A LAKE TROUT REHABILITATION PLAN FOR LAKE SUPERIOR

by

The Lake Superior Lake Trout Technical Committee

Thomas Busiahn, GLIFWC
William Eger, COTFMA
Randy Eshenroder, GLFC
Michael Hansen, WI DNR (chairman)
Wayne MacCallum, OMNR
Richard Pycha, USFWS (past chairman)
Richard Schorfhaar, MI DNR
James Selgeby, USFWS
John Spurrier, MN DNR
Bruce Swanson, WI DNR

of

The Lake Superior Committee
GREAT LAKES FISHERY COMMISSION
1451 Green Road
Ann Arbor, Michigan 48105

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INTRODUCTION

The Lake Superior lake trout population was expected to be restored because 1) substantial sea lamprey control was achieved while some residual native lake trout stocks were still extant, 2) intense stocking was begun in the early 1960s, and 3) commercial fishing was either closed or controlled by quota management in the 1960s. Nearshore lake trout abundance increased roughly tenfold from 1961 through 1971 in Michigan and Wisconsin where stocking rates were highest, more slowly in Ontario where stocking rates were lower, and little at all in Minnesota where stocking was begun several years later than elsewhere. Meanwhile, remnant native lake trout stocks continued to decline through the 1960s in nearshore waters, but increased in offshore U.S. and Canadian waters without the aid of stocking. The only substantial nearshore stock of native lake trout known to have recovered to self-sustainability were those of Gull Island Shoal, Wisconsin, and Thunder Bay, Ontario. Small native stocks in the areas of Cat Island, Wisconsin, and Munising, Michigan and in several areas of Ontario also persisted.

In the 1970s and beyond, lake trout rehabilitation was affected by a combination of reduced stocking and ineffective control of the lake trout catch. Recruitment of stocked fish declined in Wisconsin where stocking was reduced in the late 1960s and in Michigan where stocking was reduced sharply in 1971. Conversely, recruitment gradually increased in Minnesota where intense stocking continued in the late 1960s and 1970s. Recruitment of stocked fish leveled off at an unsatisfactory low level in Ontario where stocking rates were low.

Stocking in Michigan and Wisconsin was reduced because it was thought that stocked fish would be protected from fishing exploitation and that they would mature and reproduce as native fish had. However, exploitation in the U.S. increased steadily in the late 1960s and 1970s and commercial catches in Ontario generally exceeded the quotas after their imposition in 1961. Also, it became apparent during the 1970s that stocked fish were less efficient reproducers than native fish. This reproductive inefficiency is believed to result from a lack of properly-oriented homing instinct.

Presently, after more than a quarter century of sea lamprey control, nearshore stocks of lake trout in most areas of the lake are still largely supported by stocking. Natural reproduction, though increasing slowly in many areas and rapidly in a few, is still inadequate to maintain the stocks or sustain a substantial yield. All involved agencies now recognize that lake trout rehabilitation is more difficult and time-consuming than was anticipated and will require more efficient and consistent stocking practices, control of exploitation, and possibly additional knowledge and development of new methodologies.

