used in the fishery. For the second year, trap nets were also fished.

The fishing season for whitefish and lake trout was closed from November 1 through November 27. Fishing for siscowet was prohibited in water less than 35 fathoms during the closed season for lake trout and whitefish. Commercial fishing was prohibited during October in seasonal refuges, of which four were created in 1988, three in 1989, and one in 2000 (Figure 1). Target fishing for lean lake trout in other areas was prohibited during October to reduce the impact of fishing on spawning stocks of lake trout. The Keweenaw Bay tribe employed a quota system for regulating lake herring harvest by its fishermen. The Bad River and Red Cliff tribes did not use this system for lake herring. Also, the three bands allowed fishing for lake herring year-round (i.e. no seasonal restriction).



## Quota Management System

Since 1984, the tribes have used a quota management system to regulate harvest of lake trout to limit mortality on recovering lake trout stocks (Ebener and Bronte 1986). Total Allowable Catch (TAC's, expressed as number of fish) was estimated annually for each management unit with the exception of 1985, when each gill net tug was assigned a lake trout quota of 3,750 or 15,000 pounds depending on tribal affiliation. TAC's are calculated for each *fishing year*, beginning in November and running through October of the next year. Tribal quotas and TAC's by management unit and fishing year were as follows;

UNIT		YEARS			
		pre-1990 <sup>1</sup>	1990-1994 <sup>2</sup>	1995-1999 <sup>3</sup>	2000-2004 <sup>4</sup>
MI-2	TAC	19,800	10,400	9,700	6,606
	Tribal	9,900	5,200	4,850	3,303
MI-3	TAC	5,000	7,600	6,600	4,950
	Tribal	2,500	3,800	3,300	2,475
MI-4	TAC	20,600	53,400	46,920	40,440
	Tribal	10,300	26,700	23,460	20,220
MI-5	TAC	16,100	15,700	17,080	33,130
	Tribal	4,830	4,710	5,124	16,565
Total	TAC	61,500	87,100	80,300	85,126
	Tribal	27,530	40,410	36,734	42,563

<sup>1</sup>GLIFWC. 1987.

<sup>2</sup>Ebener et al. 1989.

<sup>3</sup>Mattes. 1994.

<sup>4</sup>Mattes. 2000.

Harvest quotas applied only to lean lake trout (referred to as "lake trout" in this report). Harvest of siscowet, a deep water form of lake trout, was not regulated by quotas.

## METHODS

Effort and harvest data were collected from mandatory daily catch reports filed bi-weekly by all fishermen who sold fish in their names, or by the boat captain who reported all effort and catch for his vessel. Gill net effort was reported as linear feet of gill net lifted and trap net effort was reported as equivalent to 1,000 linear feet of gill net for each night that a trap net was set. Harvest was reported in both round and dressed pounds. Species for which harvest was reported as dressed pounds and conversion factors used to calculate round pounds are given below. Harvest of burbot, walleye, and smelt was reported in round pounds.

Species	Conversion
Whitefish	1.17
Lake trout	1.25
Siscowet	1.25
Salmon	1.25
Herring	1.20
Round whitefish	1.15
Chub	1.20

Biological statistics were derived from biological monitoring data. Biological monitoring of catches occurred several times a month by the Keweenaw Bay Natural Resources Department, the Red Cliff Fisheries Department, and the Great Lakes Indian Fish and Wildlife Commission.

## RESULTS AND DISCUSSION

### Commercial Catch and Effort Statistics

Fishermen reported fishing 5.6 million feet of gill net and 110 nights of trap nets, and harvesting 529,022 dressed pounds (633,832 round pounds) of fish. Lake whitefish, the primary target species, made up 61% of the total followed by lake trout (28%), siscowet (7%), lake herring (4%), and salmon (<0.01%).

#### Unit MI-2

Effort. Seven percent of the total gill net effort was expended in MI-2 (Table 1) which was fished by two tribes (Table 2). Fishing effort was 0.37 million feet with gill nets of 4 ½ inch mesh accounting for 100% of the unit effort (Table 3, Figure 2). Fishing occurred in three grids grouped into two general areas: Union Bay (grid 1315) and Black River (grids 1413 and 1414) (Figure 1). Fifty-four percent of the effort occurred at Black River and 46% at Union Bay.

Harvest. Ten percent of the total harvest (53,626 dressed or 63,562 round pounds) was taken in MI-2 (Tables 1 and 3). Whitefish made up 80%, siscowet 13%, and lake trout 7% of this harvest. The majority of harvest occurred around Black River (61%). For whitefish, 64% of the harvest was from grids near Black River and 36% was from Union Bay, while for lake trout 59% of the harvest was from Union Bay and 41% was from Black River. For siscowet 52% were harvested near Black River and 48% near Union Bay.

Target Effort and Harvest. All fishing effort in MI-2 was targeted for whitefish and lake trout (Tables 4 and 5). Target effort (371,800 feet) and harvest (43,377 pounds) of whitefish was greater than the 1985-2001 average (196,100 feet and 32,284 pounds). Target lake trout harvest (3,582 pounds) continued to remain low (1985-2001 average: 7,685 pounds). No target fishing was directed at siscowet or lake herring.

Catch per effort (CPE or pounds harvested per 1,000 feet of gill net) for targeted fishing in the three grids fished in MI-2 varied from 90-212 pounds for whitefish and averaged 117 pounds (Table 4), within the range of average CPE's (29-308) recorded over the past 17 years (1985-2001) (Table 5). Lake trout CPE ranged from 7-18, and averaged 10 pounds (Table 4), within the range of CPE's (5-177) recorded over the past 17 years (1985-2001) (Table 5). For whitefish, average CPE in the grids fished near Black River (173 pounds) were higher than those at Union Bay (90 pounds). For lake trout, CPE was the same for both areas (12 pounds).

### Unit MI-3

Effort. Thirty-three percent of the total gill net effort (Table 1) and 67% of the total trap net effort (Table 6) was expended in MI-3, which was fished by three tribes (Table 2). Gill net fishing effort was 1.9 million feet and all gill nets fished were 4 ½ inch mesh (Table 3, Figure 2). Trap net effort was 74,000 feet or 74 trap net nights. Grids fished were grouped into four general areas: Misery Bay (grids 1219 and 1220), Redridge/West Entry (grids 1121 and 1122), 5 Mile Point (grid 1023), and Eagle River (grid 1024). The percent of total gill net effort fished at Redridge/ West Entry was 70%, followed by 19% at 5 Mile Point, 10% at Misery Bay, and 1% at Eagle River (grid 1024). Trap nets were fished at Redridge/West Entry (31 nights or 42%), Misery Bay (24 nights or 32%), and 5 Mile Point (19 nights or 26%) (Table 6).

Harvest. Twenty-three percent of the total harvest (121,752 dressed or 144,998 round pounds) was taken in MI-3 (Tables 1 and 6). Of gill net harvest in this unit, whitefish made up 81%, lake trout 7%, and siscowet 12% (Table 1), and of the trap net harvest whitefish made up 54% and lake trout 46% (Table 6). For gill nets 55% of the whitefish were from Redridge/West Entry, 28% from 5 Mile Point, 16% from Misery Bay, and 1% from Eagle River, while 38% of the lake trout were taken from 5 Mile Point, 36% Redridge/West Entry, and 26% from Misery Bay. Siscowet were harvested in the gill net fishery from Redridge/West Entry (52%), followed by 5 Mile Point (24%) and Misery Bay (24%). For trap nets 62% of the whitefish were from Redridge/West Entry, 23% from 5 Mile point, and 15% from Misery Bay, while 51% of the lake trout were taken from Redridge/West Entry, 42% from Misery Bay and 7% from 5 Mile Point.

Target Effort and Harvest. All fishing effort in MI-3 was targeted at whitefish and lake trout (Tables 4 and 6). Target gill net effort (1.9 million feet) was the highest since 1998 and at the 1985-2001 average of 1.9 million feet (Table 5). Target harvest of whitefish (85,980 pounds) was the lowest since 1994 and 76,898 pounds below the 1985-2001 average (162,878 pounds). Target harvest of lake trout (19,558 pounds) was the highest since 1998 but below the 1985-2001 average (21,405 pounds). Trap net effort (74 trap net nights) included a harvest of 3,925 pounds of whitefish and 3,303 pounds of lake trout (Table 6).

Catch per effort. CPE for targeted gill net fishing in MI-3 grids varied from 28-75 pounds for whitefish and averaged 46 pounds (Table 4). CPE for lake trout ranged from 3-33 pounds (average: 10 pounds). For whitefish CPE's were highest at Eagle River at 75 pounds, followed by Misery Bay at 70 pounds, 5 Mile Point at 68 pounds and Redridge/West Entry at 36 pounds. For lake trout CPE's were highest at Misery Bay and 5 Mile Point at 23 pounds, followed by Eagle River at 9 pounds, and Redridge/West Entry at 5 pounds.

## Unit MI-4

Effort. Since 1986 this unit has annually received the majority of tribal effort (Table 5). In 2002, 49% percent of the total gill net effort (Table 1 and 2) and 33% of the total trap net effort (Table 6) was fished in MI-4. Gill net effort was 2.8 million feet with large mesh gill nets of 4 ½ inch mesh accounting for 96% of the effort, 5.0 inch mesh accounting for another 2%, and small mesh (3.0 inch mesh) accounting for 1% (Table 3, Figure 2). Trap net effort was 36,000 feet or 36 net nights (Table 6).

