2015 Annual Report on Implementation of the 2000 Consent Decree for 1836 Treaty-Ceded Waters of the Great Lakes

Prepared for:

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By:

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and

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Preface

This report provides detailed information regarding the implementation of the 2000 Consent Decree in the 1836 Treaty-ceded waters of the Great Lakes during 2015, as required by the September 27, 2001 Memorandum of Understanding between the State of Michigan, Department of Natural Resources (MDNR) and the Michigan United Conservation Clubs, Inc., Michigan Fisheries Resource Conservation Coalition, and Bay de Noc Great Lakes Sportfishermen, Inc.

FISHERIES

I. General Information

A. Large-mesh gill-net retirement

In an effort to reduce the amount of large-mesh gill net fished by tribal fishers, the Consent Decree called for the Sault Ste. Marie Tribe to remove at least 14 million feet of large-mesh gill-net effort from lakes Michigan and Huron by 2003. Removal of large-mesh gill-net effort by other tribes also counted towards this commitment. The amount of gill net retired is based on comparison with the average effort during the base years 1993 through 1998 (Table 1). Gill-net retirement has been accomplished through the trap-net conversion program and other methods.

The removal of large-mesh gill-net effort in lakes Huron and Michigan was successfully completed by 2003 when tribal fishers used approximately 25.5 million feet less than the 1993-1998 average. Large-mesh gill-net effort has increased since then; however, in 2015 the tribal gill-net effort in lakes Michigan and Huron was still approximately 18 million feet less than the 1993-1998 average (Table 1).

Table 1. Amount of large-mesh gill-net effort (1,000s ft) in the 1836 Treaty-ceded waters of the Great Lakes during base years 1993 to 1998 and projected effort in 2015.

Lake	Management Unit	Effort		2015 reduction[b]
		1993-98[a]	2015	
Michigan	MM-123	17,912	11,104	6,808
	MM-4	1,794	1,089	705
	MM-5	240	129	111
Huron	MH-1	16,470	7,380	9,090
	MH-2	6	0	6
Superior	MI-6	780	736	44
	MI-7	2,028	1,992	36
	MI-8	6,578	5,508	1,070
Totals		45,808	27,938	17,870

[a] Average annual effort during base years.
[b] The relative reduction in 2015 (average effort in base years minus effort in current year).

B. Report from Modeling Subcommittee and modeling process description

The Modeling Subcommittee (MSC) of the Technical Fisheries Committee (TFC) prepares an annual report entitled "Status of Lake Trout and Lake Whitefish Populations in the 1836 Treaty-Ceded Waters of Lakes Superior, Huron, and Michigan, with Recommended Yield and Effort Levels" (referred to as the Status of the Stocks Report). The report detailing populations and harvest limits for fishing year 2015 was completed in August 2015. This and all previous versions are available on the 2000 Consent Decree page of the MDNR's Tribal Coordination Unit website: http://www.michigan.gov/greatlakesconsentdecree**.**

Statistical catch-at-age (SCAA) models are used to describe populations of lake trout and lake whitefish and to recommend the respective harvest limits. The modeling process begins by estimating parameters that describe each of the lake trout and lake whitefish stocks over time. Models are developed for the stocks in each defined Management Unit with data from both standard assessments and commercial and recreational fisheries. Age-specific abundance and mortality rates are estimated for each year that data are available. All models are tested for accuracy by comparing predictions to actual observations. The agreement between predictions and observations is measured by statistical likelihood. The set of parameters that gives the maximum likelihood (highest agreement) is used as the best estimate. After parameters are

estimated, the fish population is projected forward through the next fishing season in order to make short-term projections of harvest and yield that will meet criteria, such as target mortality rates and spawning stock biomass, set forth in the Consent Decree.

All fish populations are regulated by three key rates: growth, mortality, and recruitment. These are each estimated in the first stage of the modeling process and then incorporated into the projection models. Growth is described using mean length at age, which is fit to a nonlinear regression model based on the fact that growth slows as fish approach a maximum size. Mortality is estimated from age structure data by examining the decline in catch at age across age classes. Generally, there is a steady decline in the relative abundance of successive age classes over time. Total mortality is comprised of fishing and natural mortality. Fishing mortality includes recreational, subsistence, and commercial harvest, as well as mortality of fish returned to the water due to hooking and netting injuries. Harvest is monitored annually for each user group through direct reporting, wholesale fish reports, charter boat reports, and creel surveys. Models incorporate an estimate of hooking mortality for lake trout derived from a 1980s study in Lake Superior. The value currently used is 15%, but research is nearly completed in both Lake Huron and Lake Superior to update this value. Natural mortality is comprised of losses due to old age, disease, and predation. Natural mortality is generally estimated from an equation that relates the growth parameters of lake trout and lake whitefish to water temperature. Additionally, sea lamprey mortality is calculated from wounds observed during assessments, along with the estimated probability of surviving an attack. Finally, recruitment is the process of reproduction and growth to a certain size class that is beyond the initial period of high mortality. Recruitment may also imply the entry into a fishery of individuals of legal size for harvest. Most exploited fisheries demonstrate variable recruitment due to an assortment of abiotic or biotic conditions. Recruitment variability is measured by assessing the relative abundance of a single age class using a standard effort, location, and time of year. For example, managers may use the relative abundance of age-5 fish in spring gill-net surveys as an index of year-class strength. In the case of a fishery that relies almost entirely on stocking (e.g., lake trout in Lake Michigan), recruitment is essentially known.

In order to describe the dynamics of a population over time, modelers specify the initial numbers of fish at each age in the first year and recruitment of the youngest age in subsequent years. Currently, in lakes Michigan and Huron, lake trout recruitment is defined as the number

of yearlings stocked or migrating into an area less those migrating out of the area. However, natural reproduction of lake trout in Lake Huron has increased in recent years and is now accounted for by adjusting the estimated number of hatchery fish in the population by the proportion of wild fish captured in surveys, commercial nets, and recreational fishing gear. For wild lake trout (Lake Superior) and lake whitefish (all management units), recruitment is estimated from a Ricker stock-recruit function. In general, a stock-recruit relationship describes how the number of young fish (recruits) relates to the number of spawners that produced them.

After parameters have been estimated, the next step is the short-term projection of harvest limits. Harvest levels are set in order to not exceed target mortality rates set forth in the Consent Decree and are derived by applying various fishing mortality rates to the population abundance estimated at the start of the year. Target mortality rates are comprised of an assortment of age-specific mortality rates. Additionally, the target mortality rates are defined by taking into consideration the concept of spawning stock biomass per recruit, or the amount of spawning biomass that an average recruit is expected to produce. This provision ensures that there is an adequate amount of spawning stock per recruit and that more than one age class is contributing considerably to the spawning population. A more extensive and technical description of the entire modeling process is contained in the *Stock Assessment Models* section of the 2012 Status of the Stocks Report (this section was removed from the 2013 and subsequent Status of the Stocks Report).

C. Model estimates used during negotiation

During the final stages of negotiations in 1999, model estimates of harvest limits and total allowable effort were projected under presumed likely scenarios for the commercial and recreational fisheries over the life of the Consent Decree. For lake trout, the projections are separated into a phase-in period (where applicable), and rehabilitation period or sustainable management period. Phase-in periods are intended to allow for a more gradual transition to target mortality rates and final allocation percentages. For comparison, a reference period is also included for each Management Unit. Information regarding the lake trout fishery is detailed by Management Unit in Appendix 1. Information regarding the whitefish fishery is detailed by whitefish Management Unit in Appendix 2. For numerous reasons, some of these projections

were not accurate and the fishery operates under harvest limits that differ considerably from the projections.

II. Harvest Limits and TAE's (Total Allowable Effort)

A. Lake trout

As required by the Consent Decree, the MSC calculates annual harvest and effort limits for lake trout and provides these recommendations to the TFC. After reviewing the recommendations, the TFC must approve harvest and effort limits by April 30 of each year to be submitted to the Parties for final approval. In 2015, stipulations to the Consent Decree set harvest limits in MM-4, MM-5, MH-1, and MH-2. The MM-4 and MM-5 stipulations have been in place since the mid-2000s and were the result of high levels of lamprey-induced mortality, which would otherwise severely restrict all lake trout fishing. In MM-4, the model-generated harvest limit exceeded the stipulated level in 2015 and was used as the harvest limit, although the stipulated provision of the prior year's State underharvest being added to CORA's harvest limit continued. This model value is an anomaly compared to recent trends. MM-123 is also a stipulated unit; however, the Parties disagreed about how to account for the back-to-back overharvest by the tribes in 2013 and 2014. As a result, there was no harvest limit for 2015 for the State or CORA. The issue remains outstanding. The stipulation for both of the Lake Huron management units was requested by the MSC. As Lake Huron continues to shift from a population dominated by hatchery lake trout to one dominated by wild lake trout, the stock assessment models used to characterize the population have struggled. The MSC requested a stipulation to set the harvest limits for 2015 and 2016 to allow time to focus on improving the diagnostics of the models for both MH-1 and MH-2.

The Consent Decree has a provision that harvest limits in fully-phased units should not change by more than 15% over the previous year unless all the Parties agree a greater change is appropriate. In 2015, this rule was applied in MM-67 and MI-7. The MM-67 model-generated harvest limit declined by more than 15% and the parties agreed to limit the reduction to only 15% lower than the 2014 limit. In MI-7 the model increased by more than 15%, but the parties kept the limit to only 15% higher than 2014. A map of the lake trout management units is provided at the end of this document (Figure 1), and the 2015 lake trout harvest and effort limits for each management unit are below in Table 2.

Table 2. Model estimates of harvest limits (HL; pounds) and total allowable effort (TAE; linear feet of gill net) for lake trout by management unit in 1836 Treaty-ceded waters of the Great Lakes for the 2015 fishing season.

		Model-output HLs		Final HLs		
Lake	Unit	State	Tribal	State	Tribal	Tribal TAE
Michigan	MM-123	4,480	40,313	Not Set	Not Set	Not Set
	MM-4[a]	85,390	104,366	85,390	116,437	872,000
	MM-5[a]	48,238	32,159	58,800	39,200	161,000
	MM-67[b]	23,148	208,332	337,382	37,487	NA
Huron	MH-1[a]	Not Run	Not Run	50,512	370,419	10,895,000
	MH-2[a]	Not Run	Not Run	118,750	6,250	NA
Superior	MI-5	135,790	7,147	135,790	7,147	NA
	MI-6	83,714	83,714	83,714	83,714	3,159,000
	MI-7[b]	33,371	77,865	29,355	68,496	4,597,000

[a] Final HLs resulted from orders to amend the Consent Decree.
[b] TFC invoked the 15% rule, limiting the HL to a 15% deviation from the 2014 harvest limit.

B. Lake Whitefish

As required by the Consent Decree, the MSC calculates annual lake whitefish harvest limits for shared management units, and provides these recommendations to the TFC. For each whitefish management unit that is not shared, the tribes set a harvest regulation guideline (HRG) in accordance with their Tribal Management Plan. The MSC also generates recommendations for HRGs that are considered by each Tribe. After reviewing and discussing recommended harvest limits for lake whitefish, the TFC submits these harvest limits to the Parties for final approval by December 1 for the subsequent year. The TFC reached consensus on harvest limits for all shared whitefish management units, and these figures were sent to the Parties in December 2014. A map of lake whitefish management units is provided at the end of this document (Figure 2), and the 2015 lake whitefish harvest limits for each management unit are below in Table 3.

The MSC was able to generate model recommended harvest limits in all shared units and most non-shared units. The Leland/Frankfort unit (WFM-06) and the Muskegon unit (WFM-08) maintained constant harvest limits, which were first established in 2011 and 2013, respectively. In WFM-01, the TFC could not agree to a harvest limit, and the issue went to the Parties. Eventually the model recommended limit was adopted. In non-shared units, the final tribal HRGs in WFM-03 was set higher than the model value, and the final HRGs were set lower than

the model values in WFM-04 and WFM-05. The MSC does not calculate recommended harvest limits in WFM-07 and WFS-06 due to limited fishery data. The HRGs in these units remained constant from prior years. The tribes accepted model-generated recommendations for HRGs in other units.

Table 3. Model estimates for harvest limits (HL; pounds) or harvest regulation guidelines (HRG; pounds) for lake whitefish by management unit in 1836 Treaty-ceded waters of the Great Lakes for the 2015 fishing season.