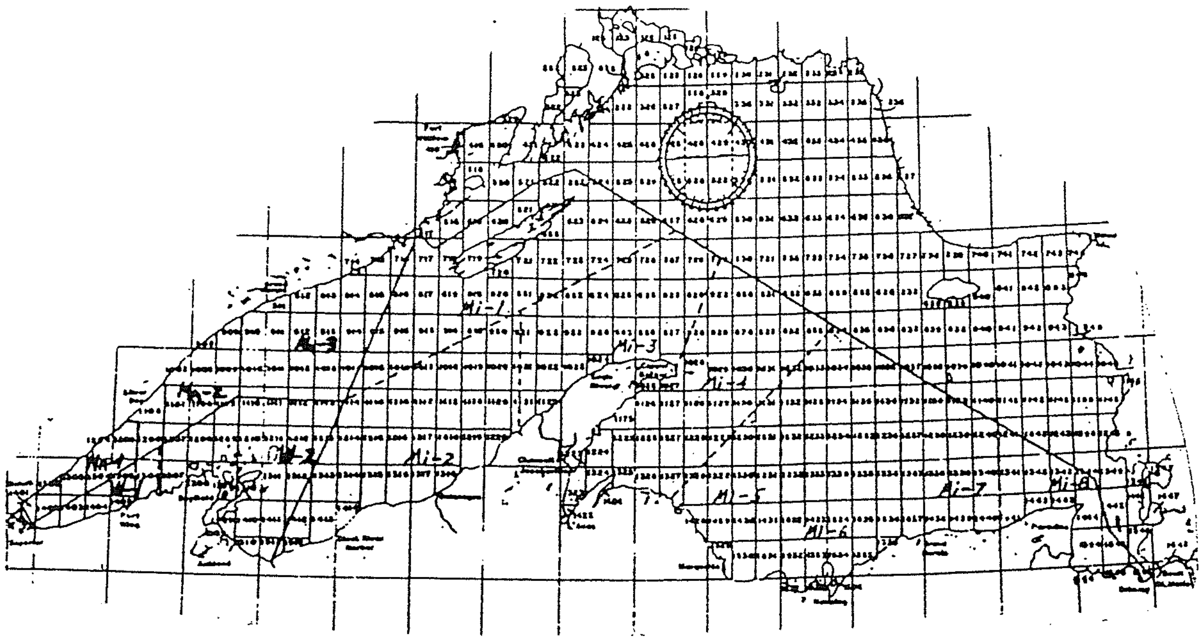

FIGURE 1. Lake Superior management zones, U. S. waters.

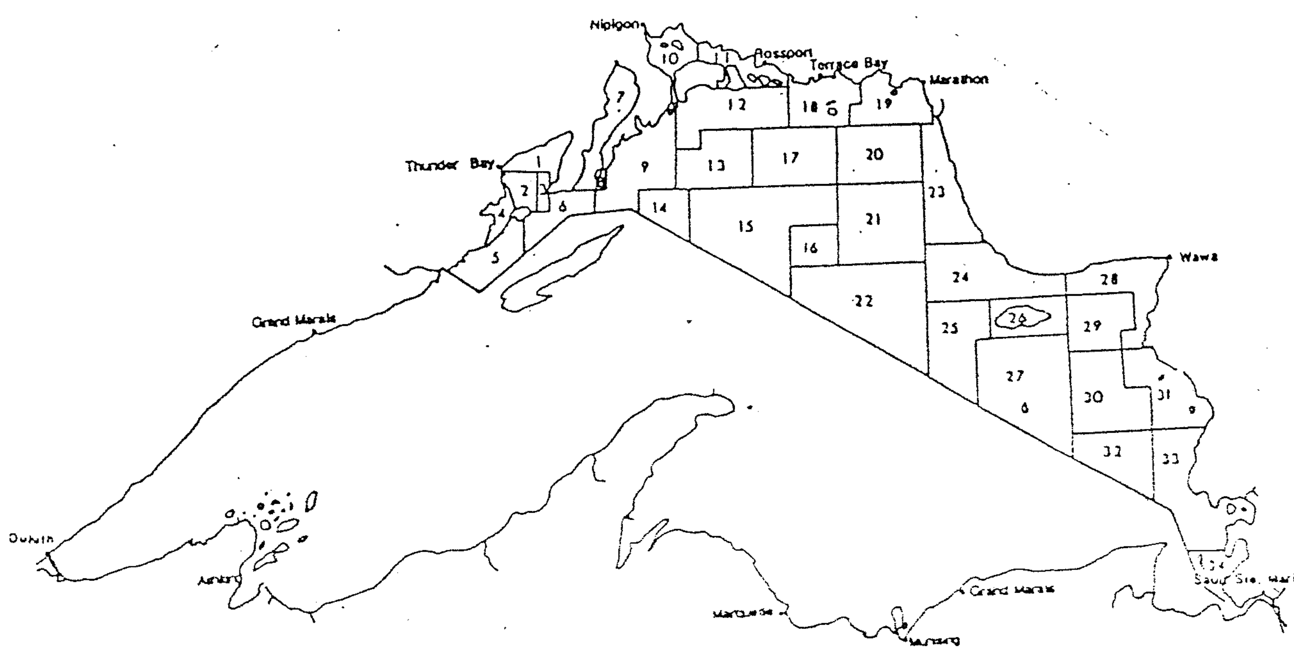

FIGURE 2. Lake Superior management zones, Canadian waters.

resulting from genetic degeneration of hatchery brood stocks or unsuitable stock selection; 3) inadequate recruitment caused by inconsistent stocking practices; and 4) excessive mortality resulting from inadequate control of exploitation and lamprey predation. Nevertheless, a rational stocking policy is fundamental to rebuilding and maintaining stocks at a level where other management measures can succeed.