Fishing occurred in 11 grids grouped into five general areas: Keweenaw Point (grid 1027), Traverse Bay to Bete Grise (grids 1026, 1125, and 1126), Traverse Island (grids 1223 and 1224), Keweenaw Bay (grids 1323, 1324, and 1423), and Huron Islands (1325, and 1326) (Figure 1, Table 1). In 2002, most of the gill net fishing effort occurred in the Traverse Island area (43% or 1.18 million feet), followed by the Traverse Bay to Bete Grise area (35% or 0.98 million feet), Huron Islands (12% or 0.33 million feet), Keweenaw Bay (9% or 0.24 million feet), and Keweenaw Point (2% or 0.04 million feet). Trap nets were fished at Traverse Bay (20 nights or 56%) and Traverse Island (16 nights or 44%) (Table 6).

Harvest. Fifty-four percent of the total harvest (284,854 dressed or 342,415 round pounds) was taken in MI-4 (Tables 1 and 6). For gill net harvest, whitefish made up 58%, lake trout 33%, siscowet 7%, herring 2%, and salmon less than 1% (Table 1). Percentages of whitefish taken by area were 35% from Traverse Island, 34% from Traverse Bay to Bete Grise, 14% from Huron Islands, 9% from Keweenaw Point, and 8% from Keweenaw Bay. For lake trout, 60% of the harvest was from Traverse Island, followed by 17% at Keweenaw Bay, 14% from the Huron Islands, and 9% from Traverse Bay to Bete Grise. No lake trout were harvested from Keweenaw Point. The majority of the siscowet harvest was from Traverse Bay to Bete Grise (74%), followed by Keweenaw Point (16%), Traverse Island (6%), the Huron Islands (2%), and Keweenaw Bay (1%). Gill net harvest for herring occurred in four grids in 2002. The Traverse Bay to Bete Grise area (grids 1026, 1125, and 1126) accounted for 80% of the harvest, while grid 1323 in Keweenaw Bay accounted for the remaining 20%. All of the salmon harvest (549 pounds) was from the Keweenaw Bay gill net fishery.

For trap net harvest, whitefish made up 94% and lake trout 6% of the harvest (Table 6). For whitefish, 53% were harvested from Traverse Bay and 47% from Traverse Island, while for lake trout 63% were harvested from Traverse Bay and 37% from Traverse Island.

Target Effort and Harvest. The majority of fishing effort (99%) was targeted at whitefish and lake trout with the remainder directed at lake herring (1%) (Table 4). No effort was targeted at siscowet or salmon in 2002. The target effort for whitefish and lake trout in 2002 (2.7 million feet), was 0.5 million feet higher than in 2001 (2.2 million feet) (Table 5). Target harvest of whitefish was 160,561 pounds, target harvest of lake trout was 91,897 pounds, and target harvest of herring was 5,890 pounds. Trap net effort (36 trap net nights) included a harvest of 6,225 pounds of whitefish and 381 pounds of lake trout (Table 6).

Catch per effort. CPE for targeted gill net fishing in the 11 grids of MI-4 varied from 32-340 pounds per 1,000 feet for whitefish (average: 59 pounds) and 7-83 pounds for lake trout (average: 34 pounds) (Table 4). For the 2 grids with gill net effort directed at herring CPE was 174 pounds (grid 1026) and 119 pounds (grid 1423) with an average of 159 pounds.

For whitefish, CPE was highest at Keweenaw Point (340 pounds) while the remaining four areas ranged from an average of 50 pounds at Traverse Island to 65 pounds at the Huron Islands (Table 4). For lake trout, CPE was highest in Keweenaw Bay (average: 68 pounds) followed by Traverse Island (average: 46 pounds), the Huron Islands (average: 38 pounds), Keweenaw Peninsula (10 pounds), and Traverse Bay to Bete Grise (average: 8 pounds).

### Unit MI-5

Effort. Eleven percent of the total effort was fished in MI-5 (Table 1), by three tribes fishing the area (Table 2). Fishing effort was 610,300 feet, an increase of 287,350 feet from 2001 (322,950) (Tables 3 and 5). Fishing effort was primarily (97%) large mesh net targeted at whitefish, lake trout, and siscowet (Figure 2). Large mesh nets consisted of a mix of 4 ½ (75%), 5.0 (22%) and 4 9/16 (0.5%) inch mesh. Fishing occurred in four grids: two at Granite Island (grid 1428 and 1429), one at Presque Isle (grid 1529), and one at Big Bay (1327) (Table 1). Total effort in MI-5 has been increasing due to regulations which require fishermen to fish outside of Keweenaw Bay, dock improvements near Marquette with direct access to fishing grounds, and good catches.

Harvest. Thirteen percent of the total harvest (68,790 dressed or 82,857 round pounds) was taken from MI-5 (Tables 1 and 3). Whitefish made up 44%, lake trout 35%, and herring 18% of the harvest. For whitefish, 51% were taken from Presque Isle, 38% from Big Bay, and 11% from Granite Island. For lake trout the majority (73%) were taken from Presque Isle, followed by 22% at Big Bay, and 5% at Granite Island. For herring 87% of the harvest occurred at Big Bay and 13% at Presque Isle.

Target Effort and Harvest. Targeted whitefish harvest was 31,329 dressed pounds, which was 8,210 pounds higher than 2001 (22,949 pounds), and near the 1986-2001 average of 28,321 pounds (Table 5). Targeted lake trout harvest was 23,010 dressed pounds, which was 6,559 pounds higher than the 1986 to 2000 average (16,451 pounds). Targeted herring harvest was 9,852 dressed pounds (Table 4).

Catch per effort. Catch per effort for targeted fishing in the four grids varied from 33-71 pounds per 1,000 feet for whitefish (average: 54 pounds) and 14-50 pounds for lake trout (average: 40 pounds) (Table 4). Whitefish CPE's were highest at Big Bay (71 pounds), while lake trout CPE's were highest at Presque Isle (50 pounds). Herring were targeted in grids 1327 and 1529 and CPE was 618 and 60 pounds, respectively.

## **Biological Statistics**

### Lake Trout MI-2

Six age groups of wild lake trout (6-11) and one age 8 hatchery fish were represented in the 20 fish aged (Table 7). The mean age of wild fish was 8.5 years. Fish ten years and older made up 25% of the wild component of the catch. Mean length and weight of the 27 fish sampled was 24.8 inches and 5.3 pounds round, respectively. The hatchery fish was 25.7 inches and the average length of wild fish was 24.7 inches.

Average lamprey marking rates were 11.1 wounds and 3.7 scars/100 fish, with fish >29.0 inches exhibiting the highest wounding rates (100.0 wounds/100 fish) (Table 8). Annual total mortality was estimated at 37% ( $Z=0.46 \pm 0.30$ ) for wild fish ages 9-11 (Table 9).

### Lake Trout MI-3

Seventeen age groups of wild lake trout (5-23) and five age groups of hatchery fish (8-11, 13) were represented in the 238 fish aged (Table 10). Mean age of 227 wild fish was 10.0 and mean age of 11 hatchery fish was 10.2. Mean length and weight for the 279 wild fish sampled was 24.0 inches and 4.7 pounds round, and was 26.5 inches and 5.6 pounds round for the 17 hatchery fish sampled. Average size at age of 7-10 year old wild lake trout has decreased and become narrower since 1985 (Figure 3). Average length of 7-10 year old hatchery fish has fluctuated since 1990, probably due to low sample sizes.

Overall lamprey marking rates were 3.6 wounds and 2.9 scars/100 fish, with fish greater than 29 inches exhibiting the highest scarring rates (Table 8). Annual total mortality rate for wild fish 7-20 years old was estimated at 27% ( $Z=0.31 \pm 0.04$ ) (Table 9).

### Lake Trout MI-4

Seven age groups of hatchery fish (5-11) and thirteen year classes of wild trout (4-12, 14, 16, 17, 21) were represented in a sample of 103 lake trout aged from MI-4 (Table 11). Mean age of hatchery and wild fish was 7.3 and 9.1 years, respectively. Fish ten years and older made up 35% of the wild component of the catch.

Mean length and weight of all fish sampled was 23.3 inches and 4.2 round pounds (Table 11). The average size of wild fish (23.5 inches, 4.4 pounds) was greater than hatchery fish (22.6 inches, 3.8 pounds). Average length of wild and hatchery fish at ages 7-10 has been tracked since 1985 (Figure 3). The variation in the average length of wild fish at ages 7-10 has become narrower since 1985. Average length of hatchery fish has fluctuated greatly primarily due to low numbers of fish sampled.

Lamprey marking rates were 5.3 wounds and 6.1 scars/100 fish, with the larger older fish exhibiting the greatest occurrence of scars (Table 8). Annual total mortality was estimated to be 21% ( $Z=0.23 \pm 0.07$ ) for wild fish ages 7-12 and 24% ( $Z=0.27 \pm 0.06$ ) for wild and hatchery fish combined (Table 9).

#### Lake Trout MI-5

No lake trout were sampled from MI-5 in 2002.

#### Lake Whitefish MI-2

Six age groups (7-12) were represented in the 34 whitefish aged in MI-2 which had a mean age of 9.5 years (Table 12). As in the past, the 1990-93 year classes (ages 9-12) were dominant and comprised 71% of the aged fish sample. Average length and weight of lake whitefish was 22.2 inches and 3.9 pounds based on a sample size of 36 fish. Annual total mortality was estimated at 27% ( $Z=0.31 \pm 0.14$ ) for ages 9-12.

#### Lake Whitefish MI-3

Eleven age groups (4-14) were represented in the 776 whitefish aged in MI-3 which had a mean age of 9.2 years (Table 12). The 1990-93 year classes (age 9-12), which have been dominant since 1996, comprised 65% of the sample, while 19% percent of the aged fish were from the 1994 year classes (age 8). Average length and weight of lake whitefish was 19.8 inches and 2.8 pounds based on a sample size of 783 fish. The average length of age 7 to 10 year old fish has generally been similar since 1995 (Figure 4). Annual total mortality was estimated at 60% ( $Z=0.91 \pm 0.10$ ) for ages 10-13.