Lake	Unit	Final State HL	Model output Tribal HL	Final Tribal HL or HRG
Michigan	WFM-01	144,580	1,301,220	1,301,220
	WFM-02	-	465,500	465,500
	WFM-03	-	622,725	780,800
	WFM-04	-	919,900	548,000
	WFM-05	-	427,000	365,000
	WFM-06	65,000	-	145,000
	WFM-07[a]	-	-	500,000
	WFM-08	500,000	-	900,000
Huron	(H01-H04 Combined)		379,900	379,900
	WFH-05	-	431,000	431,000
Superior	WFS-04	10,700	96,300	96,300
	WFS-05	65,600	344,400	344,400
	WFS-06[a]	-	-	210,000
	WFS-07	-	427,300	427,300
	WFS-08	-	161,100	161,100

[a] No model output

III. Harvest and Effort Reporting

A. State-licensed commercial and recreational fishing

1. Lake Trout

Lake trout harvest by the State of Michigan consists entirely of harvest by sport anglers. The harvest limits and reported harvest in Lake Superior represent lean lake trout only. Throwback mortality from the state recreational fishery (lake trout caught by hook and line that are returned to the water and subsequently die) was also estimated for each management unit and added to the weight of lake trout harvested for comparison to harvest limits. A study was initiated in 2010 to examine the extent of hooking mortality on lake trout by state recreational anglers. Sufficient tag returns were collected through 2015 to begin analysis. Preliminary review of the data suggests that the previous value of release mortality (15%) is substantially

lower than what is currently occurring. The tribes wanted the state to apply the preliminary results from this study to the 2015 total lake trout yield; however, because analysis is ongoing, the State did not agree, and the value used for hooking mortrality in 2015 remained 15%. Analysis will continue in 2016 and new values will likely be applied to the 2016 estimates of released lake trout.

Lake trout harvest by sport anglers in 2015 was below harvest limits in all management units except for MM-5. The harvest in MM-5 exceeded the stipulated limit, although it was not high enough to trigger a penaly that would have restricted the 2016 harvest limit. The lake trout harvest in MM-123 exceeded the stipulated limit of 50,000 lb, but because there remains an outstanding disagreement about how to account for the tribal overharvest from 2013 and 2014, no formal harvest limit was established for 2015 in MM-123. At the time of this writing, the regular, formal process for setting 2016 harvest limits has been completed and no limit was agreed to for MM-123. Negotiations are ongoing. Estimated State-licensed recreational harvest of primary species are listed below in Table 4, as is total effort for all species combined.

Table 4. Total effort, number, and weight (pounds) of estimated State-licensed recreational harvest for both creel and charter anglers, by lake trout management unit in 1836 Treaty-ceded waters of the Great Lakes for the 2015 fishing season.

Lake	Management Unit	Total effort (angler hours)	Lake trout[a]		Walleye		Yellow perch		Chinook salmon		Coho salmon	
			Number	Weight	Number	Weight	Number	Weight	Number	Weight	Number	Weight
Michigan	MM-123	291,996	11,648	64,143	7,453	28,694	61,968	18,590	1,617	18,514	71	199
	MM-4	143,693	14,791	64,229	61	235	4,437	1,331	1,991	24,589	360	1,638
	MM-5	119,031	10,758	65,666	0	0	0	0	8,575	87,894	834	3,795
	MM-67	552,456	12,234	68,119	83	320	50,692	15,208	9,793	98,126	6,257	25,153
Totals		1,107,176	49,431	262,157	7,597	29,249	117,097	35,129	21,976	229,123	7,522	30,785
Huron	MH-1	95,455	10,927	43,969	13,037	24,770	77,795	23,339	1,262	11,446	120	360
	MH-2	70,675	4,628	31,340	5,354	16,544	1,552	466	362	2,997	74	222
Totals		166,130	15,555	75,309	18,391	41,314	79,347	23,805	1,624	14,443	194	582
Superior	MI-5[b]	36,281	8,738	35,157	0	0	0	0	530	2,449	975	1,628
	MI-6	39,430	3,661	12,015	0	0	245	71	933	2,846	1,651	3,517
	MI-7	21,266	3,567	10,281	0	0	183	53	11	40	1,963	3,062
Totals		96,977	15,966	57,453	0	0	428	124	1,474	5,335	4,589	8,207
Grand totals		1,370,283	80,952	394,919	25,988	70,563	196,872	59,058	25,074	248,901	12,305	39,574

[a] Weight of Lake Trout harvest shown in the table includes hooking mortality. Lake Superior lake trout number and weight do not include Siscowets; number of Siscowet harvested was estimated at 37, 133, and 645 fish, for MI-5, MI-6, and MI-7, respectively.

[b] Includes recreational harvest from entire unit; harvest from 1842 Treaty-ceded area was not removed.

2. Lake Whitefish

Lake whitefish harvest by state-licensed commercial fishers was effectively at or below harvest limits in all lake whitefish management units. The commercial whitefish harvest reported in Table 5 includes catch from targeted effort (trap nets). Catch of lake whitefish in chub nets is minimal most years and was zero pounds for 2015. MDNR has permitted a purse seine in Big Bay de Noc since 2013. The results of those efforts have shown that the gear can effectively catch whitefish, while capturing nearly zero bycatch. Because this is an active gear, it goes back to the dock with the fisherman at the end of the day, and nothing is left in the water to be disturbed by weather or interfere with recreational boating or fishing. Purse seines are effective in specific types of areas. They are not a widespread solution to gear conflict throughout Treaty Waters, but in Big Bay de Noc it has proven to be effective and will continue to be permitted as long as the fisher is active and maintains an interest.

The largest monitored recreational fishery for whitefish historically occurred in WFM-05 (Grand Traverse Bay area). In 2011, the recreational harvest from Grand Marais (WFS-06) exceeded that from Grand Traverse Bay for the first time, and that pattern has continued through each year since. Recreational harvest of whitefish was estimated to be 923 fish in Grand Traverse Bay, and 4,089 fish in Grand Marais. The other area where recreational harvest of whitefish is common is Munising, where 1,878 fish were harvested in 2015. The State does not estimate targeted recreational effort for lake whitefish in these management units.

Table 5. Summary of state-licensed commercial lake whitefish harvest (pounds) and effort (trap-net lifts) by lake whitefish management unit in 1836 Treaty-ceded waters of the Great Lakes for the 2015 fishing season.

Lake	Unit	Harvest	Effort
Michigan	WFM-01	144,798	9[a]
	WFM-06	8,240	70
	WFM-08	123,705	334
Lake totals		276,743	413
Superior	WFS-04[b]	10,155	25
	WFS-05	30,279	179
Lake totals		40,434	204
Grand totals		317,177	617

[a]Trap-net effort in WFM-01 is low, due to the fisher primarily using a purse seine.

[b]Includes 1836 waters only.

B. Tribal commercial and subsistence fishing

Data in this section are as reported to the MDNR from the Chippewa Ottawa Resource Authority (CORA). In 2015, Sault Tribe and the Grand Traverse Band removed the fisher identification numbers from their harvest data that is shared with the State and Federal governments. The claim was that the State and Federal government had violated a confidentiality clause of the Consent Decree. The State disagreed with that position as these identification numbers are specifically required by the Consent Decree. The State has sent letters requesting they be reinstated, but to date, they have not been. Their removal prevents the State from doing detailed analysis on harvest at the level of the individual fisher; it also prevents the state from comparing tribal catch reports to wholesale reports. Such comparisons were routine and were what allowed the 2013 overharvest of lake trout in MM-123 to be discovered.

At the time this report was completed, CORA had not finalized harvest data for 2015; thus, all reported numbers are considered preliminary. It is unknown how much these preliminary numbers will change when they are made final. Historically, whitefish numbers have changed more often and by a greater margin than numbers for lake trout or other species. If readers are interested in receiving an update on final harvest numbers when they become available, please contact Dave Caroffino, caroffinod@michigan.gov.

1. Lake trout

There was no harvest limit for the CORA lake trout fishery in MM-123 in 2015, as the parties could not agree on how to handle the 2013 and 2014 tribal overharvest. CORA established a self-imposed penalty for 2015 based on a three-year running sum of deviations from their harvest limit, according to the terms of the Decree. The State disagreed with the application of this type of penalty; however, CORA managed their fishery to achieve a target harvest of roughly 355,000 lb. This resulted in regulations that included zero retention of lake trout in trap nets, and a 600 lb bag limit for gill-net fishers. The gill-net bag limit was reduced to 400 lb in August of 2015, and the entire fishery was closed on October 23rd for the remainder of the year. Fishers lost 6 weeks of fishing opportunity as a result of the closure. The final tribal harvest for 2015 included an estimate of throwback mortality (62,380 lb) due to the use of a bag limit as a management tool. The tribes rode on board commercial fishing vessels to estimate the total weight of discarded lake trout. Once this discard mortality was added to the actual landed

yield, it resulted in an overharvest of the self-imposed limit. The overharvest from 2013 and 2014 as well as the penalties associated with them are not resolved and will continue to be discussed among the Consent Decree parties.

In the remaining lake trout management units, harvest, reported in Table 6 below, was below established harvest limits in all management units. The tribes estimated throwback mortality from trap and gill nets in MH-1 where bag limit regulations also applied.

Table 6. Summary of projected tribal commercial lake trout harvest (pounds) by management unit in 1836 Treaty-ceded waters of the Great Lakes for the 2015 fishing season. Gill-net harvest includes that from small-mesh and large-mesh gill nets.

Lake	Unit	Trap-net harvest	Gill-net harvest	Total harvest
Michigan	MM-123 [a]	48	388,879	388,927
	MM-4	4,753	92,236	96,989
	MM-5	3,478	28,687	32,165
	MM-67	0	0	0
Lake total		8,279	509,802	518,081
Huron	MH-1[a]	1,725	252,070	254,996
	MH-2	0	0	0
Lake total		1,725	252,070	254,996
Superior	MI-5	0	0	0
	MI-6	0	15,718	15,718
	MI-7	0	30,341	30,341
	MI-8	2,165	70,384	72,549
Lake total		2,165	116,443	118,608
Grand total		12,169	878,315	891,685

[a] Includes estimated throwback mortality of 1,201 lb for MH-1 and 62,380 lb for MM-123.

2. Lake Whitefish

Lake whitefish harvest by Tribal commercial fishers was below the approved harvest limits and HRGs in all management units. In management units that are not shared, the tribes manage the fishery in accordance with the Tribal Plan and no penalty is incurred for overharvest. In shared whitefish management zones, overharvest penalties are incurred when a party exceeds the harvest limit by greater than 25%, although this provision of the Decree has yet to be triggered.

Table 7. Summary of preliminary tribal commercial lake whitefish harvest (pounds) and targeted effort (trap net-lifts or 1,000 feet of large-mesh gill net) by management unit in 1836 Treaty-ceded waters of the Great Lakes for the 2015 fishing season. Minor harvest from small-mesh gill nets is also included in gill-net harvest, but not effort.

		Trap nets		Gill nets		Total harvest
Lake	Unit	Harvest	Effort	Harvest	Effort	
Michigan	WFM-01	419,654	2,404	0	0	419,654
	WFM-02	74,292	350	136,092	3,684	210,384
	WFM-03	146,570	1,330	91,925	3,286	238,495
	WFM-04	57,060	428	100,862	2,565	157,922
	WFM-05	15,838	115	40,965	1,535	56,803
	WFM-06	9,816	77	7,668	89	17,484
	WFM-07	0	0	0	0	0
	WFM-08	0	0	0	0	0
Lake totals		723,230	4,704	377,512	11,159	1,100,742
Huron	Northern	113,016	790	90,999	5,722	204,015
	WFH-05	83,198	163	0	0	83,198
Lake totals		196,214	953	90,999	5,722	287,213
Superior	WFS-04	0	0	0	0	0
	WFS-05	0	0	33,650	686	33,650
	WFS-06	0	0	33,697	1,188	33,697
	WFS-07	124,075	958	268,240	5,962	392,315
	WFS-08	80,261	605	12,796	269	93,057
Lake totals		204,336	1,563	348,383	8,105	552,719
Grand totals		1,123,780	7,220	816,894	24,986	1,940,674

3. Walleye

Commercial fishing for walleye is permitted in and around Grand Traverse Bay and the Manitou Islands, in northeastern Lake Michigan (Naubinway to Gros Cap), and around St. Martin's Bay and the Les Cheneaux Islands in Lake Huron. There are gear, season, depth, size, and area restrictions on the various walleye fisheries, though no harvest limits are set forth in the Consent Decree. Walleye are occasionally harvested as incidental catch; thus, sometimes there

is harvest with no effort listed for a unit because the fishers were actually targeting other species. The largest reported walleye harvest in 2015 occurred in Lake Huron unit MH-1 (23,401 pounds).