Size and Age

Stocking of yearling lake trout, 18-25 per pound, should be maximized and stocking of fingerlings should be undertaken only to the extent that yearling production is not affected. Though fingerlings and yearlings both appear to be past the age at which imprinting to specific spawning sites is suspected to occur, high survival is desirable to build up abundant stocks to reduce the ratio of sea lamprey to lake trout (thereby minimizing lamprey-induced mortality) and to increase the density of spawning fish (partly overcoming the reproductive inefficiency of stocked fish). To date, yearling lake trout 18-25 per pound in size have survived 4-10 times as well as fall fingerlings. The relative survival of "accelerated-growth" fall fingerlings has not been soundly evaluated, but some observations suggest that their survival is still less than that of yearlings.

Although stocking of hatchery lake trout has reestablished self-reproducing populations in nearshore waters of Minnesota and Michigan, recent evidence indicates that stocking, whether from the mainland or on suitable offshore spawning reefs, failed to reestablish self-reproducing populations on shoal areas of the Apostle Islands (Krueger et al. in press). From 1952 to 1983, more than 2.3 million fingerling and 7.3 million yearling lake trout were stocked in the Apostle Islands region of Lake Superior. Reefs that did not have remnant native populations but were known to be historically important spawning grounds were not used by hatchery lake trout. Stocking early life stages (eggs and fry) on reefs in the Apostle Islands was begun in 1980 as an alternative approach to the stocking of yearlings for reestablishing reef-specific lake trout populations. The stocking of yearlings could be continued to help absorb lamprey and fishing mortality while native populations recover.

Broodstocks and Strains

Stocking of wild lake trout strains that spawned in the same or similar areas to those being stocked should be maximized. Though there is presently no evidence that fish reared from eggs taken from wild native fish reproduce better than those taken from domestic hatchery brookstock, genetic adaptation to Lake Superior conditions should be preserved. Also, since production from any future broodstocks will not be realized for 8-10 years, interim production from long-standing and possibly inbred broodstocks should be genetically enhanced by outcrossing with wild males captured in local inshore waters. Recent evidence of substantially increased abundance of wild, juvenile, lake trout in areas that were stocked only with progeny of Marquette broodstock suggests that genetic degeneration of that stock is not a serious problem. The need for proper fish disease control when domesticating wild stocks is recognized and encouraged, as outlined by the Great Lakes Fish Disease Control Committee (Meyer et al. 1983).

Given the practical problems of holding multiple broodstocks in hatcheries, development of broodstocks from distant atypical areas such as Caribou Island merely to increase genetic variability for southern Lake Superior is probably not necessary. The following stocks are suggested as sources for future broodstocks and/or production:

1. Michipicoten Island native stock for eastern Ontario waters.

2. Slate Islands native stock for western Ontario waters.

3. Eastern Ontario native river-run stock, presently existing only in an Ontario inland lake, for Ontario rivers.

4. Southern Isle Royale native stock for Minnesota waters.

5. Gull Island Shoal native stock for most of the western half of southern Lake Superior.

6. Eastern Michigan unclipped lake trout from near-shore reefs between Keweenaw Bay and Munising, Michigan (especially Traverse and Huron Islands and islands and reefs in the area of Marquette-Munising) for the eastern half of southern Lake Superior.

Stocking Priorities

Stocking priorities should be based on the potential of an area for rehabilitation and sustained yield. The criteria for developing stocking priorities are:

1. The availability of quality lake trout spawning habitat in an area.

2. The historical production of lake trout in an area.

3. The present total mortality rate in an area.

4. The recent success of natural reproduction in an area, as evidenced by the presence of young, unclipped lake trout.

from state hatcheries should be coordinated with that from federal hatcheries to achieve recommended stocking rates if the federal allocation falls short of that recommended.

Stocking Rate

A minimum stocking rate of 900 yearlings per square mile of lake trout habitat (yearlings/square mile) should be applied to all first and second priority areas for at least 5 successive years to rapidly build an abundant stock. The stocking rate should then be reduced to not less than 600 yearlings/square mile until the proportion of wild fish, the overall abundance, the growth rate, and the strength of oncoming year classes of wild fish warrant further reductions in stocking.

The stocking rates in first and second priority areas should be based on the overall hatchery availability, if inadequate numbers of fish are available in any year to meet the optimal stocking rate recommendation, as detailed below:

AVAILABILITY INDEX	STOCKING RATE PRIORITY		NUMBER AVAILABLE	
	FIRST	SECOND	U.S.	CANADA
1	900	900	2,730,600	1,863,900
2	900	600	2,200,200	1,718,100
3	600	600	1,820,400	1,242,600
4	600	0	759,600	951,000

Stocking in third priority areas should only be done after the first and second priority areas have been stocked at 900 yearlings/square mile (Appendix Table 1).