#### Lake Whitefish MI-4

Thirteen age groups (4-15, 19) were represented in the 272 whitefish aged in MI-4 which had a mean age of 8.2 years (Table 12). The 1990-93 year classes (age 9-12), which had been dominant since 1996, comprised only 41% of the sample. Forty-three percent of the aged fish were from the 1994-96 year classes (age 6-8). Average length and weight of lake whitefish was 21.5 inches and 3.7 pounds based on a sample size of 274 fish. The average length of age 7 to 10 year old fish has increased over the past six years (Figure 4). Annual total mortality was estimated at 48% ( $Z=0.66 \pm 0.21$ ) for ages 10-13.

#### Lake Whitefish MI-5

Fourteen age groups (6-18, 20) were represented in the 90 whitefish aged in MI-5 (Table 12). The 1993-94 year classes (age 8-9) were dominant, comprising 34% of the fish aged. For the 90 whitefish sampled in MI-5 the mean age was 10.5 years, mean length was 24 inches, and mean weight was 5.5 round pounds.



### Siscowet

There were ten age groups (7, 9-15, 17, 20) of siscowet in the 17 fish sampled in units MI-3 and MI-4 (Table 13). The mean age for siscowets was 12.6 in MI-3, and 15.7 in MI-4. Mean size was 23.4 inches and 4.4 pounds in MI-3 and 23.4 inches and 4.3 pounds in MI-4. Small sample size and a wide age distributions prevented the calculation of mortality rates.

### Lake Herring and Menominee Whitefish

Lake herring were only sampled from MI-4 where sixteen age groups (3-17, 20) were represented in 127 fish aged; mean age was 9.3 (Table 14). For the third year otoliths replaced scale samples as the aging structure used to assign age to individual fish. The 1989-92 year classes (age 10-13), which had been dominant since 1993, comprised only 25% of the sample. Thirty-two percent of the aged fish were from the 1996-97 year classes (age 5-6). Mean size for 204 herring sampled was 16.6 inches and 1.5 round pounds. Total annual mortality was 30% ( $Z=0.35 \pm 0.09$ ) for fish aged 12-17.

Four menominee whitefish were sampled in 2002, representing two age groups (8 and 11) with a mean age of 9.5 (Table 15). Mean size was 17.2 inches and 1.9 pounds round.

### Coho and Chinook Salmon

No salmon were monitored in 2002.

## REFERENCES CITED

Ebener, M.P., J. Selgeby, M. Gallinat, and M. Donofrio. 1989. Methods for determining total allowable catch of lake trout in the 1842 treaty-ceded area within Michigan waters of Lake Superior, 1990-1995. Great Lakes Indian Fish and Wildlife Commission, Biological Services Division Administrative Report 89-11. Odanah, Wisconsin.

GLIFWC. 1987. Calculation of lake trout total allowable catches for Michigan waters of Lake Superior. Intra-agency report dated January 16, 1987.

Mattes W.P. 1994. Memorandum to Great Lakes Indian Fish and Wildlife Commission Lake Committee Biologists dated November 30, 1994.

Mattes W.P. 2000. Memorandum to Great Lakes Indian Fish and Wildlife Commission Lake Committee Members and Biologists dated March 29, 2000.

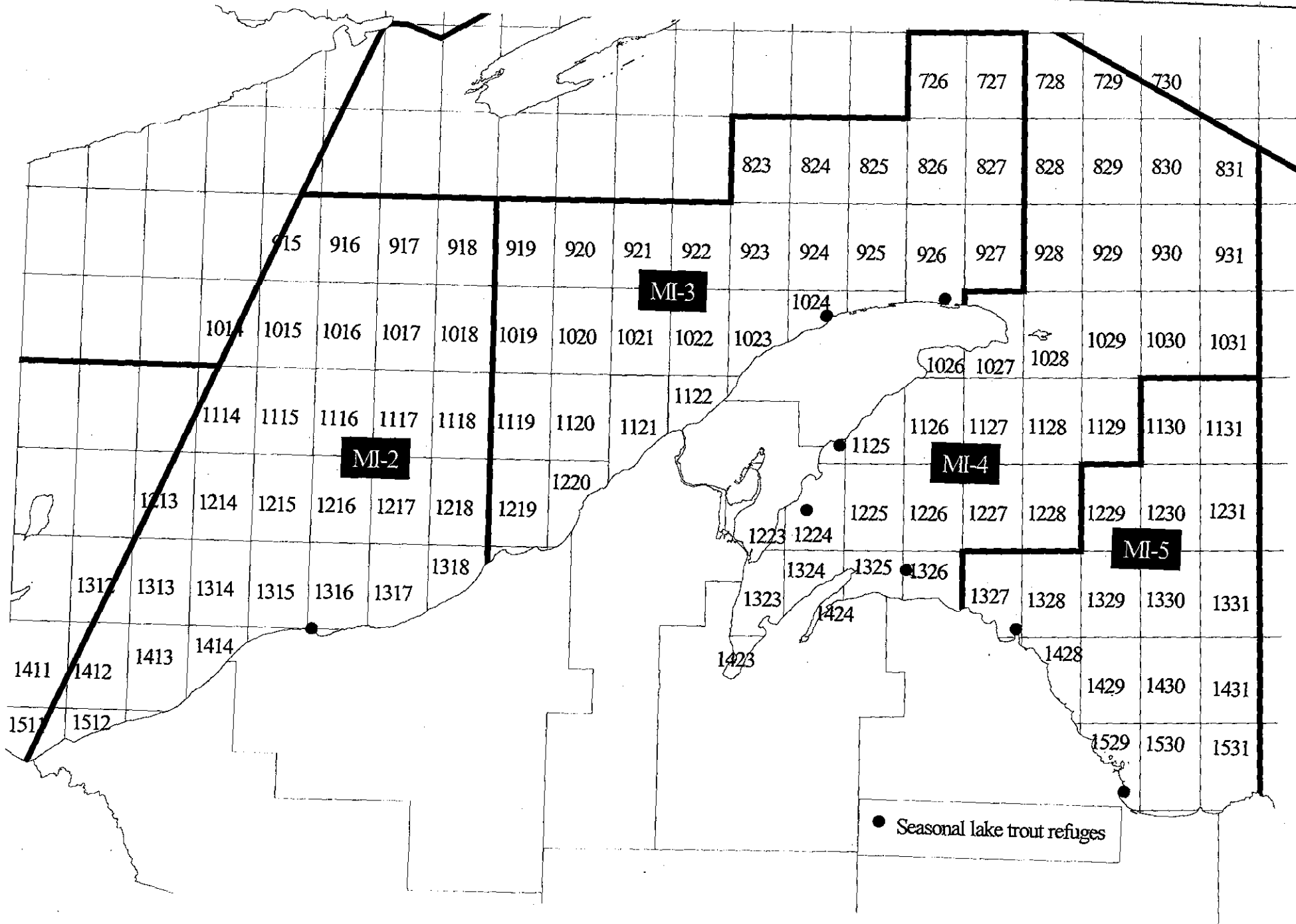


Figure 1. Management units and statistical grids in the 1842 treaty ceded area within Michigan waters of Lake Superior.

