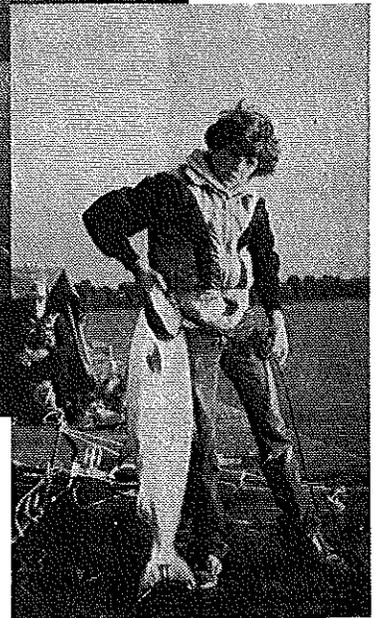
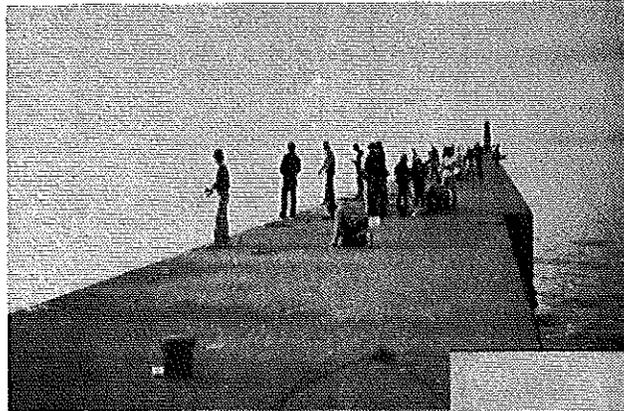
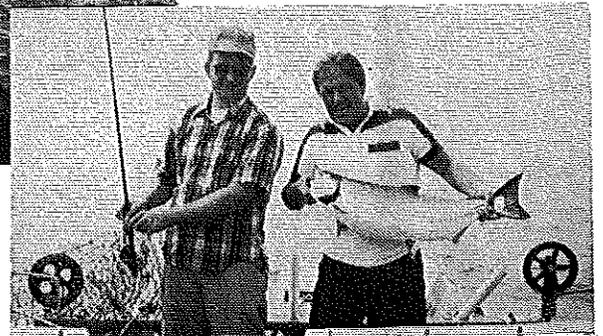


LAKE MICHIGAN FISHERIES MANAGEMENT PLAN

By Wisconsin Department of Natural Resources



Administrative
Report No. 25



Bureau of Fish Management
Department of Natural Resources
Madison, Wisconsin

March 1986

LAKE MICHIGAN FISHERIES MANAGEMENT PLAN

by

Wisconsin Department of Natural Resources

Lee T. Kernen
James T. Addis

Project Leader
Director, Bureau of
Fish Management

Brian Belonger
Cathy Bleser
Ron Bruch
Terry Dehring
Mike Hansen
Mark Holey
Dave Ives
Chuck Krueger

Terry Lychwick
Jim McNelly
Jim Moore
Paul Peeters
Tom Pellett
Ron Poff
Dennis Schenborn
Paul Schultz
Mike Toneys

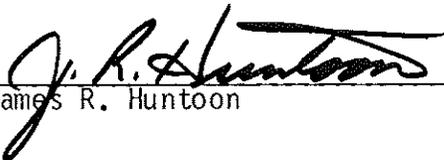
Cooperating Organizations

Wisconsin Federation of Great Lakes Sport Fishing Clubs:

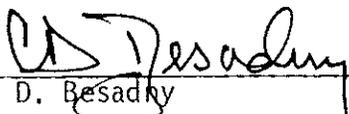
Kenosha Sport Fishing and Conservation Association
Salmon Unlimited of Wisconsin in Racine
Milwaukee Great Lakes Sport Fishermen
Ozaukee County Great Lakes Sport Fishermen
Sheboygan Area Great Lakes Sport Fishermen
Northeastern Wisconsin Great Lakes Sport Fishermen
Green Bay Area Great Lakes Sport Fishermen
Door County Great Lakes Sport Fishermen
Marinette-Menominee Great Lakes Sport Fishermen

Wisconsin Conservation Congress
Algoma Chamber of Commerce
Northeast Wisconsin Commercial Fisheries Association
Wisconsin Commercial Fishermen, Inc.
Southern Green Bay Commercial Fishing Association
Southern Wisconsin Commercial Fisherman's Association, Inc.
Sheboygan Charter Fishing Association

APPROVED:


James R. Huntoon

11/22/85
Date


C. D. Besadny

11-25-85
Date

EXECUTIVE SUMMARY

The Lake Michigan fishery has undergone many dramatic changes during the past 50 years. By the early 1950s, the lake's once abundant lake trout population had been decimated by commercial overfishing and predation by the parasitic sea lamprey, an invader from the Atlantic Ocean. As the commercial fishery turned to less valuable species such as chubs, another ocean native--the alewife--entered Lake Michigan. Unchecked by predators, the alewife population exploded and literally took over the lake, while native chub and perch populations fell dramatically.

Establishment of the Great Lakes Fishery Commission in 1955, with its sea lamprey control program, paved the way for the recovery of the fishery. Large-scale stocking of trout and Pacific salmon by the states surrounding Lake Michigan has helped restore balance to the fishery, and in the process, has created a world-class sport fishery.

Today, about 200 commercial fishers and 300,000 sport anglers share the Wisconsin waters of Lake Michigan. The 1980s sport fishery harvests nearly 700,000 trout and salmon each year--twice the lake trout poundage harvested 50 years ago during the heyday of the commercial lake trout fishery. Competition for fish and for the space and opportunity to pursue them has led to friction between the lake's user groups.

In response, the Wisconsin Department of Natural Resources (Department) has worked with the citizens who use Lake Michigan to develop a Lake Michigan Fisheries Management Plan (the Plan) for the rational management of the lake's fishery resources. This Plan has broad goals with quantified objectives. Obstacles to reaching those objectives are identified, along with tactics for overcoming each problem.

The goals were developed following the mandates given the Department by the Legislature and Natural Resources Board, and Wisconsin's commitment to federal efforts to reestablish a self-sustaining lake trout population. The objectives were developed by examining historical harvest levels, by scientifically predicting the lake's productive capacity, and through open discussions with appropriate user groups.