The rationale for these stocking rate recommendations is as follows: First, lake trout habitat in Lake Superior is thought to be restricted to waters less than 40-50 fathoms. Data are available for waters less than 40 fathoms in U. S. waters and for waters less than 50 fathoms in Canadian waters. The use of different depth ranges in the two jurisdictions does not represent a conflict of either opinion or knowledge, rather it was simply a convenient use of the available information.

However, the historical yield of lake trout from the various areas of Lake Superior (pounds produced per square mile of 0-40 fathom water, 1929-43) indicates that area alone may not adequately represent lake trout productive potential. Minnesota, for example, has only 5.8% of the 0-40 fathom area of nearshore U.S. waters but had 16.3% of the yield, while Wisconsin has 29.4%

of the area but 24.5% of the yield. Similar discrepancies are evident for western, central, and eastern Michigan waters.

Therefore, in U. S. waters the measured areas of 0-40 fathom water were adjusted for each zone based on a "productivity index", expressed as the ratio of historical yield (1929-43) per unit area in the management zone to the mean historical yield per unit area in all prioritized management zones. Historical yield from zone Mi-7 was reduced from 501,000 lb to 100,000 lb to account for the substantial offshore harvest landed in that zone (to be reevaluated later as more data is analyzed). These adjusted areas should be used in conjunction with the priorities in the preceding section of the plan as the basis for initial stocking allocations in U. S. waters (see Appendix Table 1). Similar adjustments of Ontario waters for productivity were not made due to a lack of readily available data.

Finally, the primary basis for the recommended stocking rates was the development of natural reproduction in the Keweenaw Bay area (MI-4, Fig. 1) where stocking was 900-1,000 yearlings/square mile from 1966-70 and 300-500 thereafter, and fishing exploitation was lower than in much of southern Lake Superior. The high stocking rate in 1966-70 resulted in a rapid increase in abundance of lake trout in 1970-73 to the highest level in Lake Superior. Subsequent recruitment of naturally-reproduced age-V lake trout increased 5-fold from 1977-78 and by 1980 unclipped fish composed 40% of spring assessment samples. A USFWS smallmesh gillnet survey in 1984 found that several more strong year classes of wild fish were present in the juvenile portion of the population. However, abundance of adult lake trout in this area has declined 50% since 1980 in spite of this increasing recruitment of wild fish, suggesting that stocking may have been reduced too rapidly and/or that mortality may have been too high.

CONTROL OF EXPLOITATION

All agencies having jurisdiction over lake trout fisheries should take actions to maintain the total catch of lake trout enough that the total annual mortality rate is held at 50% or less. Cooperation and concurrent action by all regulatory agencies is essential to the attainment of this objective since many lake trout stocks are commonly shared.

Total annual mortality of 50% or less has allowed adequate survival to maturity to provide enough spawning stocks to support increased natural reproduction. Thus, the highest abundance of wild, naturally-reproduced lake trout in nearshore U.S. waters of Lake Superior occur where spawning-size fish are most abundant. Spawning-size fish, in turn, are most abundant where stocking rates were moderate to high for at least several years <u>and</u> where total annual mortality of aged VII-XI fish is around 50%. Conversely, spawning stocks have generally declined and wild lake trout abundance has levelled off or declined where total annual mortality has exceeded 60%.

The estimation of total annual lake trout mortality has been by within-year, age-frequency, catch curves from 4 1/2-inch-mesh gillnets. This has been the standard sampling gear in Lake Superior for over 25 years but almost certainly overestimates total annual mortality through gear size-selectivity. Early work suggests that a 50% mortality rate estimated from this gear is roughly equivalent to a 42% actual mortality rate. Also, strong or weak year classes can have large effects on the slope of the right-hand limb of the catch curve. Thus, correct estimation of mortality may require use of three- to five-year averages. Because past methods for estimating mortality were not entirely satisfactory, different methods will be evaluated in the future (see research needs).

SPECIES INTERACTIONS

Sea Lamprey

Sea lamprey predation played a key role in the drastic reduction of lake trout stocks in Lake Superior. Subsequently, the larvicide treatment program reduced the abundance of parasitic-phase lampreys by 90-95% from their peak abundance. However, since a comprehensive understanding of the magnitude of sea lamprey predation on various sizes and ages of lake trout under the present regime of lamprey control is lacking, it is not known whether the present level of lamprey control is adequate to permit achievement of the 4 million pound annual rehabilitation goal. New methods for relating lamprey abundance and wounding rates to lake trout mortality should be tested and developed to determine necessary levels of lamprey control. Nonetheless, at least the present level of sea lamprey control must be maintained as a precondition for lake trout rehabilitation. Further reductions in sea lamprey abundance should speed up the process of rehabilitation and increase the eventual sustainable yield. New and/or additional lamprey control techniques should be applied first in Lake Superior.