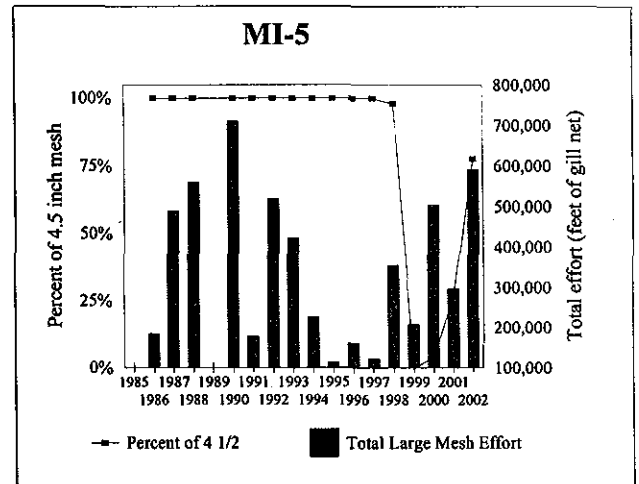
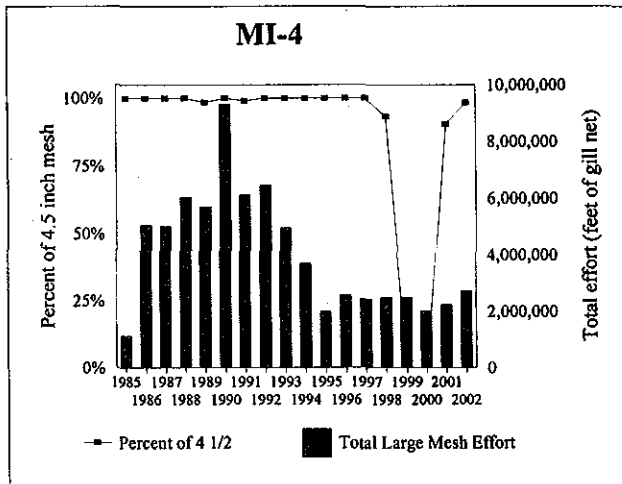
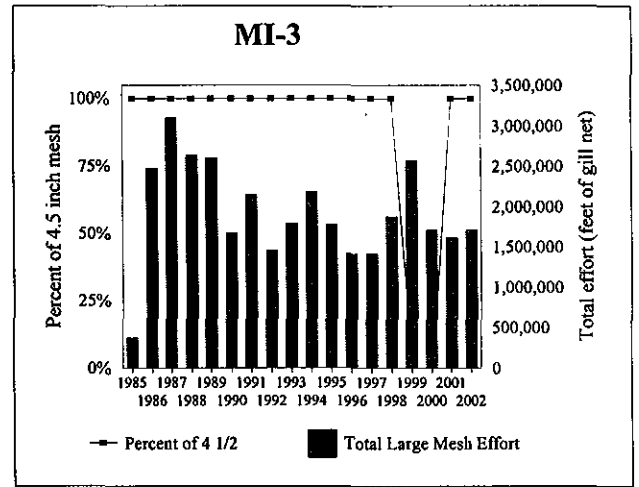
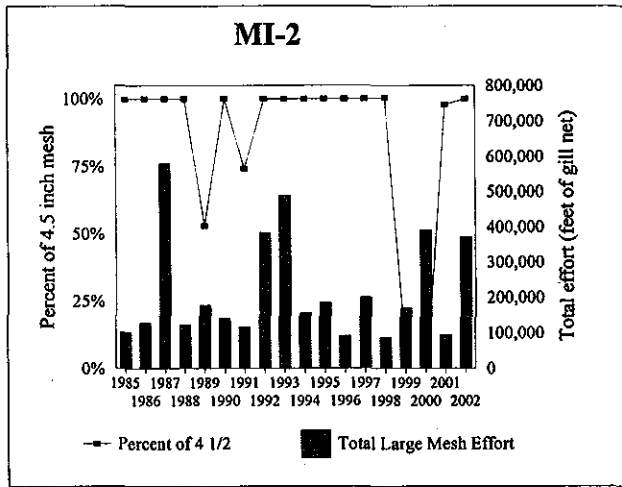
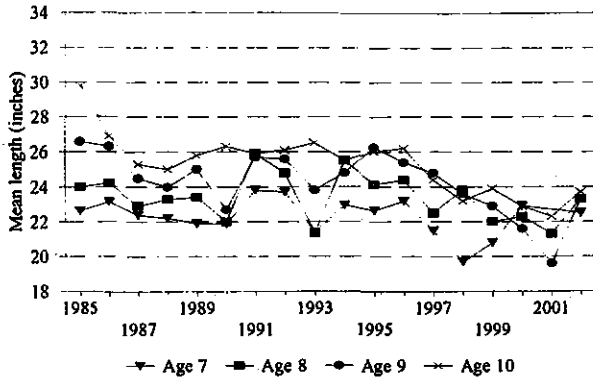
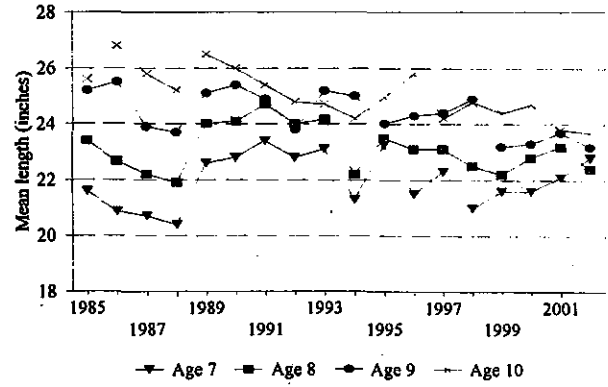


Figure 2. Proportion of 4 1/2 inch mesh and total tribal large mesh gill net effort composed of 4 1/2 inch and larger mesh by management unit, 1986 to 2002.

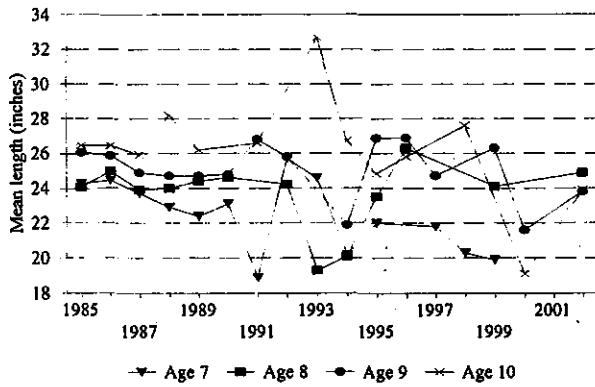
**Wild Lake Trout MI-3**



**Wild Lake Trout MI-4**



**Hatchery Lake Trout MI-3**



**Hatchery Lake Trout MI-4**

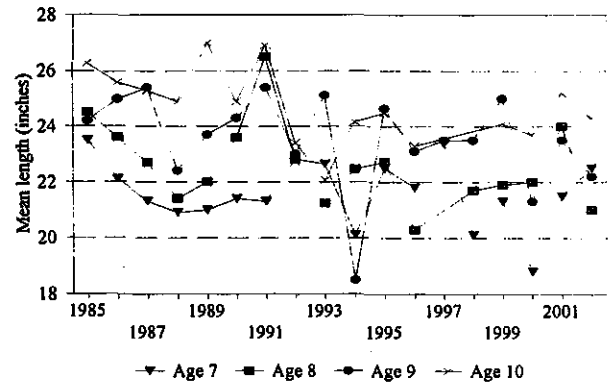
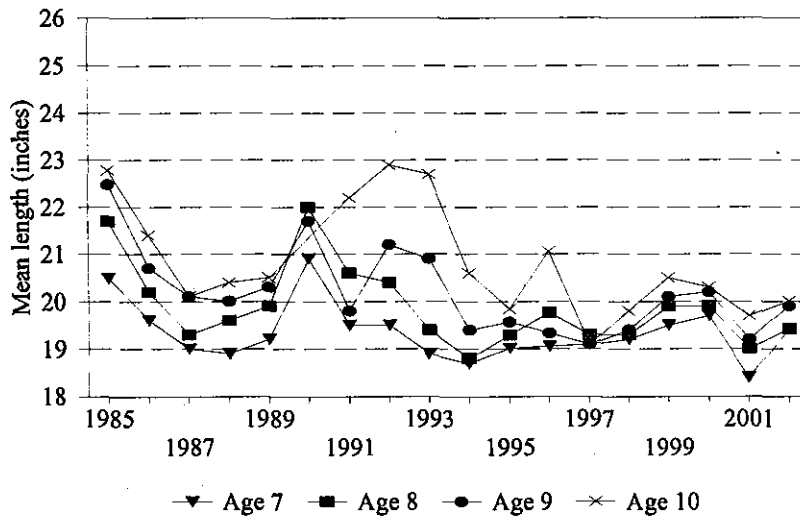


Figure 3. Trends in average length (inches) of hatchery and wild lake trout (ages 7-10) in Michigan management units MI-3 and MI-4, from 1985-2002.

### Whitefish MI-3



### Whitefish MI-4

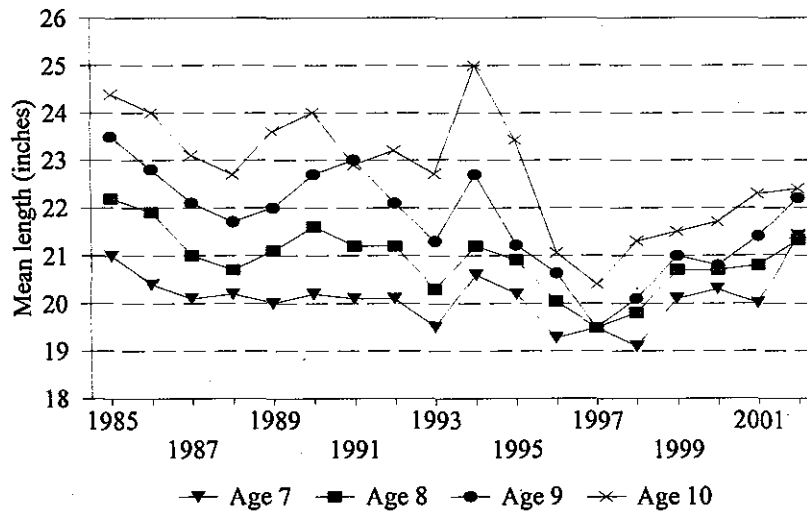


Figure 4. Trends in average length (inches) of whitefish (ages 7-10) in Michigan management units MI-3 and MI-4, from 1985-2002.

Table 1. Total tribal commercial gill net effort (feet) and harvest by management unit and grid from the 1842 ceded area within Michigan waters of Lake Superior in 2002. Lake trout, whitefish, siscowet, herring, salmon, menominee, and chubs are dressed pounds, all others are round.

Management Unit	Grid	Effort	Lake trout	Whitefish	Siscowet	Herring	Salmon	Menominee	Chub	Burbot	Walleye	Smelt
MI-2	1315	172,800	2,113	15,512	3,199	0	0	0	0	0	0	0
	1413	184,600	1,214	24,816	3,173	0	0	0	0	0	0	0
	1414	14,400	255	3,049	295	0	0	0	0			
	Subtotal:	371,800	3,582	43,377	6,667	0	0	0	0	0	0	0
MI-3	1023	365,000	8,534	24,720	2,172	0	0	0	0			
	1024	8,000	70	600	0	0	0	0	0			
	1121	1,174,500	4,295	43,220	3,071	0	0	0	0	0	0	0
	1122	136,500	2,217	3,754	1,551	0	0	0	0	0	0	0
	1219	114,000	1,797	8,605	55	0	0	0	0	0	0	0
	1220	81,000	2,645	5,081	2,137	0	0	0	0			
	Subtotal:	1,879,000	19,558	85,980	8,986	0	0	0	0	0	0	0
MI-4	1026	444,000	3,177	27,622	3,193	4,705	0	0	0	0	0	0
	1027	42,600	408	14,503	3,014	0	0	0	0	0	0	0
	1125	223,500	2,648	9,667	0	145	0	0	0	0	0	0
	1126	307,000	2,042	17,624	10,981	88	0	0	0	0	0	0
	1223	120,000	6,800	8,000								
	1224	1,060,000	48,215	48,799	1,169	0	0	0	0	0	0	0
	1323	66,350	3,350	2,498	237	25	40					
	1324	32,000	1,438	1,019								
	1325	85,000	4,485	5,673	143	0	0	0	0			
	1326	249,000	8,331	16,140	313	0	0	0	0			
	1423	143,000	11,004	9,019		1,215	519					
	Subtotal:	2,772,450	91,897	160,564	19,050	6,178	559	0	0	0	0	0
	MI-5	1327	180,200	5,002	11,829	1,332	10,825	0	0	0	0	0
1428		67,800	978	3,410	517							
1429		2,000	94	66								
1529		360,300	16,936	16,024		1,661	116					
Subtotal:		610,300	23,010	31,329	1,849	12,486	116	0	0	0	0	0
Grand Total:		5,633,550	138,047	321,250	36,552	18,664	675	0	0	0	0	0

Table 2. Total and target gill net harvest and effort statistics by tribe for lake trout, whitefish, and siscowet in Michigan waters of Lake Superior in 2002. Pounds are in dressed weight, effort is feet of net lifted and CPE is pounds/1000 ft of net lifted. Target species was assigned to each lift based on reported target species from individual catch reports. Target effort for whitefish and lake trout was combined.