Certain objectives had to be moderated when it was determined that their attainment would preclude the accomplishment of other objectives. These adjustments were the focus of animated and sometimes heated debate between user groups during the public review period, which extended from July 1983 through April 1985. Department fish management personnel met with 21 groups along the Lake Michigan shore. Nearly 700 people attended the presenta-

tions at sport, commercial, and charter fishing associations. The Wisconsin Conservation Congress' Great Lakes Study Committee and various chambers of commerce also received presentations on the Plan.

Suggestions received at each presentation were recorded and evaluated, and many were written into the Plan. Total consensus was not possible, however the Plan does represent the best possible compromise, and is a logical and necessary framework on which to build the management of Lake Michigan by 1991.

This Plan not only clearly sets management goals and objectives, but also has more far-reaching policy implications:

- 1) By virtue of establishing maximum harvest figures, the Plan recognizes that Lake Michigan fish production is finite, and that although society may demand more fish from its waters, the lake simply may not be capable of producing more than it is now.

This translates into a clear message for both commercial and sport users: a) Commercial fishers must recognize that if more participants enter the fishery, individual quotas may be reduced accordingly; b) Sport anglers must recognize that the numbers of stocked trout and salmon cannot be increased without risk of depleting the forage fish populations.

- 2) The goal for lake trout rehabilitation reflects the Department's commitment to the U.S. Fish and Wildlife Service and the other lake states to reestablish a self-sustaining lake trout population. Because progress toward achieving this goal has been slow, restrictions on the taking of lake trout by all user groups will continue.
- 3) As fish populations fluctuate and the fisheries change to better exploit them, the harvest objectives will be reviewed and altered. This will result in regulatory changes for both the sport and commercial fisheries. The Department will remain open to public input during the development of such changes.

Lake Michigan Management Plan Goals and Objectives

Goals

THE GOAL OF FISH MANAGEMENT IS TO PROVIDE OPPORTUNITIES FOR THE OPTIMUM USE AND ENJOYMENT OF WISCONSIN'S AQUATIC RESOURCES, BOTH SPORT AND COMMERCIAL. A HEALTHY AND DIVERSE ENVIRONMENT IS ESSENTIAL TO MEET THIS GOAL AND SHALL BE PROMOTED THROUGH MANAGEMENT PROGRAMS, (NR 1.01(2)).

- A. Manage for a diverse, multi-species commercial fishery to allow an optimum sustained harvest.
- B. Manage for a diverse, multi-species sport fishery to allow an optimum sustained harvest and to provide a variety of angling opportunities.
- C. Reestablish self-sustaining lake trout populations to allow an optimum sustained sport and commercial harvest.

"Optimum sustained harvest" is defined as the yield that will provide the people of Wisconsin with the greatest overall benefit in food production and recreational opportunities, taking into account the effects harvesting has on dependent or associated species.

These goals must be achieved without curtailing the opportunities for non-fishery-related user groups. Each of these goals has an equal priority for achievement.

Objectives

A. 1991 Commercial Fishery

1. Manage the lake whitefish populations at levels that will allow a sustained annual harvest of 650,000 pounds.
2. Manage the chub populations at levels that will allow a sustained annual harvest of 4 million pounds.
3. Manage the yellow perch populations at levels that will allow a sustained annual harvest of 600,000 pounds in Green Bay and 200,000 pounds in Lake Michigan.
4. Manage the round whitefish populations at levels that will allow a sustained annual harvest of 40,000 pounds.
5. Determine the status and trends of the Lake Michigan forage populations including, but not limited to, alewife and smelt. Limit trawl units to the number that is currently

fishing these stocks until the effects of this gear are better understood.

6. Describe and characterize the northern pike population in Green Bay.
7. Encourage the development of a fishery in Lake Michigan and Green Bay to harvest burbot, carp, suckers, and other under-utilized species.
8. Develop and implement management tactics to minimize or eliminate incidental catch mortality of all nontarget species.

B. 1991 Sport Fishery

1. Maintain the 1982-1984 average annual harvest of 650,000 trout and salmon within the capacity of the forage base.
 - a. Reduce total lake trout harvest to 82,000 fish or less and reduce harvest in streams to zero.
 - b. Increase rainbow trout harvest from 25,000 to 50,000 annually.
 - c. Increase the harvest of the remaining salmonid species to compensate for lake trout harvest reductions.
 - d. Produce a limited trophy fishery for chinook salmon that exceed 50 pounds.
2. Manage the redeveloping perch sport fishery in Lake Michigan and Green Bay.
 - a. Manage Green Bay for an annual sport harvest of 1.2-1.9 million yellow perch that average 4-5 fish per pound.
 - b. Manage Lake Michigan (outside of Green Bay) to sustain an annual sport harvest of 350,000 - 400,000 yellow perch at 4 fish per pound.
3. Manage the Green Bay walleye fishery to provide an annual sport harvest of 50,000 fish from a population that has 10 age classes.
4. Maintain the angling opportunities at the current level for the remaining sport species until their population status can be determined.

C. 1991 Lake Trout Rehabilitation

1. Provide a naturally reproduced year-class of lake trout that is detectable at the yearling life stage.
 - a. Manage fisheries mortality of lake trout to provide an average annual total mortality of not more than 40 percent lakewide.
 - b. Develop lake trout populations in two primary rehabilitation areas that exhibit seven mature age classes, and either:
 - i) an October spawning density of 4 trout per acre of spawning reef, or
 - ii) an annual egg deposition of 3,000 fertilized eggs per acre of spawning reef.
2. Provide an evaluation report of progress toward Objective 1 by 1991 to determine the status of lake trout rehabilitation.

CONTENTS

Executive Summary and Recommendations	1
Introduction	7
Purpose	7
Scope	7
Mandate	7
Description of the Resource and Fisheries	10
Geographical Description	10
Fisheries History Before 1963	10
Status of the Fisheries, 1963-1981	12
Current Sport Fishery, 1982-1984	13
Current Commercial Fishery, 1981-1983	18
Industrial Contaminants	22
Public Participation	28
Rationale	28
Plan Development	28
Lake Michigan Fishery Management Plan	30
Goals	30
Objectives	30
Rationale	32
Problems and Tactical Solutions	45
References	59
Appendix	60

INTRODUCTION

Purpose

The Lake Michigan Fisheries Management Plan (the Plan) was prepared by the Wisconsin Department of Natural Resources (Department) for two purposes. First, the goals and objectives established in the Plan will guide practical management of Wisconsin's Lake Michigan fisheries so it best benefits the state's citizens. The public participated extensively in the making of the Plan so that it would reflect what state citizens want from Lake Michigan.