Lamprey-induced mortality of lake trout changes with the abundance of both lampreys and lake trout, which are in turn determined by stocking rates, natural reproduction, growth rates, and fishing mortality. Available information indicates that lampreys prefer larger lake trout, that the rate of lamprey wounding on lake trout is positively related to the rate of lamprey-induced mortality, and that lamprey-induced mortality is positively related to the lamprey/lake trout ratio. Thus, total lamprey-induced mortality tends to decrease as lake trout abundance increases, but lamprey predation remains highest on the less abundant older, larger fish in the population. These large, nearly-mature and mature fish are the most important portion of the lake trout population for purposes of stock rehabilitation.

Forage Species

Decisions about the adequacy of forage should be based on analyses of lake trout growth, as compared to their growth in the early 1950s, and comparison of present forage community structure to that present in the early 1950s. The Rahrer (1967) study of lake trout growth in the 1950s should be considered the baseline for normal lake trout growth in Lake Superior, as it is sound and the only one available from a period of near normalcy. Forage community structure is inferred from work in the 1950s on lake trout diets and from catch composition in the commercial fisheries.

Historically, the principal forage fish in Lake Superior and the primary prey for lake trout were lake herring and chubs. However, lake herring, which may have composed the largest biomass of any forage species in the lake, declined drastically in various parts of U.S. waters from the 1930s through the 1960s, resulting in the near collapse of the herring fisheries. Overfishing and smelt population expansion have been implicated as contributing factors in that decline. After 1950, smelt proliferated and soon became the principal prey of lake trout.

Beginning in the mid 1970s, lake herring populations began to show signs of recovery. Conversely, smelt populations declined drastically throughout the lake in 1978-83. Though lake trout are expected to switch from smelt to lake herring as herring populations recover, food habit studies indicate that they currently continue to consume mostly smelt. Smelt are restricted to nearshore waters and do not utilize the offshore productivity of the lake as well as the more pelagic lake herring.

Therefore, in order to achieve the 4 million pound annual yield stated as the long-range goal of this plan, lake herring will have to be reestablished as the primary forage species for lake trout in Lake Superior. Management agencies should take all necessary actions to restore abundant stocks of lake herring. Recently, restrictive regulations and/or poor market conditions have prevented the lake herring fishery from expanding, but agencies should ensure through fishery controls that the catch is held at or below the 1974-83 annual average until stocks have more adequately recovered or new biological information for making sound determinations of allowable catch is available.

Exotic Predators

Large numbers of splake, brown and rainbow trout, and coho and chinook salmon have been stocked in Lake Superior over the past 20 years, mainly in U.S. waters. Currently, brown and rainbow trout and coho salmon are reproducing successfully in many tributaries to Lake Superior, while all splake and most chinook salmon are still stocked. Since 1983, after smelt declined drastically and reduced growth of lake trout was noted, concern was expressed about the effect of exotic predators, particularly chinook salmon, on lake trout. Chinook salmon grow rapidly to a large size, and thus, are heavy users of forage. Therefore, the presence of exotic predators such as chinook salmon could reduce the annual production of lake trout and other species, particularly where the forage supply is limited.

More attention to the effects of exotic predators on lake trout rehabilitation is needed. Therefore, lake trout growth should be evaluated (see forage species, above) in conjunction with the abundance of forage species being eaten by lake trout and exotic competitors, to assess the impacts of exotic predators such as chinook salmon on lake trout. If lake trout growth rates fall below "normal" and the abundance or biomass of the forage being utilized by lake trout and exotic competitors declines, stocking of exotic predators, particularly chinook and coho salmon, should be reduced.

ROUTINE ASSESSMENT

Certain information is needed annually for following the progress of rehabilitation and for making management decisions. This information should be collected, analyzed, and reported, as nearly as possible, in a standardized manner. Routine minimum needs and standards are as follows:

1. Relative abundance should be determined from the catch per unit of effort (CPUE) in 4 1/2-inch-mesh nets, of 210-2 multifilament nylon twine, 18 meshes deep, hung on the 1/2 basis, fished in the spring (late April-May), 3 nights out per lift. The same gear, with or without larger mesh sizes added on, fished in September may provide useful additional information. Though CPUE in such standardized gear may not be strictly comparable from one locality to another, comparability can probably be determined from the catch and effort statistics of the prelamprey fishery. At the least, trends of abundance within an area can be determined.