Unit	Tribe	TOTAL HARVEST							TARGET HARVEST							
		Effort	Whitefish		Lake trout		Siscowet		Effort	Whitefish		Lake trout		Siscowet		
			pounds	CPE	pounds	CPE	pounds	CPE		pounds	CPE	pounds	CPE	Effort	pounds	CPE
MI-2	Bad River	76,800	7,810	102	1,329	17	1,056	14	76,800	7,810	102	1,329	17	0	0	0
	Keweenaw Bay	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red Cliff	295,000	35,567	121	2,253	8	5,611	19	295,000	35,567	121	2,253	8	0	0	0
	subtotal	371,800	43,377	117	3,582	10	6,667	18	371,800	43,377	117	3,582	10	0	0	0
MI-3	Bad River	631,000	42,789	68	18,031	29	7,616	12	631,000	42,789	68	18,031	29	0	0	0
	Keweenaw Bay	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red Cliff	1,248,000	43,191	35	1,527	1	1,370	1	1,248,000	43,191	35	1,527	1	0	0	0
	subtotal	1,879,000	85,980	46	19,558	10	8,986	5	1,879,000	85,980	46	19,558	10	0	0	0
MI-4	Bad River	320,000	22,431	70	13,552	42	456	1	320,000	22,431	70	13,552	42	0	0	0
	Keweenaw Bay	1,399,350	68,092	49	70,496	50	237	0	1,389,350	68,089	49	70,496	51	0	0	0
	Red Cliff	1,053,100	70,041	67	7,849	7	18,357	17	1,026,100	70,041	68	7,849	8	0	0	0
	subtotal	2,772,450	160,564	58	91,897	33	19,050	7	2,735,450	160,561	59	91,897	34	0	0	0
MI-5	Bad River	49,200	6,225	127	1,862	38	0	0	35,000	6,225	178	1,862	53	0	0	0
	Keweenaw Bay	541,100	22,352	41	20,501	38	517	1	521,600	22,182	43	20,501	39	0	0	0
	Red Cliff	20,000	2,752	138	647	32	1,332	67	20,000	2,752	138	647	32	0	0	0
	subtotal	610,300	31,329	51	23,010	38	1,849	3	576,600	31,159	54	23,010	40	0	0	0
Total	Bad River	1,077,000	79,255	74	34,774	32	9,128	8	1,062,800	79,255	75	34,774	33	0	0	0
	Keweenaw Bay	1,940,450	90,444	47	90,997	47	754	0	1,910,950	90,271	47	90,997	48	0	0	0
	Red Cliff	2,616,100	151,551	58	12,276	5	26,670	10	2,589,100	151,551	59	12,276	5	0	0	0
	All Tribes	5,633,550	321,250	57	138,047	25	36,552	6	5,562,850	321,077	58	138,047	25	0	0	0



Table 3. Tribal commercial harvest by management unit and gill net mesh size from the 1842 ceded area within Michigan waters of Lake Superior in 2002. Burbot, Walleye, and smelt are in round pounds, all others are dressed.

Unit	Mesh	Effort	Lake trout	Whitefish	Siscowet	Herring	Salmon	Menominee	Chub	Burbot	Walleye	Smelt
MI-2												
	4.5	371,800	3,582	43,377	6,667	0	0	0	0	0	0	0
	subtotal:	371,800	3,582	43,377	6,667	0	0	0	0	0	0	0
MI-3												
	4.5	1,879,000	19,558	85,980	8,986	0	0	0	0	0	0	0
	subtotal:	1,879,000	19,558	85,980	8,986	0	0	0	0	0	0	0
MI-4												
	3.0	36,000	0	0	0	5,800	0	0	0	0	0	0
	4.5	2,690,450	91,729	159,419	19,050	288	559	0	0	0	0	0
	5.0	46,000	168	1,145		90						
	subtotal:	2,772,450	91,897	160,564	19,050	6,178	559	0	0	0	0	0
MI-5												
	2	2,400	0	0	0	3,574	0	0	0			
	4.5625	3,000	151	497								
	2.875	9,000				812						
	3	4,800	0	0	0	2,500	0	0	0			
	4.5	458,300	22,524	21,437	1,455	4,751	81	0	0	0	0	0
	5.0	132,800	335	9,395	394	849	35					
	subtotal:	610,300	23,010	31,329	1,849	12,486	116	0	0	0	0	0
	Total:	5,633,550	138,047	321,250	36,552	18,664	675	0	0	0	0	0

Table 4. Gill net harvest and effort statistics for target species by grid and management unit in Michigan waters of Lake Superior in 2002. Pounds are in dressed weight, effort is feet of net lifted and CPE is pounds/1,000 ft of net lifted. Target species was assigned to each lift based on reported target species from individual catch reports. Target effort for whitefish and lake trout was combined.

Unit	Grid	Whitefish			Lake trout			Siscowet			Herring		Salmon				
		Effort	pounds	CPE	Effort	pounds	CPE	Effort	pounds	CPE	Effort	pounds	CPE				
MI-2	1315	172,800	15,512	90	172,800	2,113	12										
	1413	184,600	24,816	134	184,600	1,214	7										
	1414	14,400	3,049	212	14,400	255	18										
	subtotal	371,800	43,377	117	371,800	3,582	10	0	0	0	0	0	0	0	0	0	0
MI-3	1023	365,000	24,720	68	365,000	8,534	23										
	1024	8,000	600	75	8,000	70	9										
	1121	1,174,500	43,220	37	1,174,500	4,034	3										
	1122	136,500	3,754	28	136,500	2,217	16										
	1219	114,000	8,605	75	114,000	1,797	16										
	1220	81,000	5,081	63	81,000	2,645	33										
	subtotal	1,879,000	85,980	46	1,879,000	19,297	10	0	0	0	0	0	0	0	0	0	0
MI-4	1026	417,000	27,622	66	417,000	3,177	8				27,000	4,705	174				
	1027	42,600	14,503	340	42,600	408	10										
	1125	223,500	9,667	43	223,500	2,648	12										
	1126	307,000	17,624	57	307,000	2,042	7										
	1223	120,000	8,000	67	120,000	6,800	57										
	1224	1,060,000	48,799	46	1,060,000	48,215	45										
	1323	66,350	2,498	38	66,350	3,350	50										
	1324	32,000	1,019	32	32,000	1,438	45										
	1325	85,000	5,673	67	85,000	4,485	53										
	1326	249,000	16,140	65	249,000	8,331	33										
	1423	133,000	9,016	68	133,000	11,004	83				10,000	1,185	119				
subtotal	2,735,450	160,561	59	2,735,450	91,897	34	0	0	0	37,000	5,890	159	0	0	0	0	
MI-5	1327	166,000	11,829	71	166,000	5,002	30				14,200	8,771	618				
	1428	67,800	3,410	50	67,800	978	14										
	1429	2,000	66	33	2,000	94	47										
	1529	340,800	15,854	47	340,800	16,936	50				18,000	1,081	60				
	subtotal	576,600	31,159	54	576,600	23,010	40	0	0	0	32,200	9,852	306	0	0	0	0
Grand Total		5,562,850	321,077	58	5,562,850	137,786	25	0	0	0	69,200	15,742	227	0	0	0	0

Table 5. Tribal commercial gill net effort (feet), harvest (dressed pounds), and catch per unit effort (CPE, pounds/1,000') statistics for whitefish, lake trout and siscowet by management unit and year from the 1842 ceded area within Michigan waters of Lake Superior from 1985-2002. Target effort for whitefish and lake trout was combined.