Second, the Plan identifies the obstacles to meeting the established goals and objectives, and develops tactics for overcoming these problems. Specific operational projects for Lake Michigan fisheries personnel will emerge from these tactics.

As the Plan is put into action, it will promote more efficient, consistent fisheries management, and will fully inform all resource users on what they can expect from Lake Michigan and from the Department.

Scope

The Plan covers the six years from 1985 through 1991, when it will be re-evaluated and revised. During this interim, the original Plan will be a "living document." Should drastic changes occur in Lake Michigan that are not accounted for by the Plan, the Department with public input will develop appropriate actions.

Mandate

Section 23.09 of the Wisconsin Statutes grants the Department authority in conducting fisheries management activities:

1. Section 23.09: Conservation.
 - a) Purpose: The purpose of this section is to provide an adequate and flexible system for the protection, development, and use of forests, fish and game, lakes, streams, plant life, flowers, and other outdoor resources in this state.
 - b) Departmental Rules, Studies, Surveys, Services, Powers, Long-Range Planning: The department may make such rules, inaugurate such studies, investigations, and surveys, and establish such services as it deems necessary to carry out the provisions and purposes of this section. The department shall establish long-

range plans, projects, and priorities for conservation.

2. Section 29.085: Department to regulate hunting and fishing in interstate waters.

The department may regulate hunting and fishing on and in all interstate boundary waters, and outlying waters specified in S. 29.09(4). Any act of the department in so regulating the hunting and fishing on and in such interstate boundary waters and outlying waters shall be valid, all other provisions of the statutes notwithstanding, provided such powers shall be exercised pursuant to and in accordance with SS. 23.09(2) and 29.174.

The Department also receives instruction from the Natural Resources Board through the following Wisconsin Administrative Code:

NR 1.04 Great Lakes fisheries management: The board endorses a flexible management system for the protection, development and utilization of the waters and fish populations of the Great Lakes for the maximum public benefit.

- 1) Management of the Great Lakes is of intrastate, interstate, federal, and international interest; therefore, cooperation with managing agencies shall be sought in developing management objectives and measures for fish stocks of common concern.
- 2) The Great Lakes fisheries are to be considered part of a diverse community. The department shall promote efforts to maintain and enhance the quality of this community and its environment.
- 3) Management of the fishery resources shall be based on a sound understanding of the dynamics of interacting fish stocks. The department shall conduct research and resource base inventories, and collect harvest and utilization statistics on which to base sound management decisions.
- 4) The fishery resources of the Great Lakes, though renewable, experience dynamic changes and are limited. The resources will be managed in accordance with sound biological principles to attain optimum sustainable utilization. Management measures may include but are not limited to seasons, bag and quota limits, limitations on the type and amount of fishing gear, limitation as to participation in the fisheries and allocation of allowable harvest among various users and the establishment of restricted areas.

Finally, the Department receives additional mandates via the Joint Strategic Plan for Management of Great Lakes Fisheries. This basin-wide plan was developed under the auspices of the Great Lakes Fishery Commission and was formally signed and adopted on June 17, 1981. Wisconsin entered into the joint plan along with the seven other Great Lakes states, the U.S. Fish & Wildlife Service, the National Marine Fisheries Service, the Ontario Ministry of Natural Resources and the Canada Department of Fisheries and Oceans. The plan was created to coordinate fisheries and environmental management efforts throughout the Great Lakes basin, and stresses consensus decision making. As a signatory agency, Wisconsin has agreed to a set of strategic procedures for coordinating activities and resolving conflicts.

DESCRIPTION OF THE RESOURCE AND FISHERIES

Geographical Description

Lake Michigan is the world's sixth largest lake in both area and volume, and among the Great Lakes, is the only one lying entirely within U.S. boundaries. Jurisdiction over Lake Michigan's waters is divided among Michigan, Wisconsin, Illinois, and Indiana; the largest shares, by far, belong to Wisconsin and Michigan. Wisconsin's portion comprises 4.7 million acres of water and 495 miles of shoreline as well as 25 permanent tributary streams.

Fisheries History Before 1963

Commercial - Commercial fishing began at least as early as the 1840s, and grew rapidly. The first commercial fishers worked close to shore using haul seines. Gill nets were introduced in about 1846, and pound nets about 10 years later. Together, gill nets and pound nets replaced haul seines. Today, gill nets and trap nets remain the predominant gears.

In those early days, commercial fishers concentrated on whitefish, which were plentiful near shore. By 1860, however, commercial fishing already had exhausted several whitefish populations, and in the 1870s people complained that whitefish were scarce. Commercial fishers shifted to new fishing grounds, stepped up their effort, and used more efficient gear to maintain high production. Twelve million pounds of whitefish were harvested lake-wide in 1879.

Lake trout and lake herring were becoming important by that time, and although whitefish production soon plummeted, the total average annual production flourished at about 41 million pounds at the turn of the century. Lake herring dominated the commercial harvest, but were heavily exploited and soon declined abruptly, bringing down total production as well. Total harvest then stabilized at an average of 23.6 million pounds per year from 1911 through 1942, and lake trout became the most valuable commercial species. Several species of deepwater ciscoes--better known as "chubs"--had become second in importance.

Non-native fish species new to Lake Michigan gradually began transforming the commercial fishery. By 1931, smelt, which was introduced in 1912, and carp, introduced in 1876 and first recorded in 1893, were abundantly harvested by commercial fishers.

Then, two Atlantic Ocean fish unexpectedly invaded and claimed Lake Michigan's waters. The parasitic sea lamprey entered the Great Lakes through the St. Lawrence Seaway and was first recorded taken from Lake Michigan in 1936. Within a decade, commercial fishers were complaining of high incidences of lamprey

wounds on fish they caught--especially lake trout, the lamprey's favored target. Overharvest and lamprey predation swiftly decimated the lake trout population, and by 1956 the lake trout--the top native predator--had vanished from Lake Michigan.

As the lake trout population was approaching extinction, the lamprey shifted to whitefish, contributing to their decline. Both lampreys and commercial fishers then selected for the larger chub species, thereby favoring the smallest species, the bloater. By the early 1960s, chub stocks were composed almost entirely of bloaters. Peak annual chub production occurred from 1960 to 1962 (12 million pounds).

The alewife--a silvery, thin, saltwater fish--also followed the St. Lawrence Seaway into the Great Lakes, and was first recorded in Lake Michigan in 1949. Unchecked by predators, the alewife population exploded, apparently causing the collapse of the native yellow perch population. Alewife dominated the commercial fishery by the 1960s, when trawlers were encouraged to harvest them.