2. The total annual mortality rate should be determined from the right-hand limb of within-year, age-frequency catch curves from the gear described above.

3. Sea lamprey wounding rates (number per 100 fish) should be compiled as the mean number of stage A1-3 wounds per fish in the 17.0- to 20.9-inch, 21.0- to 24.9-inch, 25.0- to 28.9-inch, and 29.0-inch and larger size groups of lake trout caught in spring.

4. Lake trout growth and age at maturity should be monitored for change from routine average length-at-age compilations from the spring assessment catches. More comprehensive analyses should be done when these routine evaluations suggest that growth has fallen below the prelamprey "normal". Growth data should be compiled separately for finclipped and wild lake trout.

5. Abundance of immature, wild lake trout, should be estimated from one-night sets of smallmesh nylon gillnets (twine type not specified), including 2-inch and 2 1/2-inch mesh sizes. Sets of more than 1 night should be reported as catch per net-night.

6. Complete lake trout catch statistics should be collected from all fisheries, including sport and commercial. Present catch data has several problems. First, sport fishery catch data has not been collected for some waters of Lake Superior. Creel surveys should be conducted on an annual basis in all jurisdictions to document lake trout catch by sport anglers. Second, large illegal commercial catches have been discovered in recent years and probably still occur. More intensive law enforcement, conducted in cooperation with management agencies, is necessary to reduce this illegal catch and to document its magnitude. Third, lake trout caught incidentally to fisheries for other species are often required to be returned to the water, dead or alive, going unreported. Monitoring of this catch should be done so that reasonable estimates of the number of fish caught and killed can be made. Last, reporting of commercial lake trout harvest is not required by all user groups. Routine reporting of all commercial lake trout harvest should be required.

RESEARCH NEEDS

Much of the information needed to develop a sound plan for rehabilitating lake trout is lacking. Specific research needed includes the following:

1. Determination of age-specific, natural, lamprey induced, and fishing mortality rates for both native and fin-clipped lake trout stocks.

2. Determination of mortality of normal-growth fingerlings, accelerated-growth fingerlings and yearlings.

3. Evaluation of stocking rates of higher or lower density than recommended, in the absence of fishing mortality.

4. Determination of the stock-recruitment relation between hatchery-reared fish and their wild progency.

5. Determination of the potential yield from a rehabilitated stock.

6. Determination of the time of imprinting of lake trout.

7. Evaluation of artificially-induced homing with chemicals.

8. Documentation of the distribution and food habits of lake trout and Pacific salmon and on the abundance of their forage in open waters of the lake.

9. Evaluation of the use of known former spawning areas by lake trout, as stocks of mature fish increase.

10. Development of improved aging techniques, for use in calculation of mortality and growth rates.

11. Development of an improved methodology for calculation of mortality.

Establishment of experimental refuges, where the effects of exploitation can be eliminated, would greatly facilitate separation of mortality components due to fishing and lamprey predation and subsequent evaluation of management measures (Eshenroder et al. 1984). Also, experimental refuges are valuable tools for carrying out many of the other research projects outlined above. Once rehabilitation is accomplished, refuges could be converted to experimental controlled-exploitation areas for determining sustainable yield.

The Gull Island refuge in Wisconsin was designed to protect the only known substantial-sized broodstock of native lake trout in nearshore U.S. waters, but is also used for experimental research on mortality components and stock-recruit relations. The area of western Michigan waters from the Wisconsin border to Ontonagon is on the main migration route of the Gull Island native spawning stock, but was subjected to increased exploitation in 1984. Exploitation in that area should be held at pre-1984 levels. Additional refuges should be established in Michigan waters from the Huron Islands to Laughing Fish Point (MI-4 & 5, grids 1326-31, 1428-31, and 1529-31; Fig. 1) and in Ontario waters (Zones 19, 20, 21, 23, and 24; Fig. 2).

REPORTING

In order to provide represented management agencies with technical information and management recommendations and to advise the Lake Superior Committee on the progress of lake trout rehabilitation, timely reporting of available information regarding routine assessment and research is necessary. Thereofore, the technical committee should gather all available information from routine assessment and research and summarize the information into an annual progress report to the Lake Superior Committee. The progress report should contain the available information on lake trout catch, mortality, abundance of stocked and wild fish, growth, sea lamprey wounding rates and/or lamprey-induced mortality, forage stock status, and research results.

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APPENDIX TABLE 1. Area, stocking priority, and stocking rates of hatchery-reared lake trout for management zones of the U. S. and Canadian waters of Lake Superior.

