2013 Annual Report on Implementation of the 2000 Consent Decree for 1836 Treaty-Ceded Waters of the Great Lakes

Prepared for:

Michigan United Conservation Clubs, Inc.

Michigan Fisheries Resource Conservation Coalition

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By:
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Table of Contents

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 2013, 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 2013 the tribal gill-net effort in lakes Michigan and Huron was still approximately 18.2 million feet less than the 1993-1998 average (Table 1). In Lake Superior the new fishing operation that moved into MI-6 in 2012 continued in 2013, which resulted in more gill-net effort than the 1993-1998 average. For all three lakes, gill-net effort was approximately 23 million feet less in 2013 compared to the 1993-1998 average.

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 2013.

Lake	Management Unit	Effort		2013 reduction[b]
		1993-98[a]	2013	
Michigan	MM-123	17,912	10,480	7,432
	MM-4	1,794	715	1,079
	MM-5	240	37	203
Huron	MH-1	16,470	7,003	9,467
	MH-2	6	0	6
Superior	MI-6	780	1,223	0 (443 increase)
	MI-7	2,028	956	1,072
	MI-8	6,578	2,405	4,173
Totals		45,808	22,819	22,989

[a] Average annual effort during base years.
[b] The relative reduction in 2013 (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 2013 was completed in August 2013. 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**.** The TFC approved changes to the format of this report, which were implemented in 2013. The report has been streamlined, eliminating some duplicative information, which allowed the report to be completed by August of the fishing year.

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 ongoing 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 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.

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 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 2013, stipulations to the Consent Decree set harvest limits in MM-123, MM-4, and MM-5. These stipulations have been in place for more than 5 years and are the result of high levels of lamprey-induced mortality on lake trout, which would otherwise severely restrict all lake trout fishing. The stipulation for MM-5 had not been used since its signing, because the model estimated harvest limits were higher than the stipulated levels; however, in 2013 the model provided lower harvest limits than the stipulation, which triggered the stipulated harvest limits.

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 2013, this rule was only applied in MH-1. The changes to the model structure made some Parties uncomfortable with the magnitude of the model's increase in recommended harvest limit, and the limit was set 15% higher than the 2012 value. In two units, the TFC agreed to waive the 15% rule. In MH-2, the model declined by more than 15%, and the TFC agreed to establish the lower harvest limit, as the model had undergone structural changes and the MSC believed it better reflected the actual stock. In MI-6, the TFC adopted the model generated harvest limit which was 19% higher than the previous year. A map of the lake trout management units is provided at the end of this document (Figure 1), and the 2013 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 2013 fishing season.

		Model-output HLs		Final HLs		
Lake	Unit	State	Tribal	State	Tribal	Tribal TAE
Michigan	MM-123[a]	0	0	50,000	453,000	15,729,000
	MM-4[a]	41,263	50,433	77,200	100,653	1,248,000
	MM-5[a]	40,340	26,874	58,800	39,200	192,000
	MM-67	418,745	46,527	418,745	46,527	NA
Huron	MH-1[b]	58,220	426,943	56,580	414,920	13,100,000
	MH-2	125,637	5,554	125,637	5,554	NA
Superior	MI-5	127,557	5,639	127,557	5,639	NA
	MI-6	81,274	81,274	81,274	81,274	4,131,000
	MI-7	22,197	51,793	22,197	51,793	2,988,000

[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 2012 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 2012. A map of lake whitefish management units is provided at the end of this document (Figure 2), and the 2013 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) maintained its constant harvest limit which was first established in 2011. The Muskegon unit (WFM-08) was added to the list of units with a constant harvest limit beginning in 2013. The TFC established a limit of 1,400,000 lb, which will be established as the limit each year, unless biological parameters indicate a population decline that warrants a reduction in fishing effort. In WFM-01, the TFC agreed to a

limit of 2 million lb, despite the model estimating a limit of 1.7 million lb. The model structure had changed and the estimated harvest limit had dropped substantially from 2012. The TFC wanted to track the model for a few years to see if the declines were real, or an artifact of the new model structure. In non-shared units with HRGs, the process of modeling all of Northern Lake Huron as one unit, which began in 2010, continued in 2013. Individual HRGs were not set for the four individual units in Northern Lake Huron, but the model output was considered and a single HRG was set for the newly created management unit. The final tribal HRG in this unit was set higher than the model, as the tribes were concerned with the magnitude of the model reduction; however, the adopted HRG was 10% lower than the 2012 value. In two other non-shared management units, the MSC could not calculate a recommended harvest limit using SCAA models. In WFM-07 there continues to be an insufficient time series of data. In 2004, the HRG for WFM-07 was set at 500,000 lb, which represented the approximate average of the model-generated harvest limits from adjacent units WFM-06 and WFM-08, and no changes have been made since. In unit WFS-06 a lack of commercial catch sampling has resulted in poor model performance; thus, the 2013 HRG was again set at 210,000 lb, the same level it has been since 2004. 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 2013 fishing season.