Sport - Records of sport fishing's history are sparse, consisting mostly of occasional references. One such reference mentions the popularity of fishing for yellow perch from the Chicago area piers and wharves in 1885. In Wisconsin, yellow perch anglers lined the breakwalls on Lake Michigan until the 1960s, and perch dominated the sport catch.

Walleye fishing also drew scores of sport anglers to Green Bay, where huge numbers of walleye were taken in the 1950s. The walleye population steadily declined after 1955, however.

From 1936 on, smelt inhabited the entire lake and were caught in tributary streams during their spawning run, and throughout Lake Michigan's shallow waters. The smelt population must have been enormous in 1942, when a peak catch--an estimated 5 million pounds--was taken by dip net sport fishers. In 1942 and 1943, smelt populations crashed, apparently due to disease.

Smallmouth bass was a popular sport fish in the waters of Green Bay and off Door County. Northern pike and rock bass also dwelt in these warmer waters, providing seasonal sport fishing for nearshore anglers.

Fisheries Management - Management of Lake Michigan officially began in 1875, when a temporary hatchery for whitefish and lake trout was set up in the engine house of the Milwaukee Water Works. Permanent hatcheries were built in 1911 at Sheboygan and Sturgeon Bay, but ceased operating when stocking did not prove successful.

Most early fisheries management was focused on regulating commercial fishing through size limits, mesh restrictions, and seasons. Commercial catch reports were required as of 1936.

The first fish manager assigned to Lake Michigan in 1952 concentrated on installing the first mechanical sea lamprey barriers in Door and Kewaunee counties. By 1958, electrical and mechanical barriers were placed across 65 tributary streams in an attempt to eradicate this predator as it continued to ravage native fish stocks.

A landmark event in Great Lakes management was the 1955 establishment of the Great Lakes Fishery Commission, by convention between Canada and the United States. Federal money and power were needed to tackle the sea lamprey problem and begin a lake trout rehabilitation program.

Status of the Fisheries, 1963 - 1981

A means of controlling the swarming population of alewives and restoring balance to Lake Michigan's beleaguered fisheries was needed. By the 1960s, alewives made up over 80 percent of Lake Michigan's biomass and were an intolerable nuisance, fouling beaches and clogging municipal and industrial intake pipes as their numbers continued to climb. Trout and salmon stocking offered a possible solution.

In 1963, Wisconsin's modern Lake Michigan fish management program was set in motion when 9,000 rainbow trout were released into a Door County tributary stream. The 1965 Anadromous Fish Conservation Act provided federal money that made large-scale salmonid (trout and salmon) stocking possible.

The lake trout rehabilitation program, coordinated by the Great Lakes Fishery Commission, also began in 1965. From then on, an average of 2 million federally produced lake trout were annually stocked lakewide. Lake trout stocking was to continue until natural reproduction took over, and commercial fishing for lake trout was prohibited.

Meanwhile, the federal government made new strides in sea lamprey control with a chemical that selectively kills sea lamprey larvae. By 1966, 3-trifluoromethyl-4-nitrophenol (TFM) had been applied to all of the lamprey's known tributary spawning grounds, and the sea lamprey population fell dramatically. The commercial harvest of whitefish, which had been badly victimized by the lamprey after it had destroyed the lake trout, began to make a slow comeback.

The alewife explosion helped drive the chub population into a severe decline that began in the mid-60s. The chub population

did not begin to recover until first a lakewide ban, and then a quota were imposed on the chub fishery in the mid- and late 70s.

In 1966, the Michigan Department of Natural Resources brought coho and chinook salmon--Pacific Ocean predators that would occupy the same habitat as the alewife--to Lake Michigan. Wisconsin began its coho salmon stocking program in 1968, and chinook salmon were first introduced in 1969. By the late 1970s, Wisconsin was releasing about 2 million chinook and one-half million cohos a year into its Lake Michigan waters.

This innovative stocking program not only succeeded in controlling the alewife, but also gave birth to a spectacular trout and salmon sport fishery that attracts anglers from throughout the United States.

Wisconsin began monitoring this newborn Lake Michigan sport fishery in 1969 with an annual creel survey of pier, shore, stream, and ramp-launched boat anglers. Charter boat fishing soon became a thriving industry, and charter captains were required to report their catch information from 1976 on. By 1981, the annual sport catch of salmon and trout from Wisconsin's Lake Michigan waters was at least 500,000 and rising.

Current Sport Fishery, 1982-1984

Large-scale stocking of salmon and trout continues to sustain Wisconsin's Lake Michigan sport fishery, which is estimated to be worth \$60 million a year. Wisconsin annually stocks about 7 million chinook and coho salmon, and lake, brown, rainbow, and brook trout. From 1982-1984, sport anglers harvested a yearly average of about 650,000 of these game fish from Wisconsin's Lake Michigan waters.

Today's Lake Michigan anglers are a heterogenous mix of pier, shore, and stream anglers, and trollers who charter, moor, or trailer their boats. Moored boat trollers--who formerly had not been included in the creel surveys--began volunteering their catch information in 1982. This group turned out to be a vital sector of the fishery, contributing as much as 32 percent of the total harvest.

The charter boat industry has grown markedly in recent years, as it attracts more and more out-of-state anglers. In 1984, a record 117,709 salmon and trout--more than double the 1981 catch--were reported harvested by Wisconsin's Lake Michigan charter trollers. This sharp rise in catch numbers parallels the increase in number of charter licenses sold, from 172 in 1981 to 477 in 1984. Since 1980, chinook salmon has dominated the charter catch, especially during July and August, when charter captains are doing peak business.

The prized chinook is Wisconsin's most intensely stocked fish, and is abundantly harvested by all types of Lake Michigan anglers. Each year from 1982 through 1984, Wisconsin stocked from 2.5 to 3 million chinook. Returns to anglers averaged about 283,000 chinook a year--44 percent of the total average annual sport catch (see Figure 1). This sizable harvest of one of the largest salmon species explains why chinook constituted a 65 percent of the 1982-84 sport harvest poundage (Figure 2). Currently, sport anglers are getting an average 10-percent return on chinook stocking.