Unit	Year	Whitefish			Lake trout			Siscowet					
		Target effort	Target harvest	Total Harvest	Target effort	Target harvest	Total Harvest	Target effort	Target harvest	Total Harvest			
MI-2	1985	101,100	5,664	56	101,100	9,238	91	9,238	0	0	0	45	
	1986	128,000	16,234	127	128,000	7,550	59	7,550	0	0	0	63	
	1987	611,300	84,756	139	611,300	20,253	33	20,318	3,200	0	0	2,059	
	1988	98,000	2,809	29	98,000	17,374	177	17,374	24,000	4,945	206	5,377	
	1989	178,000	33,511	188	178,000	13,488	76	13,488	0	0	0	4,181	
	1990	113,000	22,867	202	113,000	2,789	25	3,269	28,000	8,145	291	13,308	
	1991	136,800	32,003	234	136,800	5,273	39	5,273	0	0	0	812	
	1992	217,000	44,814	207	217,000	2,290	11	2,332	166,000	25,946	156	27,476	
	1993	419,100	74,220	177	419,100	7,780	19	8,263	52,400	10,029	191	18,680	
	1994	148,200	17,629	119	148,200	7,790	53	7,790	5,000	747	149	1,990	
	1995	155,000	11,236	73	155,000	9,729	63	10,104	15,000	3,307	221	6,682	
	1996	89,600	4,418	49	89,600	7,777	87	7,777	1,200	3	3	189	
	1997	196,300	19,512	99	196,300	10,675	54	11,302	5,000	1,608	322	2,311	
	1998	85,400	10,250	120	85,400	3,125	37	3,125	0	0	0	250	
1999	170,100	31,466	185	170,100	1,130	7	1,130	0	0	0	3,628		
2000	391,800	120,494	308	120,494	3,925	10	3,925	0	0	0	3,911		
2001	95,000	16,944	178	16,944	95,000	463	5	463	0	0	0	1,483	
2002	371,800	43,377	117	43,377	371,800	3,582	10	3,582	0	0	0	6,667	
Average:		196,100	32,284	165	32,454	196,100	7,685	39	7,807	17,635	3,219	183	5,438
MI-3	1985	2,475,200	309,525	125	309,525	2,475,200	31,501	13	31,501	0	0	0	6,098
	1986	2,936,200	265,269	90	266,919	2,936,200	39,682	14	39,888	161,000	26,172	163	44,384
	1987	2,063,800	131,843	64	140,735	2,063,800	34,724	17	35,655	538,800	58,797	109	78,320
	1988	2,427,300	222,321	92	225,440	2,427,300	32,677	14	33,158	176,400	21,934	124	34,289
	1989	1,596,000	134,078	84	134,182	1,596,000	28,215	18	28,224	68,000	10,660	157	22,461
	1990	2,127,500	110,615	52	110,615	2,127,500	28,361	13	28,361	20,000	2,967	148	28,771
	1991	1,329,900	62,714	47	65,264	1,329,900	22,507	17	23,790	123,400	14,458	117	30,005
	1992	1,675,200	119,291	71	120,176	1,675,200	19,537	12	19,912	84,600	8,272	98	27,350
	1993	2,100,100	172,270	82	172,488	2,100,100	16,958	8	17,255	63,700	5,933	93	22,052
	1994	1,703,800	73,556	43	74,632	1,703,800	12,651	7	13,433	71,000	5,053	71	22,099
	1995	1,408,400	91,358	65	91,358	1,408,400	8,013	6	8,013	0	0	0	9,774
	1996	1,359,700	135,822	100	136,622	1,359,700	9,843	7	10,798	56,000	2,750	49	6,277
	1997	1,854,100	136,221	74	136,971	1,854,100	15,954	9	16,435	18,000	1,546	86	13,270
	1998	2,556,700	267,336	105	267,411	2,556,700	24,629	10	24,759	9,500	400	42	11,706
1999	1,706,300	178,485	105	178,485	1,706,300	12,430	7	12,430	0	0	0	11,455	
2000	1,609,300	204,065	127	204,065	1,609,300	8,951	6	8,951	0	0	0	3,389	
2001	1,711,600	154,154	90	154,154	1,711,600	17,246	10	17,246	0	0	0	7,819	
2002	1,879,000	85,980	46	89,905	1,879,000	19,558	10	22,861	0	0	0	8,986	
Average:		1,920,065	162,878	85	164,061	1,920,065	21,405	11	21,753	81,788	9,350	114	22,325
MI-4	1985	1,083,275	218,666	202	219,376	1,083,275	43,118	40	44,289	0	0	0	241
	1986	4,864,900	526,710	108	527,148	4,864,900	129,258	27	129,565	105,800	25,924	245	32,038
	1987	4,110,190	300,332	73	301,898	4,110,190	71,863	18	72,864	768,200	136,596	178	160,297
	1988	5,547,065	245,246	44	246,854	5,547,065	117,982	21	119,281	266,000	34,653	130	53,689
	1989	6,781,675	371,247	55	372,637	6,781,675	112,829	17	114,353	70,000	21,781	311	58,127
	1990	8,557,900	377,190	44	382,839	8,557,900	133,645	16	139,272	600,500	38,606	64	81,902
	1991	5,945,200	278,295	47	286,046	5,945,200	94,581	16	104,481	789,300	55,800	71	96,699
	1992	5,152,100	299,967	58	313,370	5,152,100	74,849	15	86,074	950,750	46,489	49	96,550
	1993	3,939,425	165,440	42	176,357	3,939,425	65,184	17	76,105	747,500	55,090	74	92,518
	1994	2,801,325	88,866	32	95,085	2,801,325	53,075	19	62,290	559,050	38,703	69	60,395
	1995	1,529,225	74,466	49	84,682	1,529,225	47,471	31	61,986	376,000	35,363	94	51,510
	1996	2,096,400	101,931	49	108,219	2,096,400	43,737	21	50,828	336,900	23,662	70	38,361
	1997	2,238,988	127,998	57	129,103	2,238,988	54,929	25	56,302	137,986	41,753	303	65,555
	1998	2,202,700	136,100	62	139,384	2,202,700	60,014	27	63,419	196,870	19,377	98	33,038
1999	2,338,100	141,873	61	143,432	2,338,100	69,671	30	70,896	79,400	14,920	188	25,154	
2000	1,922,025	128,261	67	129,288	1,922,025	78,318	41	79,097	43,700	6,616	151	17,851	
2001	2,211,200	118,128	53	118,944	2,211,200	67,924	31	68,545	22,800	6,949	305	34,091	
2002	2,735,450	160,561	59	166,789	2,735,450	91,897	34	92,278	0	0	0	19,050	
Average:		3,724,805	217,689	58	222,039	3,724,805	77,556	21	82,332	355,927	35,428	100	58,707

Table 5. Continued.

Unit	Year	Whitefish			Lake trout			Siscowet					
		Target effort	Target harvest	Total Harvest	Target effort	Target harvest	Total Harvest	Target effort	Target harvest	Total Harvest			
MI-5	1986	180,000	25,205	140	25,205	180,000	10,667	59	10,667	4,000	750	188	1,772
	1987	440,000	32,095	73	33,126	440,000	13,509	31	13,509	48,000	2,502	52	6,269
	1988	551,900	47,233	86	47,363	551,900	32,105	58	32,105	6,000	333	56	5,449
	1989	225,500	42,809	190	42,809	225,500	12,661	56	12,661	0	0	0	2,785
	1990	706,000	80,394	114	80,394	706,000	18,490	26	18,490	0	0	0	10,026
	1991	305,500	24,355	80	24,540	305,500	7,789	26	7,899	36,000	405	11	9,787
	1992	426,000	35,827	84	37,169	426,000	8,042	19	8,977	72,000	2,970	41	8,672
	1993	416,000	21,375	51	21,522	416,000	25,555	61	25,597	4,500	206	46	2,833
	1994	211,000	5,318	25	5,388	211,000	24,974	118	24,974	14,000	290	21	2,878
	1995	113,400	9,288	82	9,288	113,400	8,445	75	8,445	0	0	0	1,839
	1996	161,400	7,672	48	7,672	161,400	8,040	50	8,040	0	0	0	1,033
	1997	102,300	17,997	176	18,831	102,300	5,249	51	6,105	8,000	200	25	1,855
	1998	280,300	23,950	85	24,452	280,300	14,942	53	16,247	74,000	1,989	27	4,023
	1999	178,000	12,213	69	12,813	178,000	18,342	103	19,824	15,500	1,222	79	4,038
2000	481,800	44,454	92	44,842	481,800	48,030	100	48,479	7,500	578	77	3,073	
2001	292,700	22,949	78	22,949	292,700	6,377	22	7,321	0	0	0	0	
2002	576,600	31,159	54	31,329	576,600	23,010	40	23,010	0	0	0	1,849	
Average:		316,988	28,321	89	28,648	316,988	16,451	52	16,834	18,094	715	40	4,146
All units	1985	3,659,575	533,855	146	534,565	3,659,575	83,857	23	85,028	0	0	0	6,384
	1986	8,109,100	833,418	103	835,506	8,109,100	187,157	23	187,670	270,800	52,846	195	78,257
	1987	7,225,290	549,026	76	560,515	7,225,290	140,349	19	142,346	1,358,200	197,895	146	246,945
	1988	8,624,265	517,609	60	522,466	8,624,265	200,138	23	201,918	472,400	61,865	131	98,804
	1989	8,781,175	581,645	66	583,139	8,781,175	167,193	19	168,726	138,000	32,441	235	87,554
	1990	11,504,400	591,066	51	597,860	11,504,400	183,285	16	189,392	648,500	49,718	77	134,007
	1991	7,717,400	397,367	51	407,853	7,717,400	130,150	17	141,443	948,700	70,663	74	137,303
	1992	7,470,300	499,899	67	516,092	7,470,300	104,718	14	117,295	1,273,350	83,677	66	160,048
	1993	6,874,625	433,305	63	444,840	6,874,625	115,477	17	127,220	868,100	71,258	82	136,083
	1994	4,864,325	185,369	38	192,734	4,864,325	98,490	20	108,487	649,050	44,793	69	87,362
	1995	3,206,025	186,348	58	197,488	3,206,025	73,658	23	88,548	391,000	38,670	99	69,805
	1996	3,707,100	249,843	67	256,931	3,707,100	69,397	19	77,443	394,100	26,415	67	45,860
	1997	4,391,688	301,728	69	304,417	4,391,688	86,807	20	90,144	168,986	45,107	267	82,991
	1998	5,125,100	437,636	85	441,497	5,125,100	102,710	20	107,550	280,370	21,766	78	49,017
1999	4,392,500	364,037	83	366,196	4,392,500	101,573	23	104,280	94,900	16,142	170	44,275	
2000	4,404,925	497,274	113	498,689	4,404,925	139,224	32	140,452	51,200	7,194	141	28,224	
2001	4,310,500	312,175	72	312,991	4,310,500	92,010	21	93,575	22,800	6,949	305	43,393	
2002	5,562,850	321,077	58	331,400	5,562,850	138,047	25	141,731	0	0	0	36,552	
Average:		6,139,311	439,506	72	445,516	6,139,311	122,129	20	127,736	472,380	48,671	103	90,371

Table 6. Total tribal commercial trap net effort (1,000 feet=1 trap night) and harvest by management unit and grid from nets fished in the 1842 ceded area within Michigan waters of Lake Superior in 2002. Lake trout and whitefish were the only species caught and reported.