Table 8. Summary of tribal commercial walleye harvest (pounds) and targeted effort (trap-net lifts or 1,000 feet of small or large mesh gill net) by management unit in 1836 Treaty-ceded waters of the Great Lakes for the 2015 fishing season.

		Trap nets		Gill nets		Total harvest
Lake	Unit	Harvest	Effort	Harvest	Effort	
Michigan	MM-123	622	0	2,452	59	3,074
	MM-4	195	0	1,611	0	1,806
	MM-5	33	0	86	0	119
Lake totals		850	0	4,149	59	4,999
Huron	MH-1	0	0	23,401	1,382	23,401
Superior	MI-8	40	0	855	2	895
Grand totals		890	0	28,405	1,443	29,295

4. Yellow perch

Commercial fisheries for yellow perch exist in northeastern Lake Michigan around Grand Traverse Bay and the Manitou Islands, around the Beaver Islands, and near the northeastern shore. A yellow perch fishery also exists in Lake Huron around the Les Cheneaux Islands. The fishery has gear, depth, area, season, and size restrictions; though no harvest limits are set forth in the Consent Decree. The largest yellow perch harvest in 2015 was in MH-1 where 4,062 pounds were harvested (Table 9). Yellow perch are occasionally harvested as incidental catch, which is why often there is harvest with no effort listed for a unit because the fishers were actually targeting other species.

Table 9. Summary of tribal commercial yellow perch harvest (pounds) and targeted effort (trap-net lifts or 1,000 feet of large-mesh and small-mesh gill net) by management unit in 1836 Treaty-ceded waters of the Great Lakes for the 2015 fishing season.

		Trap nets		Gill nets		Total
Lake		Harvest	Effort	Harvest	Effort	Harvest
Michigan	MM-123	45	0	3,505	244	3,550
	MM-4	0	0	848	29	848
	MM-5	0	0	96	13	96
Lake totals		45	0	4,449	286	4,494
Huron	MH-1	0	0	4,062	348	4,062
Superior	MI-8	0	0	2	0	2
Grand totals		45	0	8,513	634	8,558

5. Chinook and Coho salmon

Tribal commercial fisheries for salmon exist in northeastern Lake Michigan near shore from McGulpin Point south to Seven Mile Point, around the tip of the Leelanau Peninsula, and in Suttons Bay. Fisheries in northern Lake Huron exist in St Martin Bay, and near shore from Cordwood Point to Hammond Bay Harbor light. There is no target fishery for salmon in Lake Superior, but gill-net fishers are allowed to harvest these species as incidental catch. Fishing is restricted by season, gear, depth, and area; though no harvest limits are set. As in most years, the largest Chinook salmon harvest in 2015 occurred in Lake Huron unit MH-1 (Table 10). The 67,022 lb harvested in MH-1 represents a 61% decline from the 2014 take of Chinook salmon in this area, and it is an 80% decline from the 2013 harvest. In recent years, Coho salmon have been primarily harvested from Lake Superior, but in 2015 a low number were taken from northern Lake Michigan (Table 11).

Table 10. Summary of Tribal commercial Chinook salmon harvest (pounds) and targeted effort (trap-net or 1,000 feet of gill net) by management unit in 1836 Treaty-ceded waters of the Great Lakes for the 2015 fishing season.

		Trap nets		Gill nets		Total harvest
Lake	Unit	Harvest	Effort	Harvest	Effort	
Michigan	MM-123	58	0	149	0	207
	MM-4	5	0	0	0	5
Huron	MH-1	0	0	67,022	1,899	67,022
Superior	MI-8	0	0	402	0	402
Grand totals		63	0	67,573	1,899	67,636

Table 11. Summary of Tribal commercial Coho salmon harvest (pounds) and targeted effort (trap-net lifts or 1,000 feet of gill net) by management unit in 1836 Treaty-ceded waters of the Great Lakes for the 2015 fishing season.

		Trap nets		Gill nets		Total harvest
Lake	Unit	Harvest	Effort	Harvest	Effort	
Michigan	MM-123	0	0	7	0	7
Superior	MI-7	0	0	86	0	86
	MI-8	480	0	4,027	0	4,507
Lake Total		480	0	4,113	0	4,593
Grand Totals		480	0	4,120	0	4,600

6. Subsistence fishing

Subsistence fishing as defined in the Consent Decree means taking fish for personal or family consumption and not for sale or trade. Tribal subsistence fishing is allowed in all 1836 Treaty-ceded waters with some exceptions. These exceptions include: no gill nets in lake trout refuges; no nets within 100 yards of a break wall or pier; no nets within a 0.3-mile radius of certain stream mouths (listed in section IV.C.8 of the Consent Decree); no prevention of fish passage into and out of streams that flow into 1836 Treaty waters; no gill nets or walleye possession in portions of the Bays de Noc during March 1 - May 15; no gill nets within 50 feet of other gill nets. Fishers are limited to 100 pounds aggregate catch of all species in possession,

and catch may not be sold or traded. Subsistence fishers may use impoundment gear, hooks, spears, seines, dip nets, and gill nets. Gill netting is limited to one 300-ft or smaller net per vessel per day. In the St. Marys River a single gill net may not exceed 100 ft in length. All subsistence gear must be marked clearly with floats and Tribal identification numbers. Tribal fishers must obtain subsistence licenses issued from their respective Tribe, and must abide by provisions of the Tribal Code. Additionally, subsistence fishing with gill or impoundment nets requires a Tribal permit that may be limited in duration and by area. The Consent Decree states that MDNR is to be provided with copies of all subsistence licenses and permits and that data from the subsistence harvest reports of Tribal fishers shall be compiled by CORA and provided to the Parties within six (6) months. Final subsistence data for 2015 has not been reported by the tribes, but preliminary data is included below in Tables 12 and 13.

Table 12. Summary of final tribal subsistence harvest (round pounds) with gill nets for each management unit by species for the 2015 fishing season.

Species / Unit	MH-1	MI-6	MI-7	MI-8	MM-123	MM-67	St. Marys River	Total
Bass	0	0	0	2	194	0	3	199
Brown Trout	0	16	0	0	19	63	0	98
Burbot	0	55	0	0	38	0	11	104
Carp	95	0	0	0	98	0	0	193
Freshwater Drum	40	0	0	0	0	0	0	40
Cisco	4	20	0	141	0	0	264	429
Lake Trout	571	312	0	97	260	194	28	1,462
Menominee	239	50	38	22	2	0	0	351
Northern Pike	86	5	0		725	5	221	1,042
Steelhead	25	54	0	81	462	308	0	930
Salmon	93	493	189	615	133	0	36	1,559
Smelt	0	0	0	779	0	0	80	859
Splake	16	161	0	4	0	0	29	210
Sucker	513	305	0	72	343	22	184	1,439
Walleye	399	4	0	28	5,007	28	255	5,721
Whitefish	140	538	69	415	2,275	0	164	3,601
Yellow Perch	21	1	0	0	2,798	0	31	2,851
Effort (feet)	19,700	16,680	1,800	16,650	116,605	3,475	5,285	180,195

Table 13. Summary of final tribal subsistence harvest (round pounds) via snagging, traditional hook and line, tip-ups, dip nets, and spears (combined) for each management unit by species for the 2015 fishing season.

Species / Unit	MH-1	MI-6	MI-7	MI-8	MM-123	MM-67	St. Marys River	Total
Atlantic salmon	25	0	0	0	0	0	749	774
Bass	5	0	0	0	7	0	51	63
Brown Trout	0	0	4	0	0	0	0	4
Burbot	0	4	0	0	0	0	69	73
Catfish	0	0	0	0	0	0	4	4
Carp	0	0	0	0	0	0	10	10
Freshwater Drum	65	0	0	0	0	0	3	68
Panfish	1	0	0	0	0	0	2	3
Cisco	48	0	0	0	0	0	191	239
Lake Trout	1,220	0	0	0	489	0	40	1,749
Menominee	3	0	0	4	0	0	14	21
Muskellunge	0	0	0	0	0	0	12	12
Northern Pike	132	0	0	86	64	0	1,287	1,569
Pink Salmon	0	0	0	0	0	0	6	6
Steelhead	0	0	36	0	0	6	8	50
Salmon	60	22	97	99	40	4	401	723
Smelt	0	0	0	50	0	0	0	50
Splake	34	0	0	0	0	0	0	34
Walleye	199	0	0	335	163	0	4,151	4,848
White Bass	0	0	0	0	0	0	3	3
Whitefish	0	0	54	36	0	0	103	193
Yellow Perch	423	0	0	0	379	0	2,069	2,871

7. Tribal Charter Fishing

The Consent Decree includes guidelines for tribally-licensed and operated charter boats. They must pass a safety inspection similar to that required by State law. Non-tribal members fishing with a tribal charter boat must follow state laws, and the Decree outlines reporting requirements that are similar to state charter boats. In 2014, the first tribal charter boat was licensed since the signing of the 2000 Consent Decree. This individual only recorded one trip in 2014 and did not record any trips in 2015. Tribal biologists indicated that they did not believe this charter boat would continue fishing in the future.

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LAW ENFORCEMENT

I. Introduction

The Great Lakes Enforcement Unit (GLEU) is housed within the Michigan Department of Natural Resources (MDNR) Law Enforcement Division (LED). The Unit is tasked with the monitoring and enforcement of aquatic species commercialization within the state as well as other Great Lakes protection issues.

Areas of oversight include:

- State commercial fishery
- 2000 Consent Decree
- The wholesale fish industry
- Michigan's bait industry (wholesale, retail, and harvesters)
- Transportation and commercialization of aquatic invasive species
- Coastal zone management
- General marine enforcement

The 2000 Consent Decree details the allocation, management, and regulation of fishing in 1836 Treaty waters. The Decree also establishes a Law Enforcement Committee (LEC) as the primary body for consultation and collaboration on enforcement issues pertaining to the fishery in 1836 Treaty Waters of the Great Lakes. The LEC is composed of the chief law enforcement officer or designee of each tribe and the chief law enforcement officer or designee of the MDNR.

Under the Decree, each of the Tribes and the State shall commit one position as available to work with a mutual-aid enforcement team pool each year. The team shall engage in group patrols at least eight times per year, and those patrols are scheduled by the LEC. The LEC is required to meet four times a year with the first meeting taking place in January where each agencies annual summary report is reviewed.

This report provides a summary of enforcement activity for the MDNR GLEU in 2015 which is currently staffed by four Commercial Fish Specialists (CFS), and one Commercial Fish Investigator (CFI), and a 2nd/Lt. Unit Supervisor.

II. General Information

A. Equipment/Maritime Activity

For the 2015 season, the Unit's vessels were put to use for a total of 415 sea service hours. A total of 74 patrols were conducted along with an additional 6 patrols on vessels from outside of the Unit. 3,735 gallons of fuel was purchased for a total cost of $11,861.26.

The Unit's larger vessels and specialized equipment have always been an asset to the local districts and in 2015 our officers were requested to render enforcement and security assistance at the following maritime events:

- Detroit Grand Prix
- Marinette Marine shipyard launch of the latest LCS class naval warship USS Little Rock
- Traverse City Blue Angels Air Show
- Menominee Waterfront Festival fireworks display
- Operation Dry Water – River Roar hydroplane event
- Enbridge pipeline mock disaster training exercise
- Saginaw River fireworks

III. Enforcement

A. Complaints and Violations

In 2015, Law Enforcement Division investigated a total of 142 commercial fishery related complaints. Eighty-six concerned 1836 Treaty fishing and 44 concerned state commercial fishing. Within the state commercial fishery, a total of 1,576 contacts were made, 424 inspections were conducted, 2 citations were issued and 43 warnings were given. Within the tribal fishery, a total of 713 contacts were made, 405 inspections were conducted, 9 citations were issued, and 13 warnings were given. In addition, 20 referrals were made to tribal officers for follow up.

Table 14. 2015 Summary of LED Actions Regarding State Commercial Fishing Activities

	Contacts	Delinquent Reporting Complaints	Other Complaints	Inspections	Arrests	Delinquent Reporting Warnings	Other Warnings
Bait Dealers	103	0	2	98	0	10	3
State Commercial	1,306	5	11	240	1	6	0
Wholesale	167	25	1	86	1	18	6

Table 15. 2015 Summary of LED Actions Regarding Tribal Fishing Activities

	Contacts	Complaints	Inspections	Arrests	Warnings	Referrals
1836 Treaty	688	86	400	9	13	9
1842 Treaty	25	12	5	0	0	11

GLEU complaints, violations and activities of note include the following:

- The GLEU conducted a joint inspection with Michigan Department of Agriculture and Rural Development (MDARD) inspectors at a wholesale fish dealer in south west Michigan which resulted in numerous health code violations being observed and the facility was shut down. Additionally, there are issues with disposing of fish carcasses that the Department of Environmental Quality is addressing. Fish viscera and heads along with a bloody slurry were dumped on the surface of the ground adjacent to the business. The material was raw and there were concerns about botulism introductions to mammals and birds. The wholesaler was also cited for operating a wholesale fish house without a license.