Lake	Unit	Final State HL	Model output Tribal HL	Final Tribal HL or HRG
Michigan	WFM-01	200,000	-	1,800,000
	WFM-02	-	494,700	494,700
	WFM-03	-	1,598,500	1,598,500
	WFM-04	-	634,000	634,000
	WFM-05	-	365,000	365,000
	WFM-06	65,000	-	145,000
	WFM-07[a]	-	-	500,000
	WFM-08	500,000	-	900,000
Huron	(H01-H04 Combined)		356,400	485,730
	WFH-05	-	768,300	768,300
Superior	WFS-04	11,200	100,800	100,800
	WFS-05	69,900	367,100	367,100
	WFS-06[a]	-	-	210,000
	WFS-07	-	376,900	376,900
	WFS-08	-	262,600	262,600

[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. These fish were added to the weight of lake trout harvested in the recreational fishery (Table 4). Lake trout harvest by sport anglers in 2013 was below harvest limits in all management units except for MM-4, where, after accounting for hooking mortality, state fishers exceeded the harvest limit by 649 lb, not high enough to trigger a penalty under the terms of the Consent Decree. Estimated State-licensed recreational harvest of walleye, yellow perch, and Chinook and Coho salmon are also 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 2013 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	286,424	5,362	25,041	8,172	23,290	56,713	17,581	6,849	89,722	405	1,608
	MM-4	148,248	15,471	73,178	59	168	1,767	548	5,518	83,322	249	989
	MM-5	177,675	7,661	58,224	19	54	0	0	24,489	352,642	5,467	40,073
	MM-67	589,356	6,444	52,841	47	134	60,252	29,523	61,396	810,427	19,702	132,003
Totals		1,201,703	34,938	209,283	8,297	23,646	118,732	47,652	98,252	1,336,113	25,823	174,673
Huron	MH-1	218,283	3,272	16,229	6,566	11,819	143,030	54,351	7,440	71,126	56	179
	MH-2	66,039	3,055	21,446	4,588	16,242	1,205	277	1,283	10,931	50	235
Totals		284,322	6,327	37,675	11,154	28,060	144,235	54,629	8,723	82,058	106	414
Superior	MI-5[b]	45,778	11,427	42,851	0	0	0	0	493	1,883	3,806	6,813
	MI-6	47,627	4,369	17,826	0	0	911	237	1,040	5,148	3,167	6,397
	MI-7	19,345	2,676	9,500	0	0	0	0	11	42	1,336	2,766
Totals		112,750	18,472	70,177	0	0	911	237	1,544	7,073	8,309	15,976
Grand totals		1,598,775	59,737	317,135	19,451	51,707	263,878	102,518	108,519	1,425,243	34,238	191,063

[a] Weight of Lake Trout harvest shown in the table does not include hooking mortality. Lake Superior lake trout number and weight do not include Siscowets; number of Siscowet harvested was estimated at 162, 72, and 554 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 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 2013. MDNR issued a research permit for an experimental purse seine in Big Bay de Noc in 2013. The purpose of the research project was to determine if whitefish could be captured with minimal bycatch using this gear, which would result in fewer trap nets left in the water in the fall in Big Bay de Noc. The seine was successful in 2013 and the research permit has been reissued for 2014, for another year of evaluation.

The largest monitored recreational fishery for whitefish has 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 2013. Recreational harvest of whitefish was estimated to be 363 fish in Grand Traverse Bay, and 11,350 fish in Grand Marais. The other area where recreational harvest of whitefish is common is Munising, where 5,996 fish were harvested in 2013. 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 2013 fishing season.

Lake	Unit	Harvest	Effort
Michigan	WFM-01	199,302	57*
	WFM-06	20,388	136
	WFM-08	98,417	359
Lake totals		318,107	552
Superior	WFS-04	11,170	59
	WFS-05	56,422	300
Lake totals		67,592	359
Grand totals		385,699	911

*Effort in WFM-01 is low, as an experimental purse seine was used in 2013.

B. Tribal commercial and subsistence fishing

Data in this section are as reported to the MDNR from the Chippewa Ottawa Resource Authority (CORA). At the time this report was completed, CORA had not finalized harvest data for 2013; 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

According to preliminary harvest reports, in 2013 lake trout harvest by tribal commercial fishers was below established harvest limits in all management units, except for MM-123. The stipulated harvest limit in this unit was 453,000 lb, and the Tribes harvested 498,994 lb. This was a 10% deviation from their limit, not enough to trigger a penalty or require management action to reduce harvest, under the terms of the Decree. Lake trout are most commonly harvested by tribal commercial fishers as bycatch in the lake whitefish fishery; thus, effort is not reported in Table 6 (see Table 7). The Tribes estimated the throwback mortality from trap and gill nets in MH-1 where bag limit regulations apply. For 2013, the lake trout daily bag limit for gill-net fishers in MH-1 was 600 lb per day, and for non-converstion trap-net fishers it was 100 lb of lake trout each day.