Lake Michigan's native predator, the lake trout, is still not reproducing naturally, but hatchery-reared lake trout are thriving, and so are lake trout sport fishers. Lake trout ranked second in the 1982-1984 overall sport harvest, and made up 18 percent of its poundage. Catch numbers were especially high in 1983, when weather patterns drove coho salmon offshore and trollers apparently compensated by targeting more lake trout. The lake trout is a deep-water dweller, so is harvested almost exclusively by trollers.

While Wisconsin has stocked less than 360,000 cohos a year from 1982-1984, its opposite-shore neighbor, Michigan, has been stocking 2 million cohos a year. These long-distance swimmers wander into Wisconsin waters, and help supply Wisconsin sport anglers with an average yearly coho catch of 120,000 per year. Studies have shown that up to 60 percent of the coho taken in Wisconsin's portion of the lake were stocked in other states' waters. Cohos are caught predominantly by trollers and pier anglers.

Well over a million brown trout have been planted each year from 1982 through 1984, but their contribution to the total harvest, compared to salmon and lake trout, has been small. Brown trout inhabit warmer, more shallow waters and are not targeted by charter and moored boat anglers. Yet, they make up an important portion of the shore and pier anglers' catch. Most of the brown trout's 4-percent stocking return comes out of the shallower waters of Green Bay.

Despite similar stocking levels, the rainbow sport harvest has been even lower, bringing a mere 2-percent stocking return. As yet, no explanation has been found for this poor return.

An average 3-percent return on the relatively small numbers of brook trout stocked has come mostly from stream, shore, and pier anglers.

The average amount of time anglers expend on a catch varies widely among angler types (see Figure 3). From 1982-1984, it took charter boat trollers an average of only 3.5 hours to catch