- During a patrol in the Little Bay de Noc area, officers received information that a 1836 treaty area member may be utilizing an inland harvest permit to fish illegally with three 1842 treaty area members in a closed area. The officers located the subject's vehicle at a boat launch on Little Bay de Noc and set up surveillance. Eventually, a small boat was observed returning to the dock in the dark without navigation lights. Contact was made, and the four subjects were identified and in possession of four spears and approximately

95 pounds of walleye. The 1836 member claimed to be fishing in the river where his permit was valid but was observed coming from the bay in the opposite direction of the river. When questioned, he claimed that he thought the river extended out to his location a few miles from the actual river mouth. The subject was cited into Tribal court for possession of walleye in a closed area and the walleye were seized. The subject was found guilty assessed $100 in fines and costs and $300 in restitution for the fish.

- A Unit officer contacted a LTBB fisher with more than 1,300 pounds of lake trout. The fisher was over the limit by 718 pounds. The fish were seized and the fisher was ticketed. He was found guilty but not assessed a fine.

- A Joint inspection with an MDARD inspector at a wholesale dealer in northern Michigan found that the facility was not licensed as well as numerous health code violations. The MDARD inspector shut the facility down until further notice. Product on had was seized and destroyed because it was not processed in compliance with state law.

- Representatives from the GLEU participated in the Lean Process Improvement (LPI) workgroup. The workgroup consisted of staff from Fisheries Division, Department of Management and Budget, reps from the commercial fish and wholesale industry, the 1836 tribes and CORA. The process is being facilitated by the Office of Licensing and Regulatory Affairs. The workgroup has been charged with identifying a new process for electronically reporting in the wholesale fish, commercial fish, and charter boat industries.

- Unit officers assisted a LTBB officer with a net that the tribal officer had previously tagged for monitoring. The net was located and several rotten fish were observed. The officers pulled approximately 900 feet of net which contained a couple hundred pounds of rotten fish. Evidence was turned over to LTBB Law Enforcement who charged the subject for an abandoned net. The subject pled guilty, paid $350.00 and his gear was returned to him.

- A Unit officer located an illegal gill net in Big Bay de Noc where two nets had been tied together exceeding the legal length. One end was also improperly marked. The net was seized and turned over to Sault Tribe Enforcement who assisted with a follow up interview. The subject, whose number was on the net, confessed to the two nets being his and enforcement action was taken. He was fined $150.

- Officers located a subsistence net in Big Bay de Noc that appeared to be of legal length and marked as such. Upon further investigation, a second net of 250' was attached to this net and ran toward shore with no markings on it. The 500' of net was made to look like a legal net from the surface. The fisher was interviewed, and admitted to the violation. He was cited into tribal court for fishing with excessive net and failing to properly mark a subsistence net. He was fined $150.

- Officers contacted the wholesale industry to notify them of general fishing regulations regarding state and tribal commercial fishers to help stop illegal fishing activity.

- The GLEU spent a considerable amount of time patrolling MM-123 in northern Lake Michigan to address any illegal fishing and monitor compliance during the emergency fishing closure enacted by CORA. Unit officers conducted numerous patrols with tribal authorities and utilized the USCG air station in Traverse City for additional air support.

- GLEU staff have been working on the fish disease control order re-write with Fish division staff. The workgroup met internally and with the bait industry representatives several times over the past year to discuss and develop regulations to change and simplify the current fish disease order.

- GLEU staff continue to work with Fisheries Division staff regarding the commercial fish statute re-write efforts.

- Two illegal subsistence nets removed from Big Bay de Noc. On the surface the nets appeared legal but after lifting and inspecting the nets the officers found that multiple

nets were ganged together and in the case of one of the nets was approximately 400' long. The nets were set in close proximity to another legally set net belonging to a different person. Upon later contact, the fishers said that the nets did not belong to them and they hadn't been fishing in over a month. Nets with both of their identification numbers continued to be located in the area. Surveillance was set up and officers discovered that owner of the third net had been setting and tending 600 feet more of net than he was allowed by placing the other fishers identification numbers on the jugs. This was his second offense in 2015 for fishing with more net than is allowed. The fisher was cited and paid $150 fine. Forfeiture of the nets is pending.

- It was noted that a commercial gill net fishing vessel was not at the dock the morning after the season fishing closure. Surveillance on the area was maintained and the fisher was contacted when he came in with approximately #450 whitefish and lake trout. The fisher claimed that he was unable to get his nets due to unexpected high winds the day prior. However, it was determined that he had only set nets a few days earlier and should have known what weather was forecasted. He was cited and received a $250 fine and a 30 day license suspension.

- The CORA Law Enforcement committee proposed recommended changes to the subsistence fishing effort and harvest in Little Bay de Noc to address illegal marketing of subsistence caught fish. The recommendation failed to gain support before the CORA board.

- Unit and area officers located a commercial fisher lifting nets near Grand Island off of Munising a day before the season re-opened. The fisher had approximately 1,000 pounds of fish. The fish were turned over to Bay Mills law enforcement for prosecution.

IV. Aquatic Invasive Species and Aquatic Disease

Preventing the spread of Aquatic Invasive Species such as Asian Carp, and fish diseases such as Viral Hemorrhagic Septicemia (VHSv) continue to be a topic of importance to the state, tribal, and federal governmental units around the Great Lakes region. Both of these threaten

Michigan's fishery populations and could have very detrimental effects on commercial and recreational fishing.

The GLEU represents LED as a member agency of the Asian Carp Task Force coordinated by the United States Fish and Wildlife Service. The task force is comprised of state, federal and provincial law enforcement agencies cooperating to enforce regulations pertaining to the sale and movement of Asian Carp. This exchange of information and combined enforcement efforts has enhanced LED's ability to detect, interdict and prosecute for violations of transporting and marketing the fish.

The GLEU provides training to other law enforcement agencies as well as outreach programs for the public in regards the identification, detection and interdiction of Asian Carp and other invasive species.

Table 16. 2015 Summary of LED Actions Regarding Aquatic Invasive Species.

	Complaints	Inspections	Arrests	Warnings	Presentations
Aquatic Invasive Species	22	167	0	1	12

Unit members are becoming increasingly proactive in the monitoring of potential vectors that may spread invasive species/disease, as well as handling complaints concerning them. As part of this proactive involvement GLEU Officers have been involved in the following:

- Great Lakes Fish Commission Council of Lakes Committee - Presented work done by the law committee in comparing bait regulations from all Great Lakes jurisdictions. Vast disparities in regulations were identified as a problem with effective enforcement and prevention efforts to keep invasive species from entering the basin through the bait industry portal. The presentation outlined the disparities and potential problems with a request from the law committee recommending a more thorough review of jurisdictional regulations with a legal, fishery management, and law enforcement perspective, a

comprehensive report of all regulatory elements, and recommendations for future regulations. The lakes committee unanimously voted in favor of the recommendations with approved funding.

- GLEU officers put together information on retail bait dealers in southeast Michigan to assist the US Fish and Wildlife Service in eDNA testing for Asian Carp. The information was then used to create a list of businesses to be contacted to conduct a series of covert bait buys as well as collecting tank water.

- The GLEU conducted an aquatic invasive species initiative in the Detroit area. Several live fish markets were inspected. Unit officers observed, what appeared to be, Red Swamp crayfish at one store. .

- Numerous inspections of live fish markets were conducted in the Grand Rapids and Holland areas in conjunction with the covert purchases of live red swamp crayfish. The invasive species has been showing up in the Holland area as bait. During the inspections several live crayfish were seized and a supplier out of Houston, Texas has been identified.

- GLEU conducted an aquatic invasive species detail at the Detroit Metro Airport. Officers worked with a US Border Patrol and Customs agent and USF&WS Inspectors at the airport to inspect a shipment of fish that came in on a flight from the Philippines. No violations were observed. The initiative is one of several proactive efforts by the Great Lakes Enforcement Unit to help prevent aquatic invasive species from entering the state at certain vector points.

- Follow up was done on complaint information regarding a subject who had posted a picture and information on a southwest Michigan fishing blog site involving catching a snakehead in the Grand River. Additional information stated that these snakeheads had been released in Michigan. The snakehead in the picture appeared to be a Bullseye Snakehead found in Florida. The investigation and subsequent interview revealed that

the subject had posted the picture taken in Florida in an attempt to create a stir in the local fishing community.

- Follow up was done with the US Fish and Wildlife Service (FWS) regarding a subject in possession of Asian Arowana Dragon Fish. The subject was charged several years prior by the FWS for taking Arowana across the border. The fish are not on the Michigan prohibited species list but are on the FWS list.

V. Training and Education

Training conducted by unit officers includes the following:

- GLEU officers instructed at a week-long fish identification and enforcement school for the Conservation Officer recruit academy consisting of the divisions 37 new officers. Topics covered included state and tribal commercial fishing, tribal subsistence fishing, fish species identification, bait industry enforcement, aquatic invasive species, fish hauler identification and enforcement scenarios.

- Unit officers attended the Great Lakes Fish Commission Law Enforcement Committee meeting. In addition to discussing individual jurisdiction activity and cross jurisdictional efforts across the basin the meeting also involved aquatic invasive species investigations, enforcement projects, species identification, and future AIS detection and prevention efforts.

Education efforts and meetings attended by Unit officers include the following:

- Lakes Huron, Michigan, Superior, Erie & St. Clair Citizens Fishery Advisory Committees
- Michigan Fish Producers Association – Working with representatives from this organization and Fisheries Division on a re-write of the current commercial fishing laws.
- Michigan Charter Boat Association – Traverse City meeting
- Great Lakes Sport Fishing Club

- Ferris State University Criminal Justice students - Natural resource law enforcement and aquatic invasive species.
- Saginaw Bay Walleye Club - Addressed questions regarding walleye regulations and commercial fishing concerns
- Thumb Chapter of Michigan Steelheaders

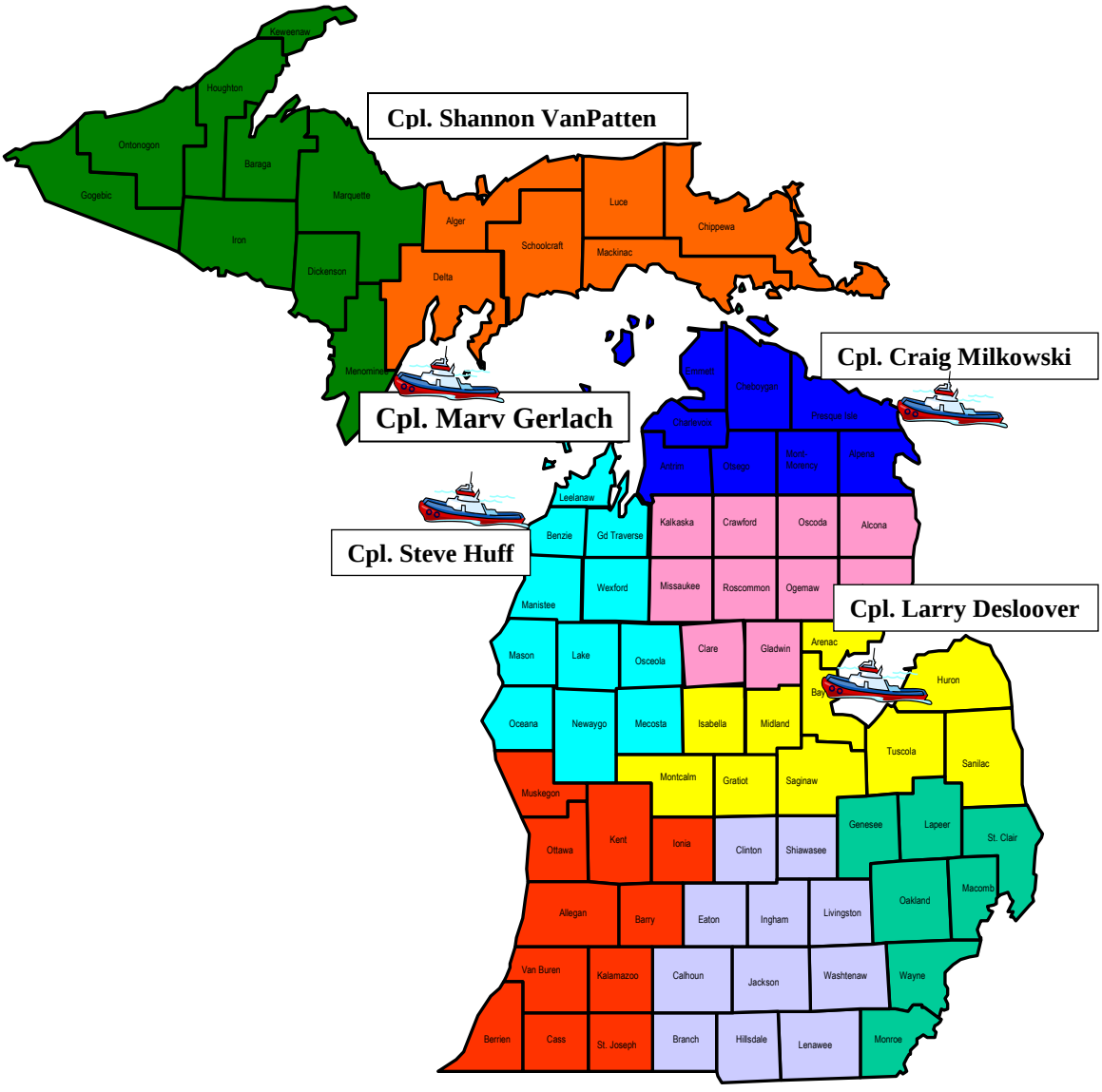
VI. Assistance to Other Agencies

The GLEU often works with officers from other agencies and jurisdictions. Examples of this include the following:

- Unit officers participated in a two day joint patrol effort with the US Coast Guard, Michigan State Police, and the Upper Peninsula Substance Enforcement Team on the Garden Peninsula on the waters of northern Lake Michigan. The operation involved the eradication of illegal marijuana plants on the Peninsula and the interdiction of subjects attempting to transport the plants by water to Wisconsin. 301 plants were pulled and several arrests, vehicle impoundments, and equipment seizures were made by ground officers.

- Unit officers participated in a mock oil spill disaster training exercise in the Straits of Mackinaw. The Enbridge pipeline mock disaster training exercise include the U.S. Coast Guard, the U.S. Environmental Protection Agency, the National Oceanic Atmospheric Administration, U.S. Fish and Wildlife Service, the Michigan State Police and local law enforcement and Native American tribes.

Michigan Department of Natural Resources
Great Lakes Enforcement Unit



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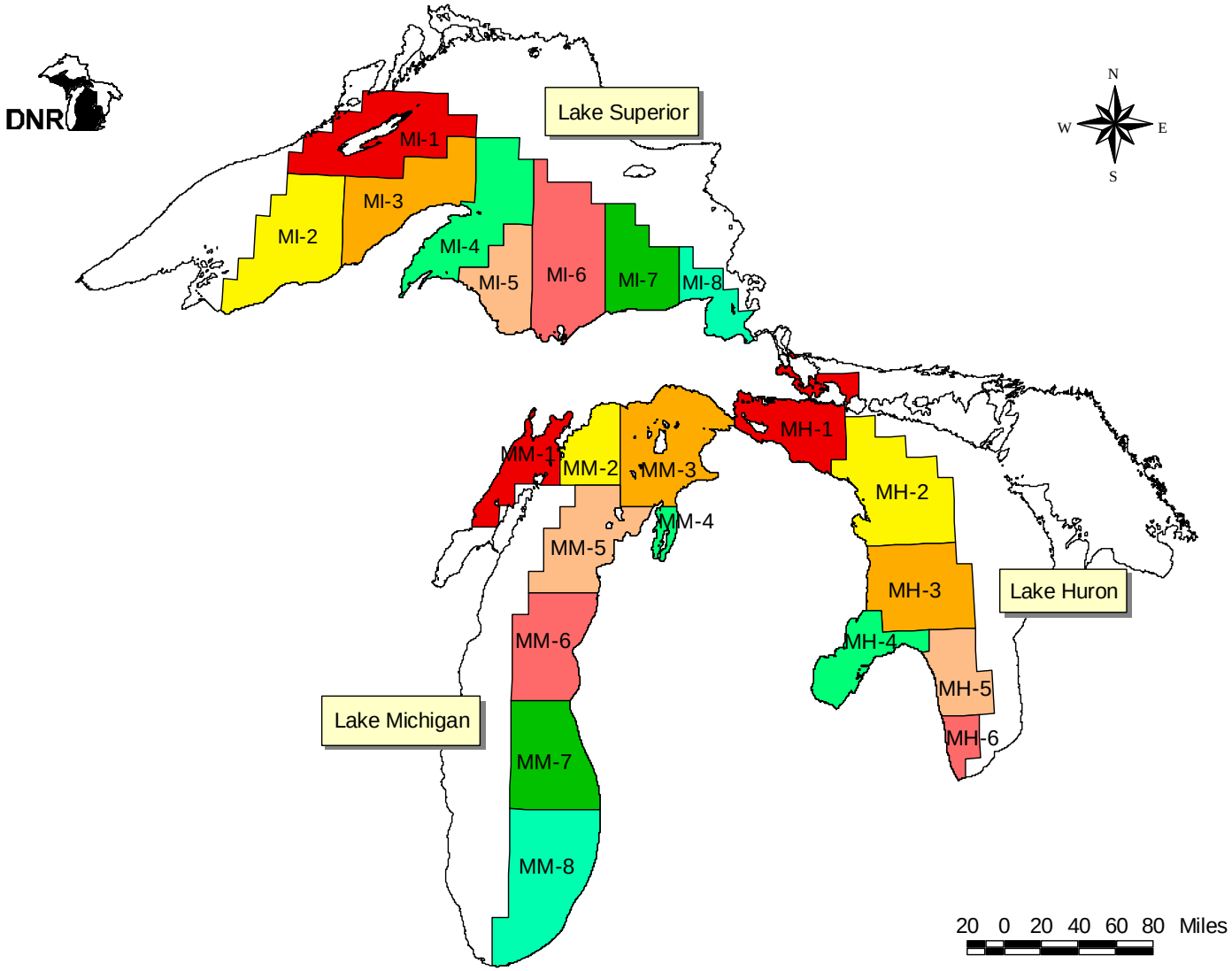

Figure 1. Lake Trout Management Units for Lakes Superior, Michigan and Huron.

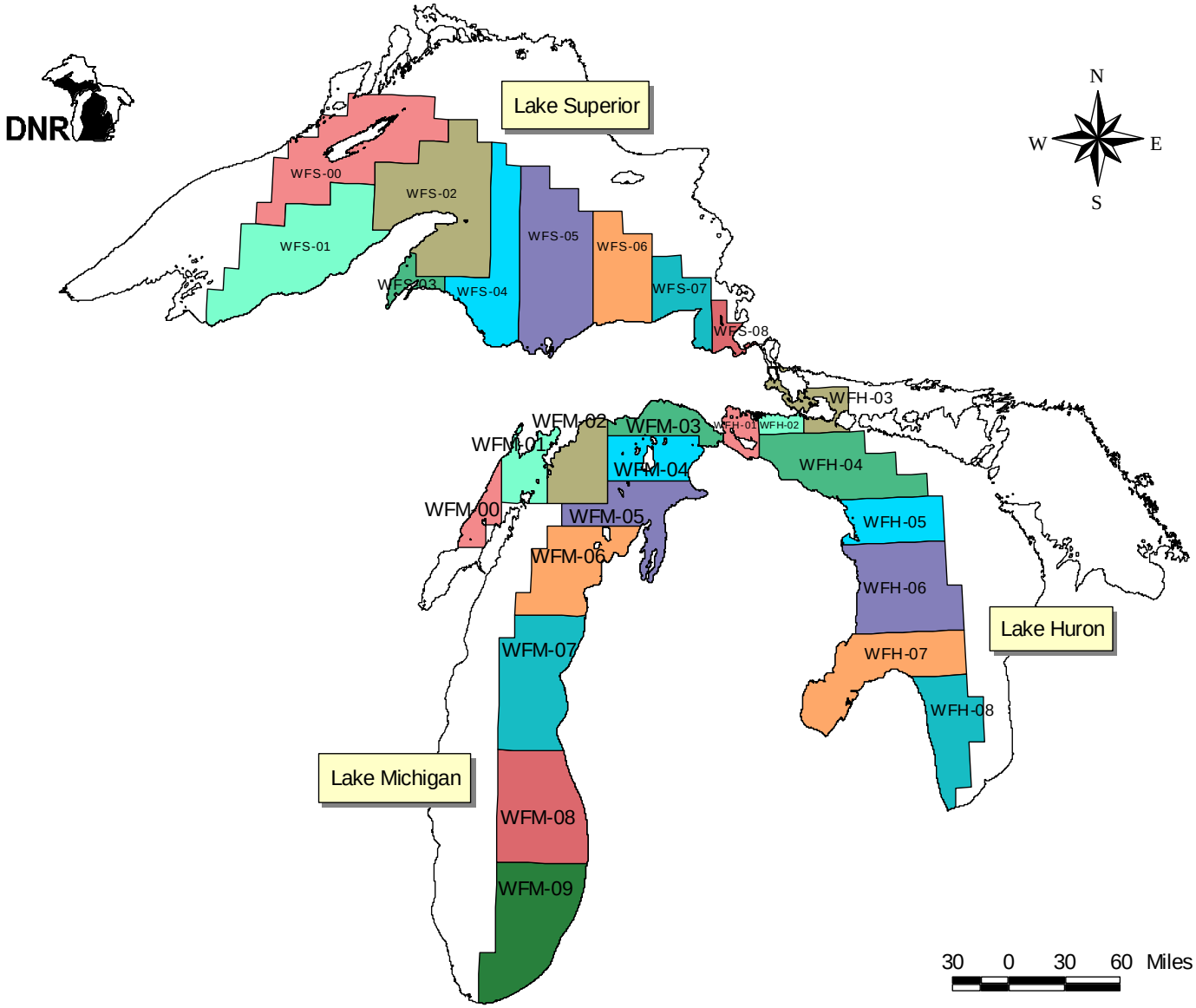

Figure 2. Lake Whitefish Management Units for Lakes Superior, Michigan and Huron.

Appendices

Appendix 1. Model estimates of harvest quota for lake trout by lake trout Management Unit in the 1836 Treaty-ceded waters of the Great Lakes as used during the final stages of negotiations.

Appendix 2. Model estimates of harvest quota for lake whitefish by whitefish Management Unit in the 1836 Treaty-ceded waters of the Great Lakes as used during the final stages of negotiations.

Apppendix 1. Lake Trout, Lake Huron, MH-1

Scenario =Effort-based, phase-in on commercial fishery from 2001 through 2005. Phase in a 24-in minimum size limit on sport fishery by 2005. 47% SSBR = 0.11
Extended phase-in of allocation percentages at 47% TAM from 2006 through 2011. Rehabiltation period at 45% TAM from 2012 through 2020. 45% SSBR = 0.13
Starting in 2002, stock 0.6 per acre of federal yearlings plus 100,000 MDNR yearlings. No change in Canadian commercial effort.