Table 6. Summary of preliminary tribal commercial lake trout harvest (pounds) by management unit in 1836 Treaty-ceded waters of the Great Lakes for the 2013 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	16,878	482,116	498,994
	MM-4	1,041	94,539	95,580
	MM-5	6,343	13,352	19,695
	MM-67	160	0	160
Lake total		24,422	590,007	614,429
Huron	MH-1[a]	14,519	261,487	276,006
	MH-2	33	0	33
Lake total		14,552	261,487	276,039
Superior	MI-5	0	0	0
	MI-6	0	37,795	37,795
	MI-7	0	36,283	36,283
	MI-8	2,973	39,495	42,468
Lake total		2,973	113,573	116,546
Grand total		41,947	965,067	1,007,014

[a] Includes estimated throwback mortality of 11,987 lb.

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 2013 fishing season. Minor harvest from small-mesh gill nets is also included in gill-net harvest, but not effort.

		Trap nets		Gill nets		Total
Lake	Unit	Harvest	Effort	Harvest	Effort	harvest
Michigan	WFM-01	721,546	2,559	0	0	721,546
	WFM-02	35,215	72	70,475	1,281	105,690
	WFM-03	331,693	2,632	182,834	4,584	514,527
	WFM-04	89,345	808	110,093	2,440	199,438
	WFM-05	3,259	22	36,304	1,186	39,563
	WFM-06	42,633	197	1,632	3	44,265
	WFM-07	1,270	3	0	0	1,270
	WFM-08	0	0	0	0	0
Lake totals		1,224,961	6,293	401,338	9,494	1,626,299
Huron	Northern	189,048	1,369	213,057	6,196	402,105
	WFH-05	289,333	479	0	0	289,333
Lake totals		478,381	1,848	213,057	6,196	691,438
Superior	WFS-04	0	0	0	0	0
	WFS-05	0	0	46,993	1,155	46,993
	WFS-06	0	0	37,416	582	37,416
	WFS-07	177,197	1,119	174,684	2,471	351,881
	WFS-08	72,870	310	33,495	288	106,365
Lake totals		250,067	1,429	292,588	4,496	542,655
Grand totals		1,953,409	9,570	906,983	20,186	2,860,392

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 2013 occurred in Lake Huron unit MH-1 (24,120 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 2013 fishing season.

		Trap nets		Gill nets		Total harvest
Lake	Unit	Harvest	Effort	Harvest	Effort	
Michigan	MM-123	493	0	5,421	86	5,914
	MM-4	497	0	1,631	0	2,128
	MM-5	10	0	0	0	10
Lake totals		1,000	0	7,052	86	8,052
Huron	MH-1	210	0	23,910	664	24,120
Superior	MI-8	12	0	1,322	6	1,334
Grand totals		1,222	0	32,284	756	33,506

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 2013 was in MM-123 where 7,510 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 2013 fishing season.

		Trap nets		Gill nets		Total
Lake		Harvest	Effort	Harvest	Effort	Harvest
Michigan	MM-123	138	0	917	28	1,055
	MM-4	5	0	2,259	47	2,264
	MM-5	140	0	0	0	140
Lake totals		283	0	3,176	75	3,459
Huron	MH-1	0	0	7,510	261	7,510
Superior	MI-8	0	0	10	0	10
Grand totals		283	0	10,696	336	10,979

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 2013 occurred in Lake Huron unit MH-1 (Table 10). The 349,992 lb harvested in MH-1 represents a 120% increase from the 2012 take of Chinook salmon in this area; however, it is only a 17% increase over the 2011 Chinook salmon harvest. In recent years, Coho salmon have been exclusively harvested from Lake Superior, but in 2013 a low number were taken from lakes Huron and 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 2013 fishing season.

		Trap nets		Gill nets		Total harvest
Lake	Unit	Harvest	Effort	Harvest	Effort	
Michigan	MM-123	80	0	1,045	0	1,125
	MM-4	0	0	2,144	5	2,144
Lake totals		80	0	3,189	5	3,269
Huron	MH-1	0	0	349,992	2,226	349,992
Superior	MI-8	0	0	4	0	4
Grand totals		80	0	353,185	2,231	353,265

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 2013 fishing season.

		Trap nets		Gill nets		Total harvest
Lake	Unit	Harvest	Effort	Harvest	Effort	
Michigan	MM-123	32	0	20	0	52
Huron	MH-1	0	0	4	0	4
Superior	MI-7	0	0	359	0	359
	MI-8	511	0	2,735	2	3,246
Lake Total		511	0	3,094	2	3,605
Grand Totals		543	0	3,118	2	3,661

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. Preliminary subsistence data for 2013, as reported by the tribes, is included below in Tables 12 and 13.

Table 12. Summary of preliminary tribal subsistence harvest (round pounds) with gill nets for each management unit by species for the 2013 fishing season.