Zone	Area*	Priority	Stocking Rate	
			900/mile2	600/mile2
Mn-1	373	2	335,700	223,800
Mn-2	77	2	69,300	46,200
Mn-3	144	2	129,600	86,400
Wi-1	149	3	134,100	89,400
Wi-2	746	2	671,400	447,600
Mi-1	-	0	-	-
Mi-2	227	2	204,300	136,200
Mi-3	201	2	180,900	120,600
Mi-4	632	1	568,800	379,200
Mi-5	319	1	287,100	191,400
Mi-6	315	1	283,500	189,000
Mi-7	164	3	147,600	98,400
Mi-8	250	deferred	-	-
O-1	128	1	115,200	76,800
O-2	87	1	78,300	52,200
O-3	38	1	34,200	22,800
O-4	54	1	48,600	32,400
O-5	98	1	88,200	58,800
O-6	23	1	20,700	13,800
O-7	232	3	208,800	139,200
O-8	13	3	11,700	7,800
O-9	111	1	99,900	66,600
O-10	154	2	138,600	92,400
O-11	121	2	108,900	72,600
O-12	55	1	49,500	33,000
O-13	0	0	-	-
O-14	11	0	-	-
O-15	0	0	-	-
O-16	8	0	-	-
O-17	4	0	-	-
O-18	68	1	61,200	40,800
O-19	102	1	91,800	61,200
O-20	51	0	-	-
O-21	0	0	-	-
O-22	0	0	-	-
O-23	40	2	36,000	24,000
O-24	101	1	90,900	60,600
O-25	25	0	-	-
O-26	60	0	-	-

APPENDIX TABLE 1. continued.

Zone	Area*	Priority	Stocking Rate 900/mile2	Stocking Rate 600/mile2
O-27	221	0	-	-
O-28	169	1	152,100	101,400
O-29	41	0	-	-
O-30	0	0	-	-
O-31	201	1	180,900	120,600
O-32	10	0	-	-
O-33	350	1	315,000	210,000
O-34	171	2	153,900	102,600

*Area adjusted for historical productivity in U.S. waters.

Mortality rates, past stocking rates, and biological characteristics of lake trout have been combined into a predictive model to determine stocking rates for specific areas in the Canadian waters of Lake Superior. In this model, the past stocking and mortality rates are entered for each year. As additional data is gathered, it is added to the model on an annual basis.

Future stocking rates were calculated to satisfy the following three targets:

1. 2.4 kg/ha vulnerable lake trout. This refers to the lake trout age 4 and older that are fully vulnerable to commercial gear. The biomass of these fish is divided by the surface area of water less than 50 fathoms deep for each specific area. The target of 2.4 kg/ha is considered desirable based on a sustainable harvest figure of 0.24 kg/ha. The choice of this biomass is based on the assumption that the rate of exploitation on Lake Superior is 10% of the available biomass, and therefore, a standing stock of 2.4 kg/ha must be available to provide the historical harvest of 0.24 kg/ha.