	Commercial (Tribal)				Recreational (State)							Lake trout population	
Year	Effort limit (million feet)	Harvest limit (pounds)	CPUE (pounds per million feet)	Percent of allowable harvest	Potential effort (hours)	Minimum size limit	Harvest limit (pounds)	CPUE (fish per 100 hours)	CPUE (pounds per 100 hours)	Average size (pounds)	Percent of allowable harvest	Female spawning biomass	SSBR
Reference Period													
1996	17.155	242,057	14,110	94%	116,026	10	15,869	4.0	13.7	3.4	6%		
1997	13.107	163,885	12,504	93%	124,637	10	12,665	2.8	10.2	3.6	7%		
1998	13.139	130,863	9,960	92%	129,874	10	11,939	2.3	9.2	4.0	8%	8,782	
Phase-in Period (Effort-Based for Commercial Fishery, Size Limit-Based for Recreational Fishery)													
2001	12.297	155,548	12,649	94%	123,512	20	9,400	2.0	7.6	3.8	6%	10,929	0.03
2002	7.957	112,004	14,077	91%	123,512	20	10,793	2.2	8.7	3.9	9%	15,974	0.04
2003	6.655	104,682	15,730	92%	123,512	22	9,141	1.8	7.4	4.1	8%	22,439	0.06
2004	5.787	107,177	18,521	91%	123,512	22	11,029	2.1	8.9	4.2	9%	30,473	0.09
2005	5.787	137,309	23,728	93%	123,512	24	9,919	1.9	8.0	4.2	7%	40,315	0.10
Extended Phase-in Period (TAM = 47%, Phase in of Allocation Percentages)													
2006	5.497	160,708	29,233	92%	135,864	24	13,934	2.4	10.3	4.3	8%	52,623	0.11
2007	5.931	196,919	33,199	92%	142,039	24	17,734	2.8	12.5	4.5	8%	67,344	0.11
2008	6.221	220,556	35,455	91%	148,215	24	21,113	3.1	14.2	4.6	9%	82,793	0.11
2009	6.365	233,171	36,631	91%	154,390	24	23,952	3.3	15.5	4.7	9%	96,081	0.11
2010	6.365	237,507	37,312	90%	154,390	24	25,410	3.4	16.5	4.8	10%	106,565	0.11
2011	6.510	245,712	37,743	90%	154,390	24	26,540	3.5	17.2	4.8	10%	114,382	0.11
Rehabilitation Period (TAM = 45%, Final Allocation - Tribal Share=88%, State Share=12%)													
2012	5.642	217,239	38,503	88%	158,096	24	28,378	3.7	18.0	4.9	12%	122,637	0.13
2013	5.642	223,029	39,530	88%	158,096	24	29,784	3.8	18.8	4.9	12%	130,495	0.13
2014	5.642	226,658	40,173	88%	158,096	24	30,920	3.9	19.6	5.0	12%	137,403	0.13
2015	5.787	234,045	40,445	88%	154,390	24	30,984	4.0	20.1	5.0	12%	142,788	0.13
2016	5.787	234,278	40,485	88%	154,390	24	31,483	4.0	20.4	5.0	12%	146,676	0.13
2017	5.787	234,257	40,482	88%	154,390	24	31,827	4.1	20.6	5.1	12%	149,351	0.13
2018	5.787	234,192	40,470	88%	154,390	24	32,069	4.1	20.8	5.1	12%	151,166	0.13
2019	5.787	234,147	40,463	88%	154,390	24	32,241	4.1	20.9	5.1	12%	152,418	0.13
2020	5.787	234,126	40,459	88%	154,390	24	32,364	4.1	21.0	5.1	12%	153,296	0.13

Appendix 1. Lake Trout, Lake Huron, MH-2

Scenario = Phase in a 24-in minimum size limit on sport fishery by 2005. Assume minimal subsistence fishing. 40% SSBR = 0.32
Assume sport fishing effort gradually increases by 25%. No change in Canadian commercial effort.

	Commercial (Tribal)				Recreational (State)							Lake trout population	
Year	Effort limit (million feet)	Harvest limit (pounds)	CPUE (pounds per million feet)	Percent of allowable harvest	Potential effort (hours)	Minimum size limit	Harvest limit (pounds)	CPUE (fish per 100 hours)	CPUE (pounds per 100 hours)	Average size (pounds)	Percent of allowable harvest	Female spawning biomass	SSBR
Reference Period													
1996	0.000	-	-	0%	213,906	10	45,841	5.1	21.4	4.2	100%		
1997	0.000	-	-	0%	212,802	10	53,203	6.1	25.0	4.1	100%		
1998	0.000	-	-	0%	157,710	10	41,558	5.9	26.4	4.5	100%	106,461	
Phase-in Period (Size Limit-Based for Recreational Fishery)													
2001	Subsistence	442	na	1%	194,806	20	47,517	5.7	24.4	4.3	99%	160,291	0.40
2002	Subsistence	333	na	1%	194,806	20	51,329	6.1	26.3	4.3	99%	193,286	0.35
2003	Subsistence	473	na	1%	214,287	22	44,672	4.3	20.8	4.9	99%	221,535	0.42
2004	Subsistence	608	na	1%	214,287	22	41,897	3.9	19.6	5.0	99%	248,990	0.51
2005	Subsistence	686	na	2%	233,767	24	33,975	2.9	14.5	5.1	98%	267,891	0.58
Rehabilitation Period (TAM = 40%)													
2006	Subsistence	816	na	2%	233,767	24	34,419	3.0	14.7	4.9	98%	282,713	0.64
2007	Subsistence	943	na	2%	243,508	24	38,251	3.2	15.7	4.9	98%	301,388	0.69
2008	Subsistence	991	na	2%	243,508	24	41,065	3.4	16.9	5.0	98%	325,931	0.73
2009	Subsistence	1,033	na	2%	243,508	24	43,311	3.5	17.8	5.0	98%	353,119	0.75
2010	Subsistence	1,076	na	2%	243,508	24	44,837	3.6	18.4	5.1	98%	380,032	0.78
2011	Subsistence	1,091	na	2%	243,508	24	45,872	3.7	18.8	5.1	98%	404,769	0.80
2012	Subsistence	1,102	na	2%	243,508	24	46,592	3.7	19.1	5.1	98%	426,678	1
2013	Subsistence	1,110	na	2%	243,508	24	47,098	3.8	19.3	5.2	98%	445,792	1
2014	Subsistence	1,115	na	2%	243,508	24	47,432	3.8	19.5	5.2	98%	461,963	0.82
2015	Subsistence	1,118	na	2%	243,508	24	47,635	3.8	19.6	5.2	98%	475,258	0.82
2016	Subsistence	1,119	na	2%	243,508	24	47,746	3.8	19.6	5.2	98%	485,903	0.82
2017	Subsistence	1,120	na	2%	243,508	24	47,803	3.8	19.6	5.2	98%	494,300	0.82
2018	Subsistence	1,120	na	2%	243,508	24	47,830	3.8	19.6	5.2	98%	500,853	0.82
2019	Subsistence	1,121	na	2%	243,508	24	47,842	3.8	19.6	5.2	98%	505,928	0.82
2020	Subsistence	1,121	na	2%	243,508	24	47,847	3.8	19.6	5.2	98%	509,839	0.82

Appendix 1. Lake Trout, Lake Michigan, MM-1/2/3

Scenario =Assume commercial effort and sport effort increases by 25%.
Maintain 24-inch size limit on sport fishery.

40% SSBR = 0.77
2006 SSBR = 0.98
2020 SSBR = 1.02

	Commercial (Tribal)				Recreational (State)							Lake trout population	
Year	Effort limit (million feet)	Harvest limit (pounds)	CPUE (pounds per million feet)	Percent of allowable harvest	Potential effort (hours)	Minimum size limit	Harvest limit (pounds)	CPUE (fish per 100 hours)	CPUE (pounds per 100 hours)	Average size (pounds)	Percent of allowable harvest	Female spawning biomass	SSBR
Reference Period													
1996	17.536	749,556	42,744	90%	103,045	24	80,837	13.1	78.4	6.0	10%		
1997	15.311	685,279	44,757	89%	124,056	24	87,450	11.0	70.5	6.4	11%		
1998	14.472	781,010	53,967	88%	135,878	24	110,251	12.1	81.1	6.7	12%		
Rehabilitation Period (TAM = 40%)													
2001	19.716	548,805	27,835	89%	151,241	24	67,589	6.4	44.7	7.0	11%		
2002	19.716	498,310	25,274	89%	151,241	24	60,877	5.9	40.3	6.8	11%		
2003	19.716	464,066	23,537	89%	151,241	24	56,730	5.6	37.5	6.7	11%		
2004	19.716	442,790	22,458	89%	151,241	24	54,102	5.4	35.8	6.6	11%		
2005	19.716	431,674	21,894	89%	151,241	24	52,243	5.3	34.5	6.5	11%		
2006	19.716	427,203	21,668	89%	151,241	24	51,318	5.3	33.9	6.4	11%		
2007	19.716	426,332	21,623	89%	151,241	24	51,056	5.3	33.8	6.4	11%		
2008	19.716	426,837	21,649	89%	151,241	24	51,030	5.3	33.7	6.4	11%		
2009	19.716	427,734	21,695	89%	151,241	24	51,101	5.3	33.8	6.4	11%		
2010	19.716	428,616	21,739	89%	151,241	24	51,244	5.3	33.9	6.4	11%		
2011	19.716	429,374	21,778	89%	151,241	24	51,374	5.3	34.0	6.4	11%		
2012	19.716	430,011	21,810	89%	151,241	24	51,460	5.3	34.0	6.4	11%		
2013	19.716	430,504	21,835	89%	151,241	24	51,530	5.3	34.1	6.4	11%		
2014	19.716	430,827	21,851	89%	151,241	24	51,582	5.3	34.1	6.4	11%		
2015	19.716	431,013	21,861	89%	151,241	24	51,613	5.3	34.1	6.4	11%		
2016	19.716	431,111	21,866	89%	151,241	24	51,630	5.3	34.1	6.4	11%		
2017	19.716	431,159	21,868	89%	151,241	24	51,639	5.3	34.1	6.4	11%		
2018	19.716	431,181	21,869	89%	151,241	24	51,644	5.3	34.1	6.4	11%		
2019	19.716	431,191	21,870	89%	151,241	24	51,646	5.3	34.1	6.4	11%		
2020	19.716	431,195	21,870	89%	151,241	24	51,647	5.3	34.1	6.4	11%		

Appendix 1. Lake Trout, Lake Michigan, MM-4

Scenario =Effort-based, phase-in on commercial fishery from 2001 through 2005. Phase in a 24-in minimum size limit on sport fishery by 2005. Forty-five percent TAM and 60/40 split from 2006 through 2009. Forty-five percent TAM and 55/45 split from 2010 through 2020.

45% SSBR = 0.40

	Commercial (Tribal)				Recreational (State)							Lake trout population	
Year	Effort limit (million feet)	Harvest limit (pounds)	CPUE (pounds per million feet)	Percent of allowable harvest	Potential effort (hours)	Minimum size limit	Harvest limit (pounds)	CPUE (fish per 100 hours)	CPUE (pounds per 100 hours)	Average size (pounds)	Percent of allowable harvest	Female spawning biomass	SSBR
Reference Period													
1996	2.260	112,637	49,840	78%	191,401	24	31,935	2.5	16.7	6.7	22%		
1997	1.776	109,354	61,573	59%	278,426	24	76,613	4.3	27.5	6.4	41%		
1998	1.556	160,063	102,868	52%	303,290	20	147,006	8.9	48.5	5.4	48%	149,532	
Effort-Based, Phase-in Period													
2001	1.864	129,753	69,610	64%	257,706	20	74,398	5.0	28.9	5.8	36%	124,666	
2002	1.268	93,833	74,029	54%	257,706	20	78,623	5.2	30.5	5.8	46%	135,249	
2003	1.268	100,951	79,645	59%	257,706	22	70,682	4.4	27.4	6.2	41%	149,413	
2004	1.268	105,272	83,054	58%	257,706	22	75,041	4.6	29.1	6.3	42%	159,232	
2005	1.268	108,645	85,714	64%	257,706	24	62,260	3.7	24.2	6.6	36%	167,267	
Rehabilitation Period (TAM = 45%, Tribal Share 60%, State Share 40%)													
2006	1.230	108,487	88,183	60%	288,630	24	72,421	3.8	25.1	6.6	40%	172,800	0.40
2007	1.230	110,259	89,624	60%	288,630	24	74,098	3.8	25.7	6.7	40%	176,541	0.40
2008	1.230	111,435	90,580	60%	288,630	24	75,202	3.9	26.1	6.7	40%	178,995	0.40
2009	1.230	112,146	91,158	60%	288,630	24	75,879	3.9	26.3	6.7	40%	180,579	0.40
Rehabilitation Period (TAM = 45%, Tribal Share 55%, State Share 45%)													
2010	1.156	105,649	91,417	55%	322,132	24	84,988	3.9	26.4	6.7	45%	180,988	0
2011	1.156	105,777	91,528	55%	322,132	24	85,063	3.9	26.4	6.8	45%	181,357	0
2012	1.156	105,888	91,624	55%	322,132	24	85,152	3.9	26.4	6.8	45%	181,706	0.40
2013	1.156	105,979	91,703	55%	322,132	24	85,237	3.9	26.5	6.8	45%	181,979	0.40
2014	1.156	106,046	91,760	55%	322,132	24	85,299	3.9	26.5	6.8	45%	182,169	0.40
2015	1.156	106,087	91,796	55%	322,132	24	85,339	3.9	26.5	6.8	45%	182,294	0.40
2016	1.156	106,111	91,817	55%	322,132	24	85,363	3.9	26.5	6.8	45%	182,370	0.40
2017	1.156	106,125	91,829	55%	322,132	24	85,377	3.9	26.5	6.8	45%	182,417	0.40
2018	1.156	106,133	91,836	55%	322,132	24	85,384	3.9	26.5	6.8	45%	182,444	0.40
2019	1.156	106,137	91,839	55%	322,132	24	85,387	3.9	26.5	6.8	45%	182,462	0.40
2020	1.156	106,139	91,841	55%	322,132	24	85,388	3.9	26.5	6.8	45%	182,473	0.40

Appendix 1. Lake Trout, Lake Michigan, MM-5

Scenario =Assume sport effort increases by 25% and commercial effort is controlled by harvest limit.
Phase in a 24-in minimum size limit on sport fishery by 2005.