Gear	Unit	Brown Trout	Burbot	Catfish	Gizzard Shad	Cisco	Lake Trout	Menominee	Northern Pike	Salmon
Gill Net	MH-1	3	0	20		0	73	149	0	19
	MI-6	5	0	0	0	8	49	0	0	24
	MI-7	0	0	0	0	0	40	0	6	155
	MI-8	0	3	0	0	872	103	7	156	1,164
	MM-123	0	96	0	82	0	775	62	364	0
	MM-67	10	0	0	0	0	8	0	16	12
	St. Marys River	0	0	0	0	52	0	0	220	0
	Totals	18	99	20	82	932	1,046	218	762	1,374

Gear	Unit	Smelt	Splake	Steelhead	Sucker	Walleye	Whitefish	Yellow Perch	Management Unit Totals	Total Gill-Net Effort
Gill Net	MH-1	0	0	65	164	100	0	85	677	7,500
	MI-6	0	10	21	89	0	330	0	535	4,200
	MI-7	0	0	12	15	0	2	0	230	910
	MI-8	1,005	0	268	329	300	656	60	4,923	26,835
	MM-123	245	0	339	284	3,702	1,311	47	7,307	56,980
	MM-67	0	0	473	0	9	0	0	527	1,760
	St. Marys River	0	0	15	0	35	46	4	373	3,100
	Totals	1,250	10	1,193	881	4,146	2,345	195	14,571	101,285

Table 13. Summary of preliminary 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 2013 fishing season.

Gear	Unit	Atlantic Salmon	Bass	Brown trout	Burbot	Cisco	Lake trout	Menominee	Muskellunge	Northern pike
Hook and Line, snagging, Tip-up, Dip Net, and Spear	MH-1	0	0	0	3	0	47	4	17	72
	MI-6	0	0	0	59	0	0	14	0	0
	MI-7	0	0	0	0	0	0	0	0	0
	MI-8	0	0	3	0	0	0	16	0	0
	MM-123	0	58	0	0	0	42	0	0	23
	MM-67	0	0	7	0	0	0	0	0	0
	St. Marys River	97	4	0	6	18	7	0	0	605
	Totals	97	62	10	68	18	96	34	17	700

Gear	Unit	Salmon	Smelt	Splake	Steelhead	Sucker	Walleye	Whitefish	Yellow perch	Management Unit Totals
Hook and Line, snagging, Tip-up, Dip Net, and Spear	MH-1	77	228	1	0	0	0	0	484	933
	MI-6	236	0	97	65	0	0	283	0	753
	MI-7	116	0	0	24	0	0	0	0	140
	MI-8	343	65	0	44	0	91	184	20	767
	MM-123	0	0	0	0	0	163	0	401	687
	MM-67	24	0	0	138	0	0	103	0	272
	St. Marys River	32	20	0	79	30	569	166	903	2,538
	Totals	828	313	98	349	30	823	736	1,809	6,090

IV. Fisheries Contacts

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LAW ENFORCEMENT

I. Introduction

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

Areas of oversight include:

- 2000 Consent Decree
- State commercial fishery
- 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.

The State and the Tribes shall provide, support, and maintain adequately equipped law enforcement personnel and resources to provide for protection of the resource, insure regulatory compliance, prevent harassment and vandalism, and maintain public confidence. In addition, the tribes and the state shall each provide a minimum of one officer for each of the eight required joint patrols a year.

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 CFEU in 2013.

II. General Information

For the 2013 season, all of the Unit's vessels were put to use for a total of 502.5 sea service hours. A total of 120 patrols were conducted along with an additional 13 patrols on vessels from outside of the Unit.

Table 14. Service Hours, Patrols, Fuel Consumption & Fuel Costs.

VESSEL	PORT	SERVICE HOURS	PATROLS
WILLIAM ALDEN SMITH	Cedar River	88	16
RANSOM HILL	Rogers City	82	21
SHAFFER		10	2
M.W. NEAL	Saginaw Bay	201	50
RICK ASHER	Leland	121.5	31
OTHERS*	N/A	N/A	13
TOTAL		502.5	133

The Unit's larger vessels and specialized equipment has always been an asset to the local districts and in 2013 our officers were requested to render enforcement and security assistance at the following maritime events:

- Tourism promotion involving Michigan's Secretary of State kayaking from Mackinac Island to Mackinaw City
- Bay City area hydroplane races and Tall Ships Festival
- Traverse City Cherry Festival Air Show
- Menominee Waterfront Festival fireworks display
- Labor Day Mackinac Bridge Walk

CFEU officers spent two days utilizing the unit's side scan sonar in the waters surrounding Michigan's newest state park, Belle Isle, and the MacArthur Bridge that connects it to the mainland. During the deployment of the equipment the officers were able to do the following:

- Gather images and build an inventory of the bottom lands and objects on them
- Locate a large amount of debris (tires, barrels, cables, logs) as well as a large number of unknown objects
- Locate a 12 foot vessel on the river bottom near the island

- Assist Detroit Police and the US Coast Guard (USCG) in a search for a suicidal subject who jumped off the MacArthur Bridge. Unfortunately, the subject was unable to be located.
- During the search, an overturned vehicle was located on the bottom of the Detroit River. This information was turned over to Detroit Police for follow up.

III. Enforcement

A. Complaints and Violations

In 2013, the CFEU investigated a total of 102 complaints, with 88 related to 1836 Treaty fishing and 13 regarding state commercial fishing. Some of these complaints were unfounded, and the others resulted in a total of 21 citations being issued. Lastly, a total of 25 verbal warnings were issued, and 41 referrals were made to tribal officers.

Table 15. 2013 Commercial Fish Complaints Investigated by the CFEU.