Management Unit	Grid	Trap net nights	Effort (feet)	Lake trout (dressed pounds)	Whitefish (dressed pounds)
MI-3					
	1023	19	19,000	220	880
	1121	15	15,000	933	1,194
	1122	16	16,000	772	1,246
	1219	24	24,000	1,378	605
	Subtotal:	74	74,000	3,303	3,925
MI-4					
	1125	20	20,000	241	3,295
	1224	16	16,000	140	2,930
	Subtotal:	36	36,000	381	6,225
Grand Total:		110	110,000	3,684	10,150

Table 7. Age and size composition of hatchery (H) and wild (N) lake trout in tribal commercial harvests from unit MI-2 during 2002. Weight is in round pounds, length is in inches, and sd=standard deviation.

Unit	Origin	Age	Number Aged	Number Measured	Length (in.)		Number Weighed	Weight (lbs)	
					mean	sd		mean	sd
MI-2									
	H								
		8	1	1	25.7		1	5.8	
Sample Size:			1	1			1		
Means:			8.0		25.7			5.8	
	N								
			0	7	25.1	4.8	7	6.0	3.7
		6	1	1	21.1		1	3.3	
		7	5	5	23.5	1.5	5	4.4	0.8
		8	3	3	24.1	1.8	3	4.5	1.0
		9	5	5	25.1	1.2	5	5.2	0.8
		10	3	3	27.9	3.0	3	7.1	2.9
		11	2	2	23.8	0.8	2	4.5	0.6
Sample Size:			19	26			26		
Means:			8.5		24.7	3.0		5.3	2.3
			20	27			27		
Sample Size:			20	27			27		
Means:			8.5		24.8	3.0		5.3	2.3

Table 8. Lamprey wounding and scarring rates (marks/100 fish) on lake trout, per Lake Superior Technical Committee protocol, captured in the tribal commercial harvests from management units in the 1842 ceded area within Michigan waters of Lake Superior during 2002. No lake trout were monitored from MI-5 in 2002.

Unit	Length Category (Inches)	Fish Examined	Type AI, AII, AIII Wounds	Wounds per 100 fish	Scars	Scars per 100 fish
MI-2						
	2: 17-20.9	1	0	0.0	0	0.0
	3: 21-24.9	15	0	0.0	1	6.7
	4: 25-28.9	8	0	0.0	0	0.0
	5: > 29	3	3	100.0	0	0.0
	Total:	27	3	11.1	1	3.7
MI-3						
	1: < 17	1	0	0.0	0	0.0
	2: 17-20.9	29	0	0.0	0	0.0
	3: 21-24.9	142	4	2.8	1	0.7
	4: 25-28.9	94	5	5.3	6	6.4
	5: > 29	13	1	7.7	1	7.7
	Total:	279	10	3.6	8	2.9
MI-4						
	2: 17-20.9	24	0	0.0	0	0.0
	3: 21-24.9	64	1	1.6	2	3.1
	4: 25-28.9	21	1	4.8	2	9.5
	5: > 29	5	4	80.0	3	60.0
	Total:	114	6	5.3	7	6.1

Table 9. Catch curve mortality and survival rates on lake trout from management units in the 1842 ceded area within Michigan waters of Lake Superior for data collected January-December 1988-2002.

Management Unit		Ages	Instantaneous total mortality Z	95% confidence limit for Z	Annual total mortality A	Annual Survival S
<u>Wild Lake Trout</u>						
MI-2	2002	9-11	0.458	+/- 0.030	0.369	0.631
	2001	9-15	0.326	+/- 0.098	0.281	0.719
	2000	9-13	0.220	+/- 0.342	0.198	0.802
	1999	7-13	0.256	+/- 0.157	0.229	0.771
	1998	7-13	0.385	+/- 0.111	0.316	0.684
	1990	8-11	0.750	+/- 0.416	0.528	0.472
	1988	9-13	0.406	+/- 0.306	0.334	0.666
MI-3	2002	7-20	0.307	+/- 0.035	0.267	0.733
	2000	7-11	0.204	+/- 0.454	0.184	0.814
	1999	7-16	0.215	+/- 0.099	0.197	0.803
	1997	7-11	0.176	+/- 0.212	0.165	0.835
	1996	8-13	0.238	+/- 0.267	0.213	0.787
	1995	8-11	0.522	+/- 0.325	0.405	0.595
	1991	8-11	0.469	+/- 0.353	0.375	0.625
	1989	8-12	0.723	+/- 0.084	0.513	0.487
	1988	9-13	0.651	+/- 0.396	0.478	0.522
MI-4	2002	7-12	0.227	+/- 0.068	0.206	0.794
	2001	7-15	0.364	+/- 0.051	0.302	0.698
	2000	6-13	0.323	+/- 0.586	0.276	0.724
	1999	7-12	0.202	+/- 0.069	0.181	0.819
	1998	7-12	0.220	+/- 0.166	0.197	0.803
	1997	7-12	0.455	+/- 0.182	0.369	0.631
	1996	7-12	0.556	+/- 0.162	0.429	0.571
	1995	7-12	0.200	+/- 0.226	0.181	0.819
	1994	7-12	0.281	+/- 0.103	0.244	0.756
	1993	6-11	0.349	+/- 0.334	0.295	0.705
	1992	5-11	0.430	+/- 0.105	0.349	0.651
	1991	6-11	0.592	+/- 0.130	0.446	0.554
	1990	6-11	0.723	+/- 0.153	0.513	0.487
	1989	7-11	0.786	+/- 0.395	0.546	0.454
	1988	9-13	0.912	+/- 0.134	0.598	0.402
MI-5	2001	7-15	0.268	+/- 0.074	0.237	0.763
	2000	10-16	0.188	+/- 0.336	0.171	0.829
	1991	5-8	0.744	+/- 0.563	0.523	0.477
<u>Wild and Hatchery Lake Trout Combined</u>						
MI-2	2002	9-11	0.458	+/- 0.030	0.369	0.631
	2001	9-15	0.341	+/- 0.099	0.288	0.712
	2000	9-13	0.220	+/- 0.300	0.197	0.803
	1999	7-13	0.287	+/- 0.162	0.252	0.748
	1998	7-13	0.389	+/- 0.106	0.323	0.677
	1990	8-12	0.706	+/- 0.247	0.508	0.492
MI-3	2002	7-20	0.312	+/- 0.036	0.267	0.733
	2000	7-11	0.200	+/- 0.450	0.181	0.819
	1999	7-16	0.039	+/- 0.090	0.197	0.803
	1997	7-11	0.208	+/- 0.196	0.189	0.811
	1996	8-13	0.276	+/- 0.190	0.244	0.756
	1995	8-11	0.563	+/- 0.328	0.429	0.571
	1992	7-13	0.372	+/- 0.355	0.309	0.691
	1991	8-11	0.396	+/- 0.334	0.330	0.670
	1989	8-11	0.642	+/- 0.094	0.473	0.527
	1988	11-13	0.779	+/- 0.445	0.541	0.459
MI-4	2002	7-12	0.268	+/- 0.058	0.237	0.763
	2001	7-15	0.366	+/- 0.064	0.309	0.691
	2000	5-13	0.270	+/- 0.520	0.237	0.763
	1999	7-12	0.254	+/- 0.030	0.221	0.779
	1998	7-12	0.299	+/- 0.129	0.259	0.741
	1997	7-12	0.339	+/- 0.115	0.288	0.712
	1996	7-12	0.572	+/- 0.154	0.434	0.566
	1995	7-12	0.252	+/- 0.170	0.221	0.779
	1994	7-12	0.305	+/- 0.094	0.267	0.733
	1993	6-11	0.300	+/- 0.242	0.259	0.741
	1992	5-11	0.448	+/- 0.081	0.362	0.638
	1991	6-11	0.577	+/- 0.104	0.440	0.560
	1990	6-11	0.591	+/- 0.088	0.446	0.554
	1989	7-11	0.705	+/- 0.218	0.508	0.492
	1988	8-13	0.540	+/- 0.276	0.417	0.583
MI-5	2001	7-15	0.279	+/- 0.067	0.244	0.756
	2000	10-16	0.165	+/- 0.256	0.156	0.844
	1991	5-8	0.602	+/- 0.452	0.451	0.549



Table 10. Age and size composition of hatchery (H) and wild (N) lake trout in tribal commercial harvests from unit MI-3 during 2002. Weight is in round pounds, length is in inches, and sd=standard deviation.

Unit	Origin	Age	Number Aged	Number Measured	Length (in.)		Number Weighed	Weight (lbs)	
					mean	sd		mean	sd
MI-3									
	H		0	6	30.7	6.2	6	7.5	3.5
		8	1	1	24.9		1	5.2	
		9	2	2	23.8	1.3	2	4.1	0.9
		10	4	4	23.9	1.8	4	4.8	1.2
		11	3	3	24.2	2.5	3	4.3	1.3
		13	1	1	25.5		1	5.0	
Sample Size:			11	17			17		
Means:			10.2		26.5	4.9		5.6	2.6
	N		0	36	24.3	2.4	36	4.9	1.6
		5	1	1	19.5		1	2.3	
		6	8	8	21.6	1.9	8	3.6	0.8
		7	28	28	22.5	2.1	28	3.7	1.0
		8	35	35	23.3	2.2	35	4.2	1.2
		9	42	42	23.3	2.2	42	4.1	1.2
		10	35	35	23.7	2.2	35	4.5	1.2
		11	24	24	24.7	2.1	24	5.2	1.4
		12	24	24	25.7	2.4	24	5.8	2.4
		13	10	10	24.8	3.3	10	5.6	2.0
		14	4	4	27.0	2.5	4	6.1	0.5
		15	4	4	26.2	4.1	4	6.4	4.0
		16	5	5	24.8	2.8	5	5.3	1.6
		17	1	1	28.8		1	7.7	
		18	2	1	33.2		1	14.3	
		19	1	1	27.0		1	5.5	
		20	2	2	29.7	0.0	2	8.4	0.8
		23	1	1	28.3		1	7.7	
Sample Size:			227	262			262		
Means:			10.0		24.0	2.6		4.7	1.8
Sample Size:			238	279			279		
Means:			10.0		24.2	2.9		4.8	1.8

Table 11. Age and size composition of hatchery (H) and wild (N) lake trout in tribal commercial harvests from unit MI-4 during 2002. Weight is in round pounds, length is in inches, and sd=standard deviation.