Figure 1
 WISCONSIN'S LAKE MICHIGAN SPORT FISHERY
 CATCH AND CATCH COMPOSITION, 1982 - 1984

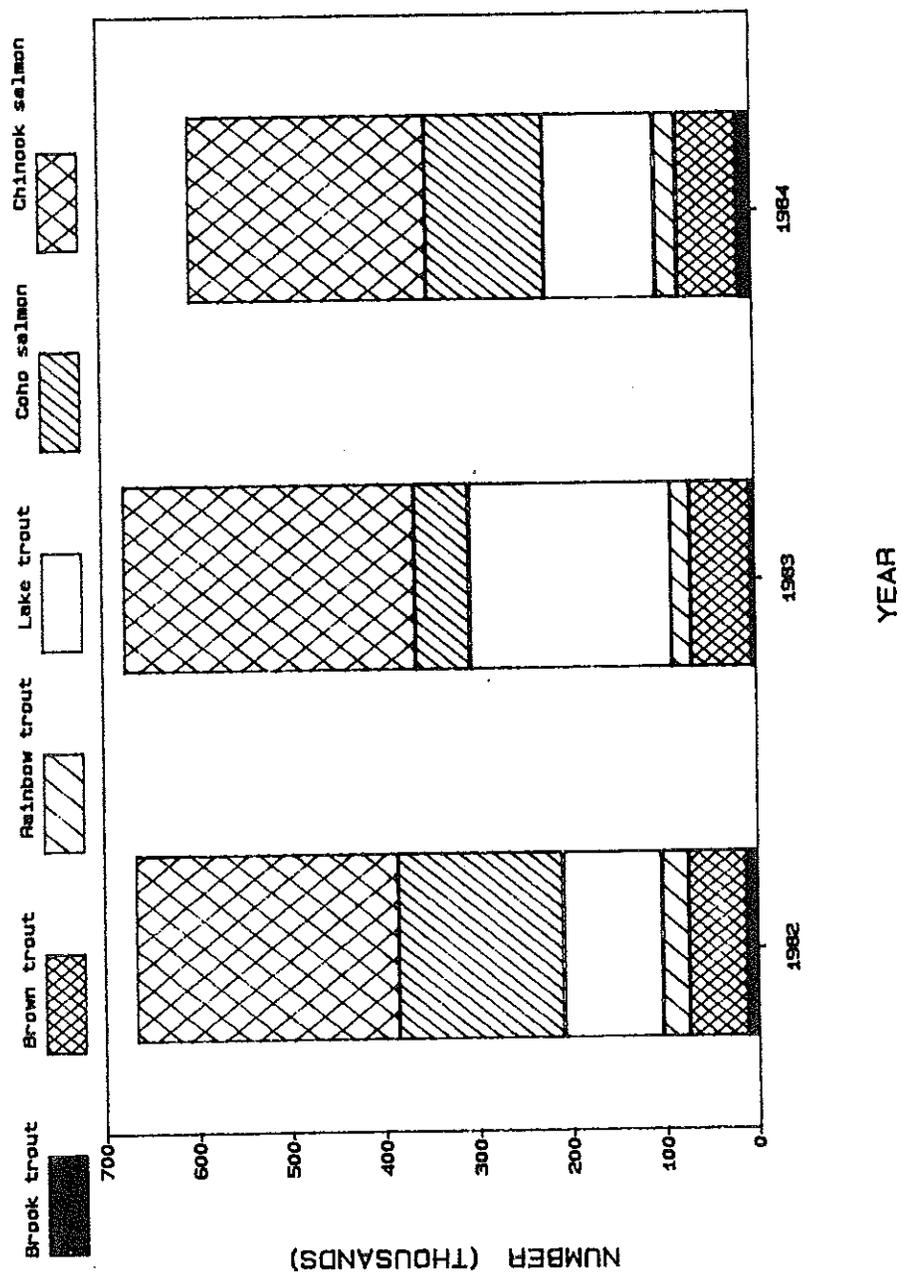


Figure 2

SPECIES' BIOMASS CONTRIBUTIONS
1982 - 1984 LAKE MICHIGAN SPORT FISHERY

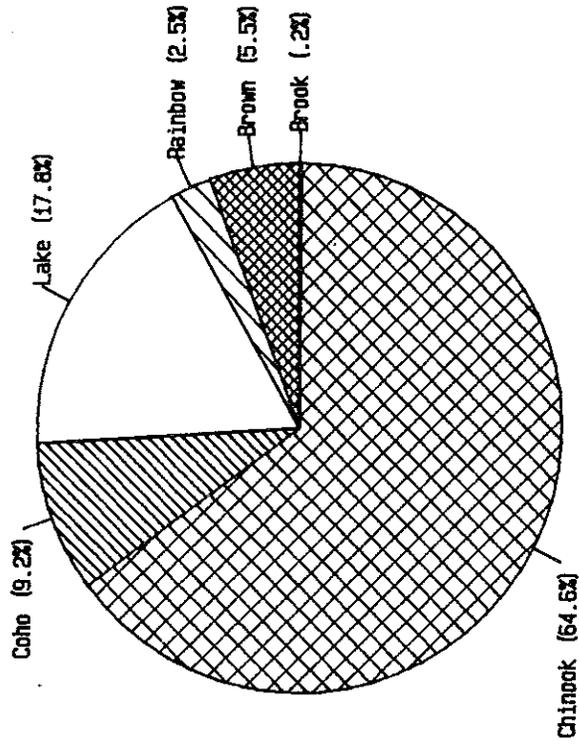
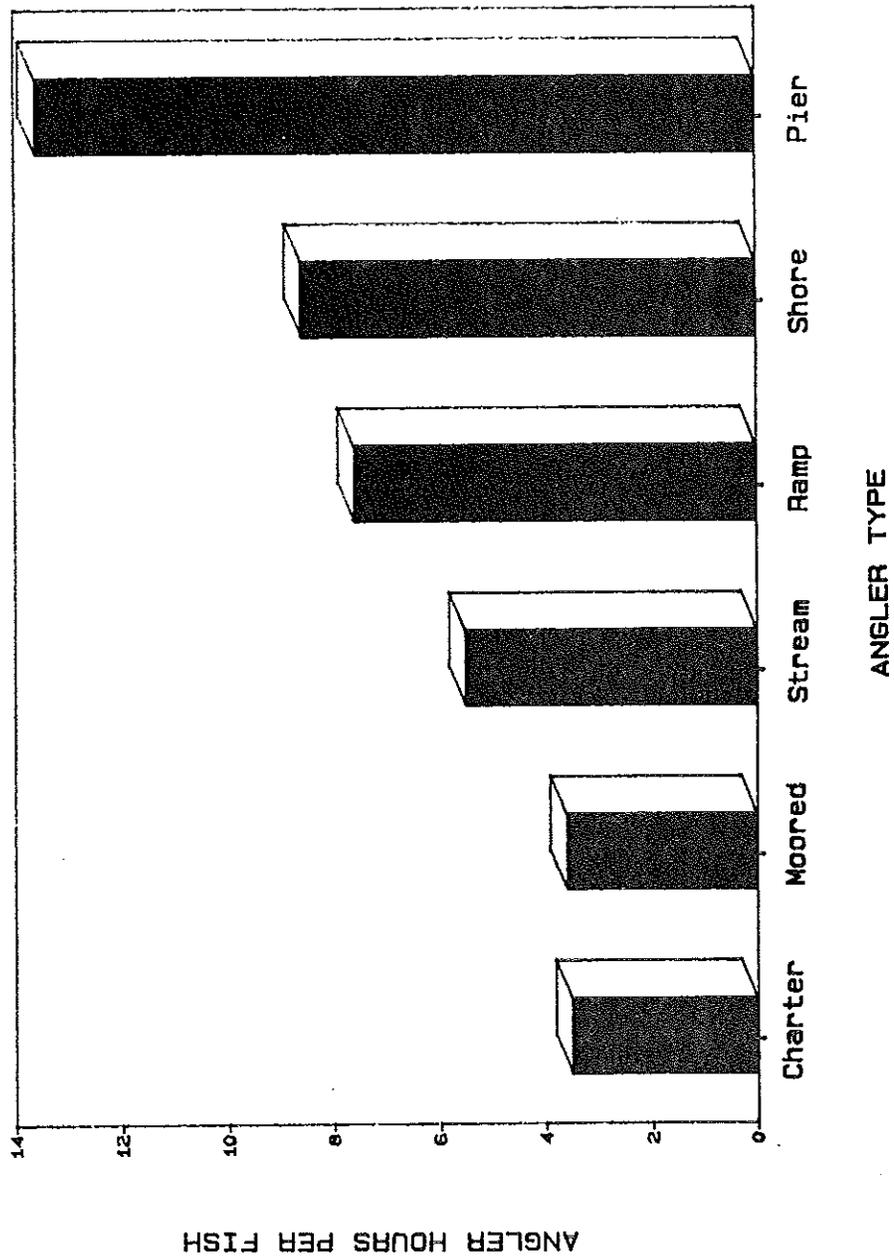


Figure 3
 ANGLER HOURS EXPENDED PER FISH CAUGHT
 1982 - 1984 LAKE MICHIGAN SPORT FISHERY



a fish, while pier fishers invested an average of 13.6 hours per catch.

Total Department Fish Management expenditures for the Lake Michigan sport fishery were \$1,532,223 in 1983-84. Table 1 provides a breakdown of these current program costs.

Table 1

1983 - 1984 Lake Michigan Sport Fishery Expenditures*

A. General fishing license money expenditures:	
Hatchery operations	\$711,943
Lake Michigan sport fish projects	185,067
Salaries for salmon stamp projects	131,244
Central office	96,552
Data processing	4,000
B. Salmon stamp money expenditures: 403,417	
TOTAL: \$1,532,223	

*Does not include facilities development costs.

Current Commercial Fishery, 1981-1983

Today, Wisconsin's Lake Michigan commercial fishery lands nearly 26 million pounds of fish a year, worth about 3.4 million dollars. The number of licensed commercial fishers has gradually but steadily dropped to about 200 in recent years.

Alewives, which are primarily used by the pet food industry, still dominate the commercial catch at 80 percent of the total poundage (see Figure 4). Market demand has set the harvest level at about 20.6 million pounds per year, however alewife has a relatively low value of 2-cents per pound, and the harvest value (about \$440,000) ranks fourth among all commercial species (see Figure 5). Most of the alewife harvest is taken by trawlers off Two Rivers and Manitowoc.