COMPLAINTS	1836 TREATY FISHERY	STATE FISHERY	1842 TREATY FISHERY	TOTALS
NETS	73	6	0	79
LICENSING	2	1	0	3
ACCESS	4	0	0	0
OTHER	9	6	0	15
TOTALS	88	13	0	102

Table 16. 2013 Summary of Commercial Fisheries Related Violations.

VIOLATIONS	1836 TREATY FISHERY	STATE FISHERY	1842 TREATY FISHERY	TOTALS
ARRESTS	21	0	0	21
REFERRALS	41	N/A	0	41
WARNINGS	13	12	0	25

Complaints and Violations of note include the following:

- 20 citations were issued to a Tribal Commercial Fisher for selling subsistence caught fish and for falsifying his catch reports. This was the second stage of a case that took place in 2012. It involved a subsistence fisher selling subsistence caught fish from the Big Bay de

Noc area to the tribal commercial fisher, who in turn sold them in his retail store. The commercial fisher was assessed fines and costs of $1,175.00.

- Unit officers assisted Sault Tribe Law Enforcement with pulling a gill net set by an unlicensed tribal fisher near Goose Island in Northern Lake Huron.

- A complaint was called in regarding a gill net that was entangled on the shipwreck "Miztec" located in 50 feet of water off of Whitefish Point in Lake Superior. There was concern for diver safety as the net was not only entangled on the wreck but ran up to the surface at the mooring buoy. This wreck is used to teach novice divers. Unit officers utilized patrol vessel "H. Ransom Hill" as a base platform for the MSP Dive Team to remove a large amount of gill net from the wreck. Bay Mills and the Sault Tribe Officers assisted with vessels with gill net lifters and removed the net as the dive team cut it away from the wreck. Approximately 500 feet of net was removed. The shipwreck society and dive community expressed thanks for the efforts by all agencies to make the popular dive location safe again.

- Complaints came in of a net set south of the closure line in West Bay of Grand Traverse Bay. The fisher was located and ticketed for fishing in a closed area.

- A records review indicated that there has been substantial over-harvest of walleye in the Bay Mills Small Boat Zone in Northern Lake Huron in the fall of the year. CFEU Officers worked for several days in this area to ensure that the 15 lb by-catch allowance was adhered to.

- Numerous complaints concerning illegal retention of lake trout have come in regarding a commercial fisher in Northern Lake Michigan. Efforts have been put forth in this area and the information was shared with Tribal Law Enforcement.

- Unit and area officers along with Sault Tribe Law Enforcement conducted a joint operation aboard MDNR vessels to locate and remove approximately 10,000 feet of

abandoned gill net from Lake Michigan east of the Garden Peninsula. It is estimated that the net contained several thousands of pounds of rotten Lake Trout, Whitefish, and Burbot and had been there for many months. The net was not able to be removed in one day, and the remaining part of the net was remarked for removal at another time. When the officers returned, they found that the net had been tampered with as the staff that the officers used to mark the net with had been removed. The officers were able to locate the other end which had the suspected fisher's name written on a float. An additional 1,000 feet was removed. Sault Tribe Law Enforcement followed up with prosecution and issued a total of 6 citations to two fishers.

- A Unit officer was involved in the monitoring of a tribal fishing vessel that sunk along the Ludington city wall. The USCG, DEQ and Tribal officials were notified of the situation and the vessel was hoisted from the bottom.

- Two improperly marked nets belonging to a new tribal fisher in the waters of Big Bay de Noc were located. The information was turned over to Little Traverse Bay Band Officers who contacted the subject and issued a citation.

- An unknown net surfaced off of Ludington and that it may be a net that was lost years ago. The Charter Boat Association in Ludington was contacted to advise them of the hazard as well as Little River Band (LRB) Enforcement.

Many complaints came in regarding approximately 14 abandoned trap nets off of Ludington and Whitehall that belong to two different fishers from Little River Band (LRB).

- A USCG vessel out of Ludington became entangled in one of these nets while responding to a boater in distress call. They were able to free their vessel. The USCG has now become involved in this matter and has conducted its own inspections and inventory of the net locations.

- A CFEU Officer worked with LRB authorities on the unmarked/abandoned net situation off of Whitehall. They have marked the nets as abandoned and the process for removal is resting with the tribe.

- Several sport anglers ran into nets in the area and became entangled in improperly marked nets.

- A charter vessel became entangled in a net off Whitehall. The vessel was able to free itself. CFEU and LRB officers removed approximately 1000 feet of half inch poly line from the water. The net was marked by the officers and was included on the list of nets that need to be removed.

- Another complaint of a charter vessel becoming entangled in an improperly marked net came in North of Muskegon. The vessel was able to free itself.

- A GTB fisher removed one abandoned net from the Ludington location. He advised that he will not be returning in the spring to remove the 9 remaining nets.

B. Inspections

Unit members completed total of 1,127 inspections in 2013. These included 264 net inspections, 36 on water boardings, 300 dockside inspections, and 283 state wholesale inspections.

Table 17. 2013 CFEU Inspections.