Unit	Origin	Age	Number		Length (in.)		Weight (lbs)		
			Aged	Measured	mean	sd	Number Weighed	mean	sd
MI-4									
	H								
			0	7	23.5	3.0	7	4.4	1.6
		5	3	3	20.2	1.3	3	3.3	0.9
		6	2	2	22.3	4.1	2	3.9	3.1
		7	6	6	22.5	2.5	6	3.8	0.9
		8	1	1	21.0		1	2.8	
		9	1	1	22.2		1	2.8	
		10	2	2	24.3	0.0	2	3.7	0.4
		11	1	1	22.2		1	3.6	
Sample Size:			16	23			23		
Means:			7.3		22.6	2.5		3.8	1.3
	N								
			0	4	24.4	7.8	4	4.3	3.2
		4	2	2	20.5	1.3	2	3.0	0.1
		5	4	4	20.6	1.6	4	3.1	0.5
		6	5	5	21.2	1.7	5	3.3	0.8
		7	14	14	22.8	1.3	14	3.8	0.8
		8	15	15	22.4	1.3	15	3.7	0.5
		9	18	18	23.2	2.2	18	4.1	1.2
		10	11	11	23.7	2.3	11	4.5	1.9
		11	7	7	26.0	2.6	7	6.3	2.3
		12	5	5	25.7	2.8	5	5.2	1.9
		14	1	1	24.4		1	4.1	
		16	2	2	29.0	0.4	2	7.4	0.7
		17	1	1	28.6		1	8.3	
		21	2	2	29.9	5.7	2	8.9	5.0
Sample Size:			87	91			91		
Means:			9.1		23.5	3.0		4.4	1.9
Sample Size:			103	114			114		
Means:			8.8		23.3	3.0		4.2	1.8

Table 12. Age and size composition of whitefish in tribal commercial harvests from management units in the 1842 ceded area within Michigan waters of Lake Superior during 2002. Weight is in round pounds, length is in inches, and sd=standard deviation.

Unit	Age	Number		Length (in.)		Number		Weight (lbs)	
		Aged	Measured	mean	sd	Weighed	mean	sd	
MI-2									
		0	2	22.6	0.4	2	4.1	0.1	
	7	1	1	22.0		1	3.4		
	8	9	9	21.9	1.0	9	3.6	0.4	
	9	7	7	21.6	1.0	7	3.6	0.6	
	10	9	9	22.5	1.0	9	4.2	0.6	
	11	5	5	22.1	1.4	5	3.9	0.6	
	12	3	3	23.7	1.6	3	4.7	1.3	
Sample Size:		34	36			36			
Means:		9.5		22.2	1.2		3.9	0.7	
MI-3									
		0	7	19.7	1.5	7	2.6	0.5	
	4	3	3	17.6	0.3	3	1.9	0.0	
	5	14	14	17.5	0.6	14	2.0	0.2	
	6	25	25	18.7	1.1	25	2.4	0.4	
	7	69	69	19.4	1.1	69	2.7	0.5	
	8	149	149	19.4	1.2	149	2.6	0.6	
	9	171	171	19.9	1.2	171	2.8	0.6	
	10	188	188	20.0	1.4	188	2.9	0.6	
	11	101	101	20.3	1.3	101	3.0	0.7	
	12	43	43	21.0	1.4	43	3.2	0.9	
	13	12	12	21.3	2.1	12	3.4	0.7	
	14	1	1	25.3		1	6.3		
Sample Size:		776	783			783			
Means:		9.2		19.8	1.4		2.8	0.7	

Table 12. Continued.

Unit	Age	Number		Length (in.)		Weight (lbs)		
		Aged	Measured	mean	sd	Number Weighed	mean	sd
MI-4								
		0	2	19.8	0.6	2	2.8	0.4
	4	11	11	17.8	1.1	11	2.0	0.4
	5	24	24	18.5	0.8	24	2.1	0.4
	6	46	46	20.5	1.0	46	2.9	0.5
	7	37	37	21.4	1.7	37	3.5	0.9
	8	34	34	21.3	1.5	34	3.6	0.9
	9	38	38	22.2	1.6	38	4.0	1.1
	10	29	29	22.4	1.5	29	4.2	1.1
	11	30	30	22.9	1.9	30	4.5	1.2
	12	15	15	23.4	1.5	15	4.8	1.1
	13	4	4	24.9	1.6	4	5.3	1.2
	14	1	1	29.3		1	10.0	
	15	2	2	27.1	2.4	2	8.2	1.4
	19	1	1	30.5		1	12.6	
Sample Size:		272	274			274		
Means:		8.2		21.5	2.3		3.7	1.4
MI-5								
	6	1	1	17.6		1	2.1	
	7	9	9	20.5	1.3	9	3.4	0.9
	8	13	13	21.5	0.5	13	3.6	0.5
	9	18	18	23.3	1.2	18	4.7	0.7
	10	10	10	23.7	1.0	10	5.1	0.8
	11	16	16	25.0	1.3	16	5.8	0.9
	12	7	7	26.1	0.8	7	7.0	0.9
	13	5	5	26.0	0.8	5	6.7	0.7
	14	1	1	27.2		1	8.4	
	15	4	4	27.0	1.9	4	8.2	1.4
	16	1	1	27.5		1	8.1	
	17	2	2	29.1	1.3	2	8.4	1.7
	18	1	1	31.1		1	14.8	
	20	2	2	30.3	1.4	2	11.2	0.2
Sample Size:		90	90			90		
Means:		10.5		24.0	2.7		5.5	2.1

Table 13. Age and size composition of siscowet in tribal commercial harvests from management units in the 1842 ceded area within Michigan waters of Lake Superior during 2002. Weight is in round pounds, length is in inches, and sd=standard deviation.

Unit	Age	Number		Length (in.)		Number		Weight (lbs)	
		Aged	Measured	mean	sd	Weighed	mean	sd	
MI-3									
		0	9	24.4	3.9	9	5.0	2.3	
	7	1	1	21.8		1	3.3		
	9	1	1	21.4		1	2.8		
	10	2	2	21.0	0.8	2	3.0	0.4	
	11	2	2	20.8	0.4	2	2.9	0.6	
	12	2	2	20.4	0.1	2	2.3	0.2	
	13	2	2	22.1	2.1	2	3.0	0.4	
	14	1	1	21.7		1	3.7		
	17	2	2	26.0	0.2	2	6.8	0.2	
	20	1	1	32.7		1	11.0		
Sample Size:		14	23			23			
Means:		12.6		23.4	3.6		4.4	2.4	
MI-4									
		0	1	21.2		1	3.4		
	12	1	1	24.7		1	4.7		
	15	1	1	25.5		1	5.4		
	20	1	1	22.2		1	3.7		
Sample Size:		3	4			4			
Means:		15.7		23.4	2.0		4.3	0.9	

Table 14. Age and size composition of lake herring in tribal commercial harvests from management units in the 1842 ceded area within Michigan waters of Lake Superior during 2002. Weight is in round pounds, length is in inches, and sd=standard deviation.

Unit	Age	Number		Length (in.)		Number		Weight (lbs)	
		Aged	Measured	mean	sd	Weighed	mean	sd	
MI-4		0	77	16.4	1.5	77	1.4	0.4	
	3	2	2	16.6	0.1	2	1.4	0.0	
	4	5	5	15.6	1.5	5	1.2	0.4	
	5	23	23	16.1	1.1	23	1.4	0.3	
	6	18	18	16.1	1.1	18	1.3	0.3	
	7	7	7	15.9	1.7	7	1.5	0.6	
	8	9	9	15.8	1.4	9	1.3	0.4	
	9	6	6	17.6	2.0	6	1.8	0.6	
	10	6	6	17.6	1.4	6	1.7	0.3	
	11	5	5	16.6	1.5	5	1.6	0.6	
	12	13	13	18.0	1.5	13	1.8	0.5	
	13	8	8	17.6	1.1	8	1.5	0.6	
	14	9	9	17.5	1.3	9	1.7	0.5	
	15	9	9	17.3	1.1	9	1.4	0.2	
	16	3	3	17.6	0.3	3	2.6	1.8	
	17	2	2	16.6	0.4	2	1.2	0.2	
	20	2	2	16.0	0.7	2	1.4	0.0	
Sample Size:		127	204			204			
Means:	9.3			16.6	1.5		1.5	0.5	

Table 15. Age and size composition of menominee in tribal commercial harvests from management units in the 1842 ceded area within Michigan waters of Lake Superior during 2002. Weight is in round pounds, length is in inches, and sd=standard deviation.

Unit	Age	Number		Length (in.)		Number		Weight (lbs)	
		Aged	Measured	mean	sd	Weighed	mean	sd	
MI-3	8	2	2	13.4	0.0	2	0.8	0.1	
	11	2	2	21.0	0.0	2	3.0	0.4	
Sample Size:		4	4			4			
Means:		9.5		17.2	4.4		1.9	1.3	