45% SSBR = 0.29

	Commercial (Tribal)				Recreational (State)							Lake trout population	
Year	Effort limit (million feet)	Harvest limit (pounds)	CPUE (pounds per million feet)	Percent of allowable harvest	Potential effort (hours)	Minimum size limit	Harvest limit (pounds)	CPUE (fish per 100 hours)	CPUE (pounds per 100 hours)	Average size (pounds)	Percent of allowable harvest	Female spawning biomass	SSBR
Reference Period													
1996	0.215	40,965	190,533	32%	323,133	10	86,964	4.8	26.9	5.6	68%		
1997	0.332	75,478	227,344	53%	332,193	10	68,233	3.7	20.5	5.6	47%		
1998	0.487	47,996	98,555	35%	363,157	10	88,251	4.0	24.3	6.1	65%	131,889	
Rehabilitation Period (TAM = 45%)													
2001	0.312	45,876	147,075	42%	339,494	22	62,179	2.7	18.3	6.8	58%	134,820	
2002	0.312	46,579	149,329	43%	339,494	22	62,814	2.7	18.5	6.8	57%	136,008	
2003	0.314	47,028	149,939	42%	339,494	22	63,776	2.8	18.8	6.8	58%	138,536	
2004	0.324	48,156	148,635	43%	339,494	22	64,003	2.7	18.9	6.9	57%	139,226	
2005	0.362	53,498	147,825	46%	339,494	24	63,763	2.7	18.8	6.9	54%	139,419	
2006	0.334	49,753	148,817	49%	339,494	24	52,693	2.2	15.5	7.2	51%	141,429	0.33
2007	0.327	48,998	149,644	46%	373,444	24	58,473	2.2	15.7	7.2	54%	142,217	0.32
2008	0.321	47,909	149,463	43%	407,393	24	63,678	2.2	15.6	7.2	57%	141,596	0.32
2009	0.324	48,146	148,604	42%	424,368	24	65,757	2.2	15.5	7.2	58%	140,282	0.31
2010	0.326	48,145	147,815	42%	424,368	24	65,281	2.1	15.4	7.2	58%	139,378	0.31
2011	0.327	48,250	147,358	43%	424,368	24	64,969	2.1	15.3	7.2	57%	138,840	0.31
2012	0.327	48,176	147,133	43%	424,368	24	64,790	2.1	15.3	7.1	57%	138,578	0.31
2013	0.331	48,636	146,991	43%	424,368	24	64,678	2.1	15.2	7.1	57%	138,358	0.31
2014	0.331	48,594	146,864	43%	424,368	24	64,594	2.1	15.2	7.1	57%	138,195	0.31
2015	0.331	48,570	146,792	43%	424,368	24	64,538	2.1	15.2	7.1	57%	138,088	0.31
2016	0.331	48,557	146,752	43%	424,368	24	64,504	2.1	15.2	7.1	57%	138,021	0.31
2017	0.331	48,550	146,731	43%	424,368	24	64,485	2.1	15.2	7.1	57%	137,980	0.31
2018	0.331	48,547	146,719	43%	424,368	24	64,474	2.1	15.2	7.1	57%	137,956	0.31
2019	0.331	48,545	146,714	43%	424,368	24	64,468	2.1	15.2	7.1	57%	137,941	0.31
2020	0.331	48,544	146,711	43%	424,368	24	64,465	2.1	15.2	7.1	57%	137,932	0.31

Appendix 1. Lake Trout, Lake Michigan, MM-6/7

Scenario =Assume minimal subsistence fishing. Assume sport effort increases by 25%.

40% SSBR = 0.63
2006 SSBR = 1.13
2020 SSBR = 1.13

	Commercial (Tribal)				Recreational (State)							Lake trout population	
Year	Effort limit (million feet)	Harvest limit (pounds)	CPUE (pounds per million feet)	Percent of allowable harvest	Potential effort (hours)	Minimum size limit	Harvest limit (pounds)	CPUE (fish per 100 hours)	CPUE (pounds per 100 hours)	Average size (pounds)	Percent of allowable harvest	Female spawning biomass	SSBR
Reference Period													
1996	0.000	-	-	0%	1,137,475	10	155,230	2.8	13.6	4.9	100%		
1997	0.000	-	-	0%	1,321,468	10	183,520	2.4	13.9	5.9	100%		
1998	0.000	-	-	0%	1,359,033	10	254,120	3.6	18.7	5.2	100%		
Rehabilitation Period (TAM = 40%)													
2001	Subsistence	4,265	na	1%	1,590,823	10	319,710	3.1	20.1	6.6	99%		
2002	Subsistence	4,172	na	1%	1,590,823	10	311,448	2.9	19.6	6.7	99%		
2003	Subsistence	4,000	na	1%	1,590,823	10	295,197	2.8	18.6	6.7	99%		
2004	Subsistence	3,842	na	1%	1,590,823	10	279,365	2.6	17.6	6.8	99%		
2005	Subsistence	3,657	na	1%	1,590,823	10	264,016	2.5	16.6	6.7	99%		
2006	Subsistence	3,548	na	1%	1,590,823	10	254,767	2.4	16.0	6.6	99%		
2007	Subsistence	3,426	na	1%	1,590,823	10	247,308	2.4	15.5	6.6	99%		
2008	Subsistence	3,358	na	1%	1,590,823	10	243,548	2.3	15.3	6.5	99%		
2009	Subsistence	3,314	na	1%	1,590,823	10	241,364	2.3	15.2	6.5	99%		
2010	Subsistence	3,290	na	1%	1,590,823	10	240,417	2.3	15.1	6.5	99%		
2011	Subsistence	3,276	na	1%	1,590,823	10	239,902	2.3	15.1	6.5	99%		
2012	Subsistence	3,271	na	1%	1,590,823	10	239,698	2.3	15.1	6.5	99%		
2013	Subsistence	3,270	na	1%	1,590,823	10	239,602	2.3	15.1	6.5	99%		
2014	Subsistence	3,270	na	1%	1,590,823	10	239,550	2.3	15.1	6.5	99%		
2015	Subsistence	3,269	na	1%	1,590,823	10	239,513	2.3	15.1	6.5	99%		
2016	Subsistence	3,269	na	1%	1,590,823	10	239,486	2.3	15.1	6.5	99%		
2017	Subsistence	3,269	na	1%	1,590,823	10	239,466	2.3	15.1	6.5	99%		
2018	Subsistence	3,269	na	1%	1,590,823	10	239,452	2.3	15.1	6.5	99%		
2019	Subsistence	3,269	na	1%	1,590,823	10	239,442	2.3	15.1	6.5	99%		
2020	Subsistence	3,269	na	1%	1,590,823	10	239,434	2.3	15.1	6.5	99%		

Appendix 1. Lake Trout, Lake Superior, MI-5

Scenario = Assume minimal subsistence fishing. Assume sport fishing effort increases by 20%.

45% SSBR = 0.37
2006 SSBR = 1.06
2020 SSBR = 1.06

	Commercial (Tribal)				Recreational (State)							Lake trout population	
Year	Effort limit (million feet)	Harvest limit (pounds)	CPUE (pounds per million feet)	Percent of allowable harvest	Potential effort (hours)	Minimum size limit	Harvest limit (pounds)	CPUE (fish per 100 hours)	CPUE (pounds per 100 hours)	Average size (pounds)	Percent of allowable harvest	Female spawning biomass	SSBR
Reference Period													
1996	0.000	-	-	-	61,750	10	55,409	18.1	89.7	4.9	100%		
1997	0.000	-	-	-	72,922	10	72,385	20.7	99.3	4.8	100%		
1998	0.000	-	-	-	54,612	10	57,867	21.6	106.0	4.9	100%		
Sustainable Management Period (TAM = 45%)													
2001	Subsistence	2,041	na	4%	75,714	10	51,914	17.7	68.6	3.9	96%		
2002	Subsistence	1,949	na	4%	75,714	10	50,787	17.6	67.1	3.8	96%		
2003	Subsistence	1,902	na	4%	75,714	10	51,977	18.1	68.6	3.8	96%		
2004	Subsistence	1,913	na	4%	75,714	10	52,448	18.2	69.3	3.8	96%		
2005	Subsistence	1,908	na	4%	75,714	10	51,677	17.9	68.3	3.8	96%		
2006	Subsistence	1,908	na	4%	75,714	10	51,174	17.7	67.6	3.8	96%		
2007	Subsistence	1,893	na	4%	75,714	10	50,873	17.6	67.2	3.8	96%		
2008	Subsistence	1,883	na	4%	75,714	10	50,750	17.6	67.0	3.8	96%		
2009	Subsistence	1,882	na	4%	75,714	10	50,713	17.6	67.0	3.8	96%		
2010	Subsistence	1,878	na	4%	75,714	10	50,647	17.6	66.9	3.8	96%		
2011	Subsistence	1,875	na	4%	75,714	10	50,614	17.6	66.8	3.8	96%		
2012	Subsistence	1,875	na	4%	75,714	10	50,614	17.6	66.8	3.8	96%		
2013	Subsistence	1,875	na	4%	75,714	10	50,614	17.6	66.8	3.8	96%		
2014	Subsistence	1,875	na	4%	75,714	10	50,614	17.6	66.8	3.8	96%		
2015	Subsistence	1,875	na	4%	75,714	10	50,614	17.6	66.8	3.8	96%		
2016	Subsistence	1,875	na	4%	75,714	10	50,614	17.6	66.8	3.8	96%		
2017	Subsistence	1,875	na	4%	75,714	10	50,614	17.6	66.8	3.8	96%		
2018	Subsistence	1,875	na	4%	75,714	10	50,614	17.6	66.8	3.8	96%		
2019	Subsistence	1,875	na	4%	75,714	10	50,614	17.6	66.8	3.8	96%		
2020	Subsistence	1,875	na	4%	75,714	10	50,614	17.6	66.8	3.8	96%		

Appendix 1. Lake Trout, Lake Superior, MI-6

Scenario =Effort-based, phase-in on commercial fishery from 2001 through 2005. Phase in a 22-in minimum size limit on sport fishery by 2005.
Adjust commercial and sport effort to achieve a 50/50 split from 2006 through 2020.

45% SSBR = 0.24
2006 SSBR = 0.24
2020 SSBR = 0.24

	Commercial (Tribal)				Recreational (State)							Lake trout population	
Year	Effort limit (million feet)	Harvest limit (pounds)	CPUE (pounds per million feet)	Percent of allowable harvest	Potential effort (hours)	Minimum size limit	Harvest limit (pounds)	CPUE (fish per 100 hours)	CPUE (pounds per 100 hours)	Average size (pounds)	Percent of allowable harvest	Female spawning biomass	SSBR
Reference Period													
1996	0.820	17,322	21,130	47%	35,370	10	19,256	12.0	54.4	4.5	53%		
1997	0.452	20,107	44,496	48%	42,493	10	21,819	11.6	51.3	4.4	52%		
1998	0.879	19,604	22,308	48%	38,157	10	21,439	12.6	56.2	4.4	52%		
Phase-in Period (Effort-Based for Commercial Fishery, Size Limit-Based for Recreational Fishery)													
2001	0.717	10,942	15,265	51%	46,408	20	10,458	5.8	22.5	3.9	49%		
2002	0.681	10,920	16,035	50%	46,408	20	10,752	6.1	23.2	3.8	50%		
2003	0.638	10,532	16,508	48%	46,408	20	11,203	6.3	24.1	3.8	52%		
2004	0.638	10,034	15,728	51%	46,408	22	9,705	5.4	20.9	3.9	49%		
2005	0.638	10,267	16,093	50%	46,408	22	10,142	5.6	21.9	3.9	50%		
Sustainable Management Period (TAM = 45%)													
2006	0.638	10,632	16,666	50%	46,408	22	10,442	5.8	22.5	3.9	50%		
2007	0.638	10,706	16,782	50%	46,408	22	10,644	5.9	22.9	3.9	50%		
2008	0.638	10,742	16,838	50%	46,408	22	10,758	5.9	23.2	3.9	50%		
2009	0.638	10,757	16,861	50%	46,408	22	10,805	5.9	23.3	3.9	50%		
2010	0.638	10,762	16,870	50%	46,408	22	10,826	6.0	23.3	3.9	50%		
2011	0.638	10,765	16,873	50%	46,408	22	10,835	6.0	23.3	3.9	50%		
2012	0.638	10,765	16,874	50%	46,408	22	10,838	6.0	23.4	3.9	50%		
2013	0.638	10,765	16,875	50%	46,408	22	10,839	6.0	23.4	3.9	50%		
2014	0.638	10,765	16,875	50%	46,408	22	10,839	6.0	23.4	3.9	50%		
2015	0.638	10,765	16,875	50%	46,408	22	10,839	6.0	23.4	3.9	50%		
2016	0.638	10,765	16,875	50%	46,408	22	10,839	6.0	23.4	3.9	50%		
2017	0.638	10,765	16,875	50%	46,408	22	10,839	6.0	23.4	3.9	50%		
2018	0.638	10,765	16,875	50%	46,408	22	10,839	6.0	23.4	3.9	50%		
2019	0.638	10,765	16,875	50%	46,408	22	10,839	6.0	23.4	3.9	50%		
2020	0.638	10,765	16,875	50%	46,408	22	10,839	6.0	23.4	3.9	50%		

Appendix 1. Lake Trout, Lake Superior, MI-7

Scenario =Assume commercia effort and sport effort increases by 20%.