INSPECTIONS	1836 TREATY FISHERY	STATE FISHERY	1842 TREATY FISHERY	TOTALS
NETS	124	140	0	264
BOARDINGS	23	13	0	36
DOCKSIDES	147	153	0	300
STATE WHOLESALE	N/A	283	0	283
BAIT INDUSTRY	N/A	244	0	244
TOTAL	294	833	0	1,127

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 CFEU 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. CFEU has provided training and training materials to task force agencies in regards to training officers in the identification, detection and interdiction of Asian Carp. These efforts have resulted in expanding the enforcement efforts across state and international borders enhancing the ability to stop illegal shipments of Asian Carp from reaching Michigan. 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, the CFEU conducted a statewide bait industry initiative. Information was gathered as to the types of bait that are being harvested in Michigan or imported into Michigan as well as the water bodies that they come from. Information on this and the licensees understanding of the Department's Fisheries Disease Control Order (FO) was compiled and presented to Fisheries Division for consideration in future regulations. Parameters of the initiative included:

- Inspect all bait wholesalers
- "Telephone inspections" on all non-resident bait wholesalers
- Inspect as many bait catchers as possible
- Inspect at least 1 bait retailer in each county of the state
- Inspect ALL retail bait dealers in the UP
- Focus on understanding/compliance with FO 245

At the close of the initiative the following was completed:

- 32 active wholesaler dealers were inspected
- 61 minnow catchers were inspected
- 173 retailers were inspected (80 of which were in the UP)
- 3 citations were issued to unlicensed businesses
- 27 verbal warnings were given for various violations
- A summary was presented to Fisheries Division

The Unit also conducted a massive sweep through the Detroit area looking for and inspecting fish markets for invasive species. Roughly 40 retail businesses were inspected during the two day initiative with data collected regarding where the markets were located, what species of fish were on the premises, and where fish were obtained. No violations were observed. Most market owners stated they no longer were dealing with Asian Carp (live or dead).

A Unit officer attended the Asian Carp Task Force meeting in Arkansas. The task force members got a look at the aquaculture industry where many of the carp are raised.

V. Training and Education

Numerous USCG boat stations have requested and received commercial fish enforcement training by the unit. They are considered an ex officio member of the LEC under the 2000 Consent Decree. They have indicated an interest in participating in commercial fish patrols. Stations that received training in 2013 include:

- Houghton
- Marquette
- Cheboygan
- St. Joseph
- Muskegon
- Traverse City

VI. Assistance to Other Agencies

The Unit works closely with officers from other jurisdictions and is frequently called upon to render assistance in their investigations. Examples of this in 2013 include:

- Unit officers met with the new Ontario Ministry of Natural Resources Officers and exchanged information regarding working together along the international boundary.

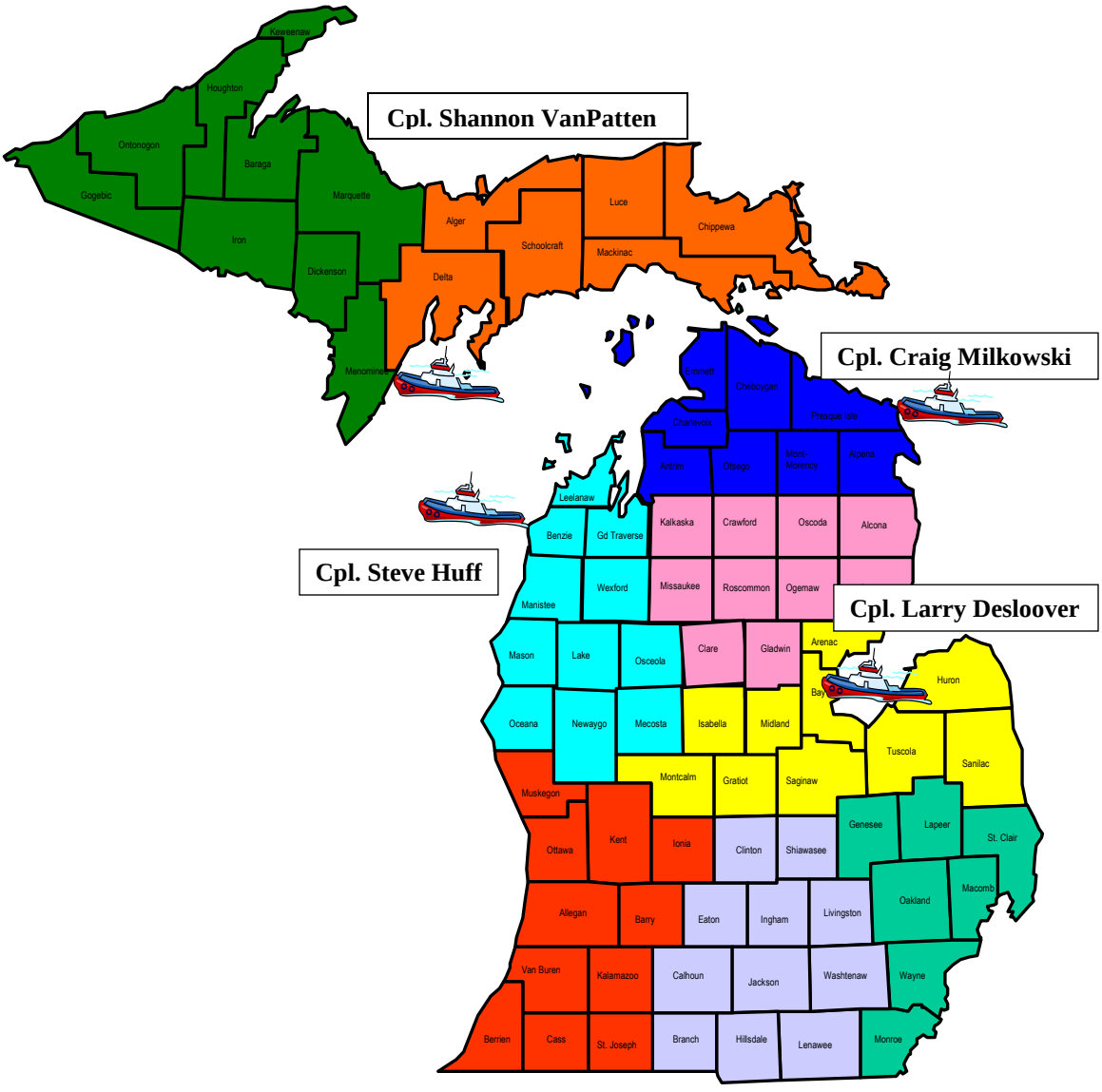
- Unit officers conducted bait wholesale inspections in southeast Michigan in conjunction with a request from Minnesota regarding the possible illegal importation of leeches into their state.