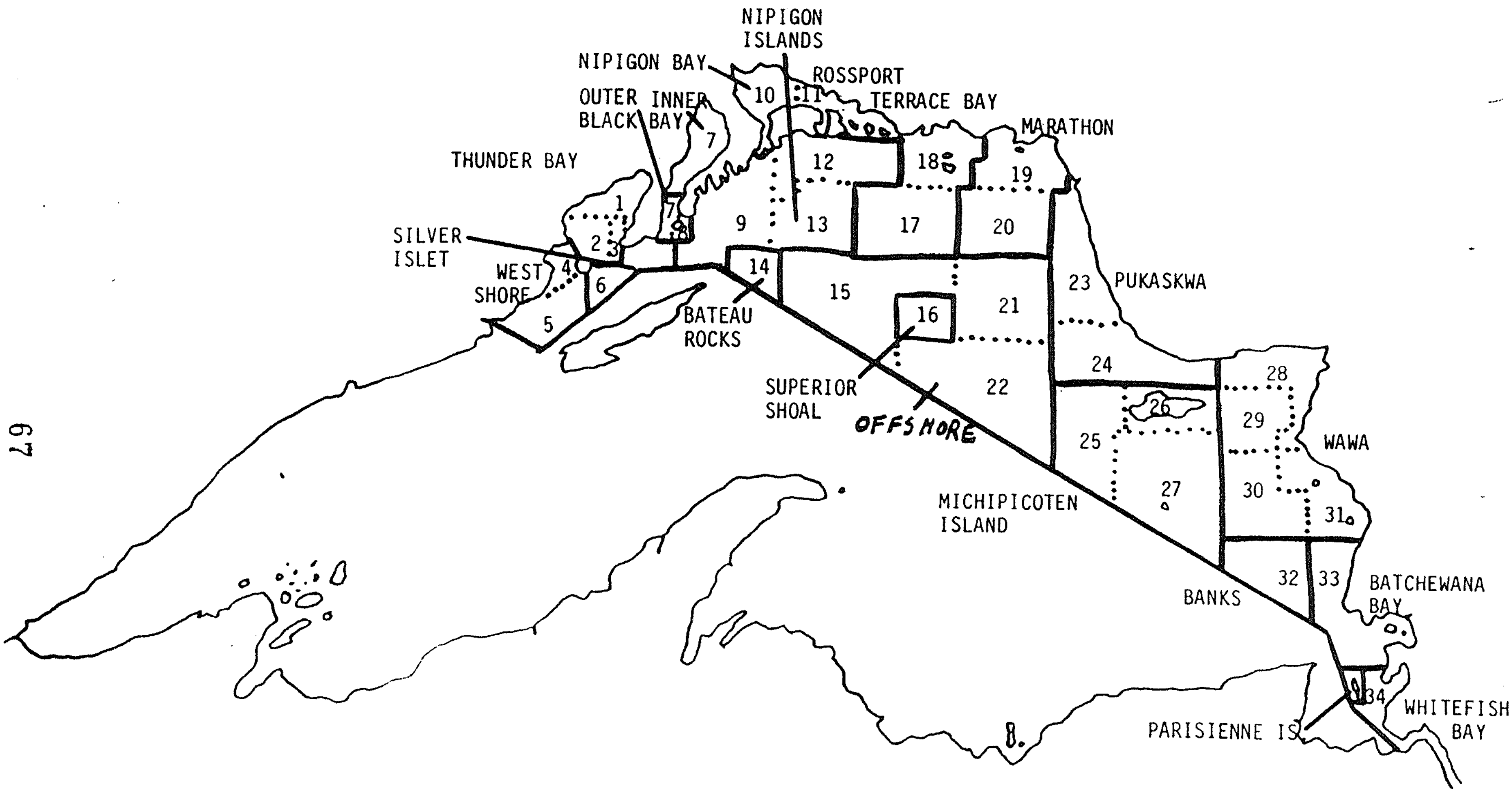
2. At least 9 year classes stocked in a 13 year period. This target was developed to ensure consistent year classes. Based on this model, stocking less than 9 years produces fluctuating year classes.

3. At least 500 female lake trout surviving to maturity. The number of reproductive females surviving to maturity was considered critical to the rehabilitation objective. The disappointments of rehabilitation to date in Lake Superior may be due, in part, to understocked lake trout that can not generate an aggregation with enough females for successful spawning. The number of mature fish per shoal in inland lake trout populations vary from 75 to 2,200. Approximately 500 mature female per shoal was assumed necessary to achieve rehabilitation. This number was calculated by summing the total number of fish from age 9 through age 17, inclusive, and dividing it in half.

Once these targets have been met by the stocking program, the rehabilitation of lake trout in Lake Superior should be sustained by harvest controls that keep the lake trout mortality at less than 50%.

This will be the basis for the development of the stocking requirements for the Ontario waters of Lake Superior and is believed to be consistent with the above recommended stocking rates for U.S. waters.

FIG. 2.



LAKE SUPERIOR MANAGEMENT ZONES • • • •
AND STOCKING AREAS ———

Appendix I. Revised Ontario stocking needs.

Stocking Zone	Fisheries Management Zones	Area 0-50 Fathoms (square mile)	Priority	Number of Fish Needed
Thunder Bay	1, 2, 3, 4	266	0	0
West Shore	4, 5	82	1	100,000
Silver Islet	6	24	0	0
Inner Black Bay	7	81	3	0
Outer Black Bay	7, 8	66	1	200,000
Nipigon Islands	9, 12, 13	144	1	300,000
Nipigon Bay	10, 11	137	2	300,000 (acc. fall fingerlings)
Rossport	11	85	2	0
Bateau Rocks	14	8	0	0
Terrace Bay	17, 18	62	1	60,000
Superior Shoal	16	13	0	0
Marathon	19, 20	101	1	170,000
Offshore	15, 21, 22	-	0	0
Pukaskwa	23, 24	108	1	170,000
Michipicoten Island	25, 26, 27	330	0	0
Wawa	28, 29, 30, 31	285	1	completed
Batchawana Bay	33	392	1	420,000
Banks	32	-	0	0
Whitefish Bay	34	159	3	0
Parisienne Island	34	50	1	100,000
Total				*1,820,000*