The bloater chub harvest, averaging about 2 million pounds per year, is the most highly valued commercial catch. Valued at about 1.4 million dollars, it accounts for 41 percent of the worth of the entire commercial harvest. The chub harvest is limited by a 3-million-pound quota that is allowing chub populations

Figure 4

Commercial Fish Production in Wisconsin Waters
of Lake Michigan - 1981 through 1983 Average

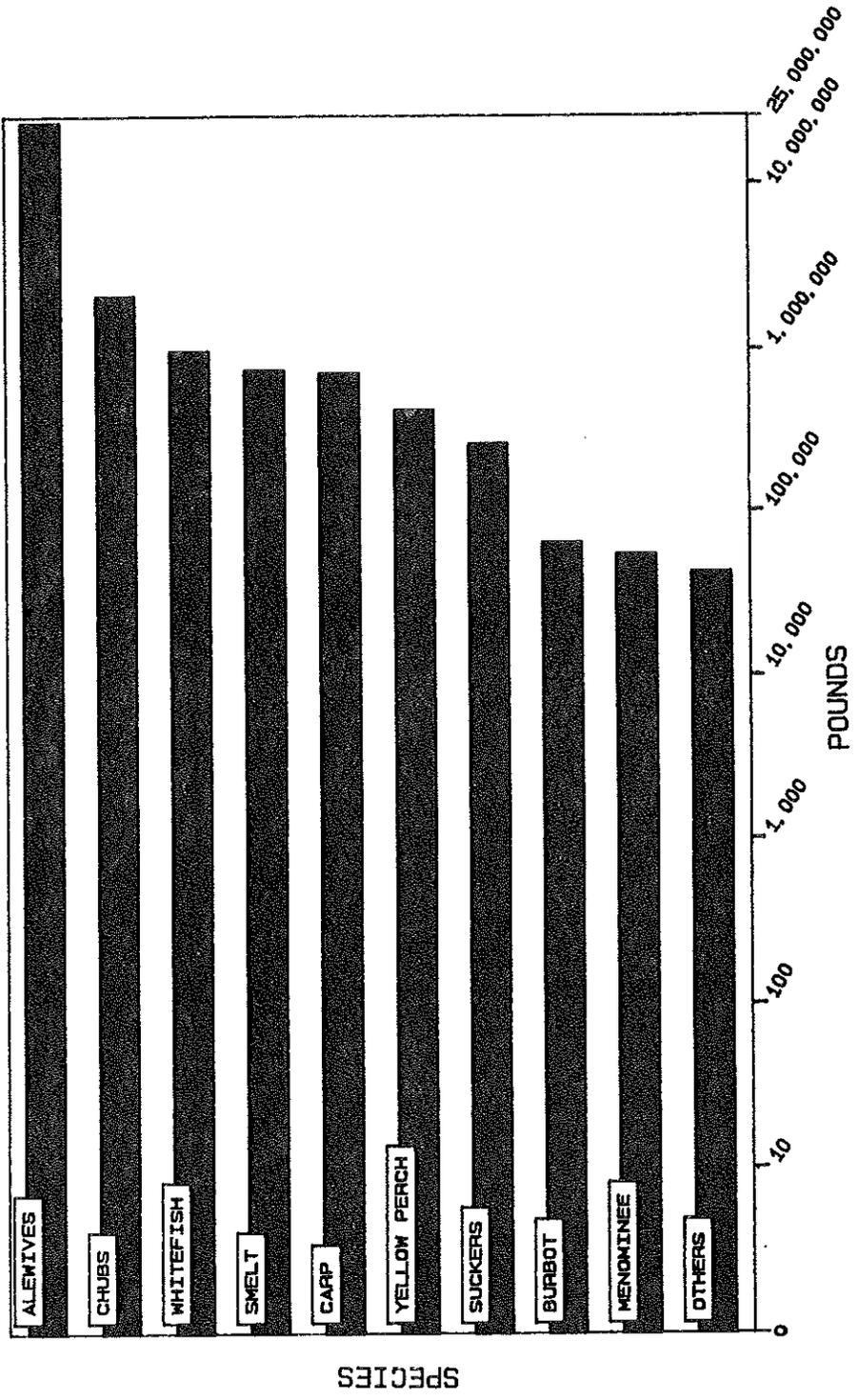
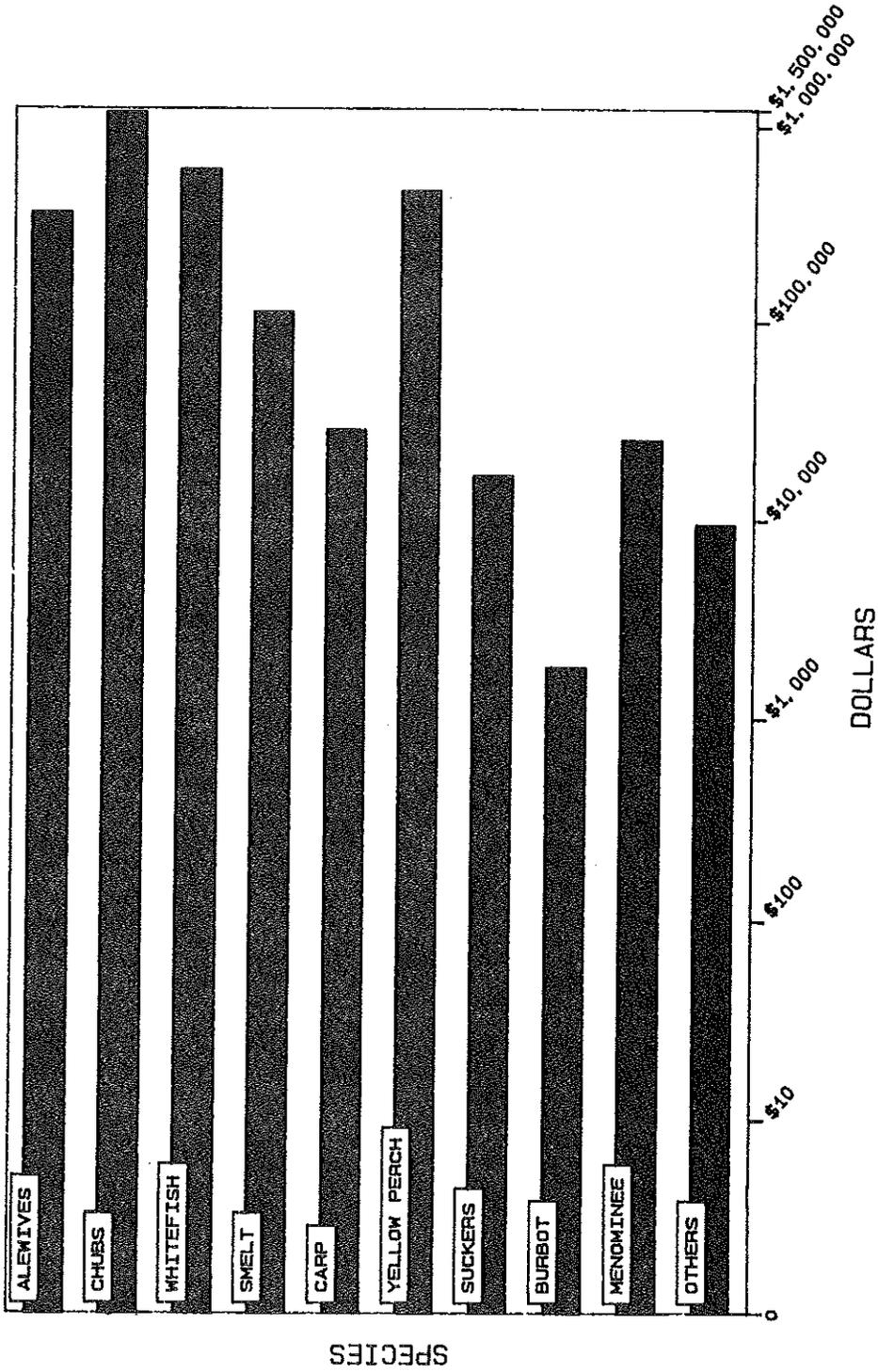