- A unit officer assisted a Canadian Food Inspector with an inspection at a wholesale buying club in Dearborn regarding possible import violations on a subject buying from the wholesaler and transporting the product into Canada.

- Unit officers participated in a joint patrol with the USCG in Sault Ste. Marie and Bay Mills tribal law enforcement on the Whitefish Bay area on Lake Superior. The patrol was to target the illegal taking of fish and movement of fish and vessels across the international border. Unfortunately, the operation was compromised as information was apparently leaked to Bay Mills commercial fishermen.

- A member of the CFEU observed a tribal fishing vessel come into Ludington in the dark without navigation lights activated. The unit officer assisted the USCG with the contact. A LRB Officer was contacted and enforcement action was turned over to tribal authorities.

Michigan Department of Natural Resources
Commercial Fish Enforcement Section



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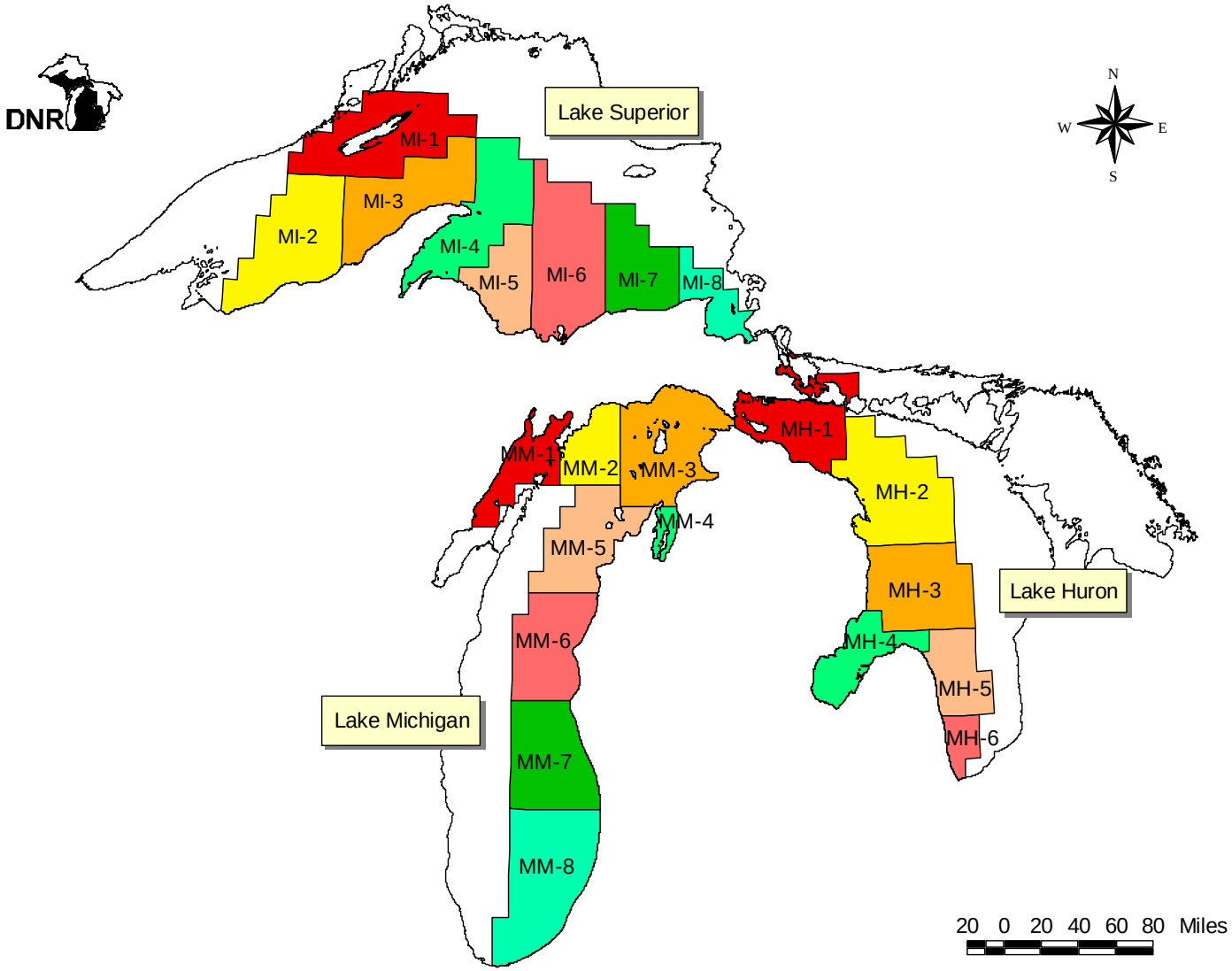