45% SSBR = 0.20
2006 SSBR = 0.53
2020 SSBR = 0.53

	Commercial (Tribal)				Recreational (State)							Lake trout population	
Year	Effort limit (million feet)	Harvest limit (pounds)	CPUE (pounds per million feet)	Percent of allowable harvest	Potential effort (hours)	Minimum size limit	Harvest limit (pounds)	CPUE (fish per 100 hours)	CPUE (pounds per 100 hours)	Average size (pounds)	Percent of allowable harvest	Female spawning biomass	SSBR
Reference Period													
1996	1.047	23,450	22,403	69%	14,872	10	10,712	13.9	72.0	5.2	31%		
1997	3.400	41,499	12,207	78%	17,563	10	11,802	14.4	67.2	4.7	22%		
1998	3.010	27,299	9,069	74%	13,153	10	9,665	16.0	73.5	4.6	26%		
Sustainable Management Period (TAM = 45%)													
2001	2.983	48,045	16,108	69%	18,235	10	21,153	32.2	116.0	3.6	31%		
2002	2.983	51,486	17,262	73%	18,235	10	19,451	27.9	106.7	3.8	27%		
2003	2.983	54,064	18,126	72%	18,235	10	20,745	29.6	113.8	3.8	28%		
2004	2.983	55,313	18,545	72%	18,235	10	21,470	30.5	117.7	3.9	28%		
2005	2.983	55,700	18,674	72%	18,235	10	21,684	30.7	118.9	3.9	28%		
2006	2.983	55,934	18,753	72%	18,235	10	21,722	30.7	119.1	3.9	28%		
2007	2.983	55,986	18,770	72%	18,235	10	21,686	30.6	118.9	3.9	28%		
2008	2.983	55,935	18,753	72%	18,235	10	21,636	30.6	118.7	3.9	28%		
2009	2.983	55,931	18,752	72%	18,235	10	21,610	30.5	118.5	3.9	28%		
2010	2.983	55,827	18,717	72%	18,235	10	21,577	30.5	118.3	3.9	28%		
2011	2.983	55,773	18,699	72%	18,235	10	21,564	30.5	118.3	3.9	28%		
2012	2.983	55,773	18,699	72%	18,235	10	21,564	30.5	118.3	3.9	28%		
2013	2.983	55,773	18,699	72%	18,235	10	21,564	30.5	118.3	3.9	28%		
2014	2.983	55,773	18,699	72%	18,235	10	21,564	30.5	118.3	3.9	28%		
2015	2.983	55,773	18,699	72%	18,235	10	21,564	30.5	118.3	3.9	28%		
2016	2.983	55,773	18,699	72%	18,235	10	21,564	30.5	118.3	3.9	28%		
2017	2.983	55,773	18,699	72%	18,235	10	21,564	30.5	118.3	3.9	28%		
2018	2.983	55,773	18,699	72%	18,235	10	21,564	30.5	118.3	3.9	28%		
2019	2.983	55,773	18,699	72%	18,235	10	21,564	30.5	118.3	3.9	28%		
2020	2.983	55,773	18,699	72%	18,235	10	21,564	30.5	118.3	3.9	28%		

Appendix 2. Model estimates of harvest quota for lake whitefish by whitefish Management Unit in 1836 Treaty-ceded waters of the Great Lakes as used during the final stages of negotiations.

Total harvest (lb) for whitefish in Lake Michigan whitefish management units (WFMU) for 1999-2020 with target mortality rate used in the unit.

	Whitefish Management Unit								State share		
Year and TAM used[1]	WFM-00 65%	WFM-01 59%	WFM-02 65%	WFM-03 85%	WFM-04 65%	WFM-05 60%	WFM-06 65%	WFM-08 65%	WFM-01 200K or 10%	WFM-06 65 K or 30%	WFM-08 500 K or 22.5%
1999	1,420,742	477,853	211,960	1,223,717	332,021	170,017	140,976	416,853	47,785	42,293	93,792
2000	1,216,222	847,198	173,320	1,203,052	306,771	158,806	322,036	415,147	84,720	96,611	93,408
2001	1,323,355	659,310	143,700	2,397,616	577,825	258,313	551,763	2,551,846	65,931	165,529	574,165
2002	1,272,192	854,887	188,129	1,686,142	565,289	241,118	349,487	1,676,415	85,489	104,846	377,193
2003	1,250,747	960,488	225,231	1,524,416	558,347	233,733	249,959	1,312,155	96,049	74,988	295,235
2004	1,242,439	1,013,997	244,311	1,493,578	557,877	228,845	212,595	1,168,241	101,400	63,778	262,854
2005	1,239,875	1,040,501	251,961	1,488,065	558,631	226,743	185,382	1,113,252	104,050	55,615	250,482
2006	1,238,931	1,052,527	254,740	1,487,144	558,703	226,041	176,252	1,092,576	105,253	52,876	245,830
2007	1,238,597	1,057,639	255,718	1,486,992	558,715	225,646	173,390	1,085,045	105,764	52,017	244,135
2008	1,238,481	1,059,745	256,060	1,486,967	558,720	225,517	172,086	1,082,351	105,974	51,626	243,529
2009	1,238,440	1,060,612	256,180	1,486,963	558,721	225,454	171,622	1,081,402	106,061	51,487	243,316
2010	1,238,426	1,060,969	256,221	1,486,963	558,722	225,425	171,457	1,081,070	106,097	51,437	243,241
2011	1,238,421	1,061,116	256,236	1,486,963	558,722	225,413	171,399	1,080,954	106,112	51,420	243,215
2012	1,238,419	1,061,177	256,241	1,486,963	558,722	225,408	171,378	1,080,913	106,118	51,413	243,205
2013	1,238,418	1,061,202	256,243	1,486,963	558,722	225,406	171,371	1,080,899	106,120	51,411	243,202
2014	1,238,418	1,061,212	256,244	1,486,963	558,722	225,405	171,368	1,080,894	106,121	51,410	243,201
2015	1,238,418	1,061,216	256,244	1,486,963	558,722	225,405	171,367	1,080,892	106,122	51,410	243,201
2016	1,238,418	1,061,218	256,244	1,486,963	558,722	225,405	171,367	1,080,891	106,122	51,410	243,201
2017	1,238,418	1,061,219	256,244	1,486,963	558,722	225,405	171,367	1,080,891	106,122	51,410	243,201
2018	1,238,418	1,061,219	256,244	1,486,963	558,722	225,405	171,367	1,080,891	106,122	51,410	243,201
2019	1,238,418	1,061,219	256,244	1,486,963	558,722	225,405	171,367	1,080,891	106,122	51,410	243,201
2020	1,238,418	1,061,219	256,244	1,486,963	558,722	225,405	171,367	1,080,891	106,122	51,410	243,201

[1] Rule 4 is to increase total mortality on fully vulnerable age class to 65% (Z=1.05) by increasing fishing mortality unless resulting SPR_T (Spawning potential reduction target) is less than 0.20. If SPR_T is less than 0.20, find fishing multiplier that produces SPR = 0.20

Total harvest (lb) for whitefish in Lake Superior whitefish management units (WFMU) for 1999-2020 with target mortality rate used in the unit.

	Whitefish Management Unit					State share	
Year and	WFS-04	WFS-05	WFS-06	WFS-07	WFS-08	WFS-04	WFS-05
TAM used[1]	55%	45%	37%	50%	65%	25K or 10%	130K or16%
1999	88,491	292,112	43,385	537,861	84,866	8,849	46,738
2000	91,340	371,008	47,114	500,323	71,839	9,134	59,361
2001	377,091	933,264	51,617	494,649	91,306	37,709	149,322
2002	274,538	759,312	59,577	512,639	90,299	27,454	121,490
2003	218,928	649,591	63,922	524,201	88,975	21,893	103,935
2004	187,843	572,498	66,031	527,126	87,994	18,784	91,600
2005	170,289	520,142	65,871	528,551	87,782	17,029	83,223
2006	159,891	482,461	66,672	530,220	87,766	15,989	77,194
2007	153,869	455,046	67,823	531,271	87,749	15,387	72,807
2008	150,655	438,522	69,009	531,932	87,741	15,065	70,164
2009	148,957	428,585	70,084	532,349	87,739	14,896	68,574
2010	148,061	422,612	70,994	532,611	87,738	14,806	67,618
2011	147,589	419,021	71,731	532,776	87,737	14,759	67,043
2012	147,339	416,863	72,311	532,880	87,737	14,734	66,698
2013	147,208	415,565	72,759	532,945	87,737	14,721	66,490
2014	147,138	414,785	73,098	532,986	87,737	14,714	66,366
2015	147,102	414,316	73,352	533,012	87,737	14,710	66,291
2016	147,082	414,034	73,540	533,028	87,737	14,708	66,246
2017	147,072	413,865	73,678	533,038	87,737	14,707	66,218
2018	147,067	413,763	73,779	533,045	87,737	14,707	66,202
2019	147,064	413,702	73,852	533,049	87,737	14,706	66,192
2020	147,062	413,665	73,905	533,052	87,737	14,706	66,186

[1] Rule 4 is to increase total mortality on fully vulnerable age class to 65% (Z=1.05) by increasing fishing mortality unless resulting SPR_T (Spawning potential reduction target) is less than 0.20. If SPR_T us less than 0.20, find fishing multiplier that produces SPR = 0.20

Total harvest (lb) for whitefish in Lake Huron whitefish management units (WFMU) for 1999-2020 with target mortality rate used in the unit.

	Whitefish Management Unit					
Year and	WFH-01	WFH-02	WFH-03	WFH-04	WFH-05	WFH-06
TAM used[1]	65%	70%	No calc. done	65%	69%	No calc. done
1999	237,307	315,624		340,484	250,148	
2000	195,682	214,094		228,570	182,076	
2001	285,004	158,729		411,601	617,497	
2002	378,113	248,742		619,347	509,433	
2003	437,870	350,847		761,713	659,455	
2004	463,261	399,800		814,900	760,598	
2005	473,617	417,069		839,083	804,087	
2006	480,374	425,623		849,366	821,098	
2007	484,221	429,558		854,654	829,495	
2008	486,605	431,799		857,813	834,510	
2009	488,126	433,219		859,812	837,768	
2010	489,158	434,199		861,181	840,039	
2011	489,908	434,930		862,198	841,732	
2012	490,444	435,461		862,930	842,962	
2013	490,810	435,829		863,429	843,820	
2014	491,033	436,053		863,727	844,350	
2015	491,153	436,170		863,878	844,634	
2016	491,210	436,223		863,944	844,767	
2017	491,236	436,244		863,971	844,822	
2018	491,247	436,252		863,981	844,843	
2019	491,253	436,254		863,985	844,850	
2020	491,255	436,255		863,986	844,852	

[1] Rule 4 is to increase total mortality on fully vulnerable age class to 65% (Z=1.05) by increasing fishing mortality unless resulting SPR_T (Spawning potential reduction target) is less than 0.20. If SPR_T is less than 0.20, find fishing multiplier that produces SPR = 0.20