Figure 1. Lake Trout Management Units for Lakes Superior, Michigan and Huron.

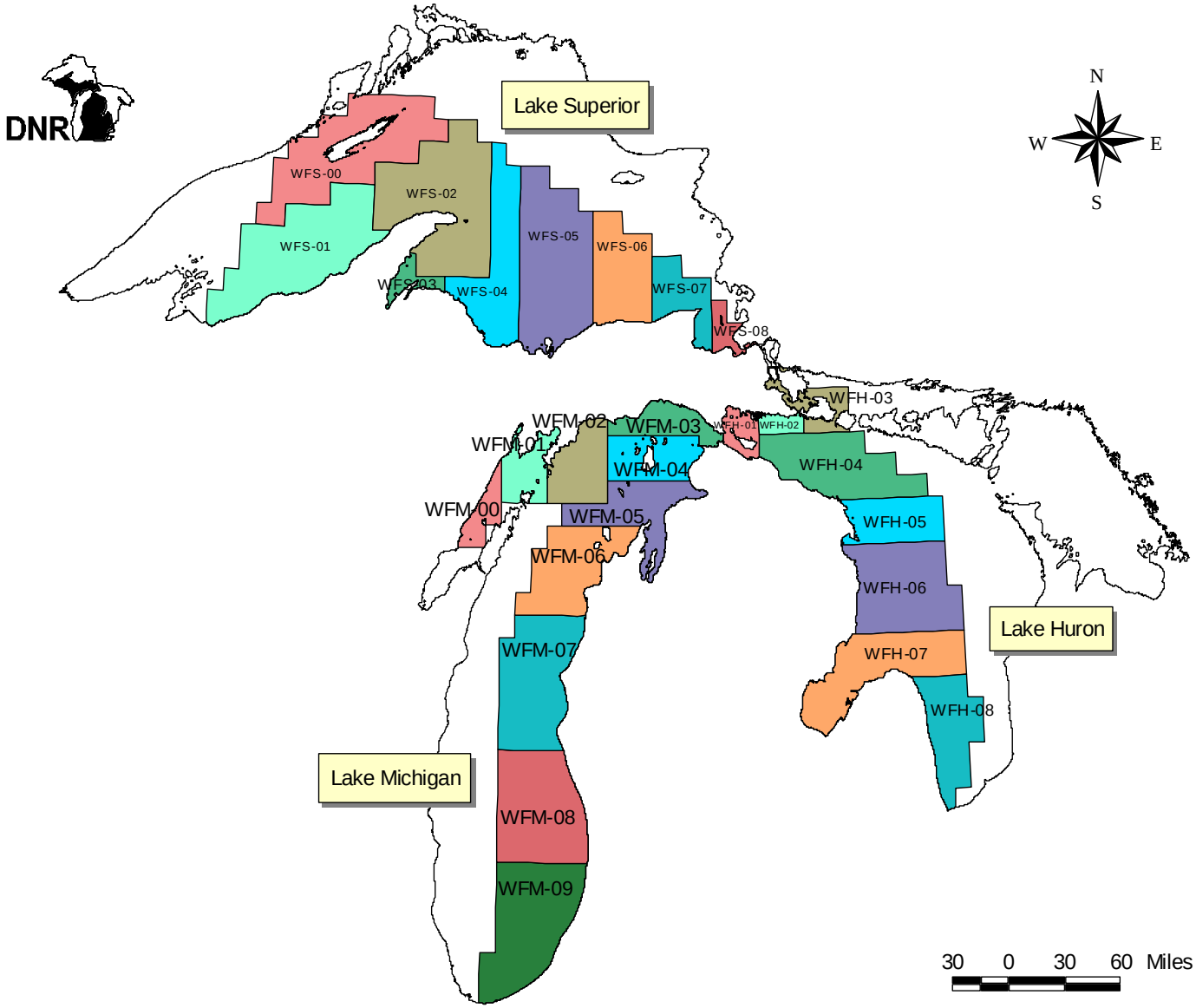

Figure 2. Lake Whitefish Management Units for Lakes Superior, Michigan and Huron.

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. Assume sport fishing effort gradually increases by 25%. No change in Canadian commercial effort.

40% SSBR = 0.32

	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