Figure 5

Commercial Fish Production in Wisconsin Waters
of Lake Michigan - 1981 through 1983 Average



to recover from a severe drop that began in the mid-60s. These fish are taken with small mesh gill nets set in deep water; most are caught south of Kewaunee, and the remainder are caught north of Baileys Harbor.

Whitefish are commercially harvested by trap, pound, and large mesh gill nets north of Baileys Harbor and in Green Bay. Trap and pound nets fished near Manitowoc and Sheboygan take lesser amounts of whitefish. An average of nearly 940,000 pounds of whitefish are caught by Wisconsin commercial fishers each year. The value of the harvest--nearly \$736,000--is second greatest among all commercial species.

Most of the whitefish are caught off Door County from May through December; lesser numbers are caught off Sheboygan, Two Rivers, and Algoma from spring through fall during their northward migration to the Door County spawning grounds.

Smelt are fished commercially mostly during the winter by trawlers at Two Rivers and Manitowoc and in small mesh gill nets and pound nets elsewhere. The smelt catch varies widely from year to year, averaging about 718,000 pounds from 1981-1983, with an average value of about \$136,000.

Carp were caught commercially in Green Bay using large mesh gill nets until 1984, when commercial carp fishing was banned due to PCB contamination. Prior to that time, the carp harvest had been increasing, averaging about 686,000 pounds. The value of this catch was about \$34,000.

Before 1984, the commercial fishery for yellow perch was concentrated in Green Bay. The perch fishery in Green Bay is regulated by a quota and operates in shallow water, using small mesh gill nets and drop (fyke) nets. An average of 409,000 pounds of perch are taken each year in Green Bay, at a value of \$570,000. Recently, the commercial perch harvest has increased dramatically in southern Lake Michigan in response to the resurging perch populations there.

All other commercially valuable species are considerably less important in both pounds harvested and value. Most of these minor species are fished by small operators, by large operators during lulls in fishing for the major species, or are landed incidentally while fishing for major species. Menominee (round whitefish) are the most valuable of the minor species; nearly 54,000 pounds are caught annually at a value of over \$30,000.

Total Department management expenditures for the Lake Michigan commercial fishery were \$211,127 in 1983-84. Table 2 provides a breakdown of these program costs.

Table 2

1983-84 Lake Michigan commercial fishery expenditures

General fishing license money expenditures:

Lake Michigan commercial fish projects	\$178,501
Central office	20,026
Data Processing	12,600
TOTAL:	\$211,127

Industrial Contaminants

History - Contamination of Lake Michigan and its fish stocks is tied to the widespread use of chemicals for industrial and agricultural purposes throughout the Great Lakes basin. Today, about 300 chemical compounds have been detected in Lake Michigan. Some of the most toxic substances fall into a group of organic compounds known as the chlorinated hydrocarbons, which includes pesticides such as DDT, dieldrin, and chlordane, as well as PCBs (polychlorinated biphenyls).

The 1962 publication of Rachel Carson's Silent Spring--a book about pesticides and their effects in nature--first alerted the general public to how these organic contaminants affect fish and birds. These persistent chemicals progressively accumulate up through the food chain and concentrate in certain fish, sea birds, and eventually in humans.

Concentrations of these chemicals in Lake Michigan's waters are generally low, and the water has been determined safe for all uses, including for drinking water. But because fish accumulate these contaminants, they contain much higher concentrations, evoking public concern about consuming Great Lakes fish.

These chemicals concentrate most heavily in the fatty tissues and in fish species with a high fat content. As a rule, they tend to concentrate in the largest and oldest predator fish--those at the top of the food chain. Contaminants eventually sink to the bottom of the lake and lie in the sediments, so bottom-feeders like carp can reach some of the highest concentrations.

DDT was the first toxic substance identified in Lake Michigan fish. The pesticide was banned nationally in 1972, and DDT levels in fish have declined markedly since then. Current (1984) levels are below the 5 parts per million tolerance level in all

but the largest lake trout. DDT breaks down to DDE, which is also toxic, but like DDT is at low levels in all fish except large lake trout.

The Federal Food and Drug Administration (FDA) establishes tolerance levels for toxic substances in food, so has jurisdiction over the interstate sale of fish from Lake Michigan. In 1971, PCB levels exceeding the FDA tolerance level of 5 parts per million were found in certain fish. Wisconsin banned sale of its coho salmon, chinook salmon, and lake trout, and issued its first consumption advisory. In 1976, the federal government banned manufacture of PCBs, and a year later proposed reducing the tolerance level to 2 parts per million. An anticipated \$49 million loss to the fishing industry delayed this reduction. Since 1976, PCB levels substantially declined in all Lake Michigan fish. By 1984, most trout and salmon, with the exception of lake trout, were meeting the 5 parts per million FDA standard. However, in August 1984, the FDA lowered the PCB tolerance level in fish to 2 parts per million. This meant that many of the larger Lake Michigan fish again exceeded the tolerance level.

Current Management Implications - In 1984, the Department banned the commercial carp fishery on Green Bay because fish exceeded FDA levels for PCBs. That same year, dieldrin levels in chubs prompted the Wisconsin Department of Agriculture, Trade and Consumer Protection, in cooperation with the commercial fishing industry, to develop a system for testing smoked chubs before they reach consumers. These actions will continue as necessary to protect the public health.

Sport-caught fish are not legally sold on the market, so they do not have to conform to the same regulations as commercially sold fish. Nevertheless, the Department must inform the fishing public of the possible health hazards of eating contaminated fish. Since 1971, the Department has regularly published a health advisory that groups species and sizes of fish according to their contaminant concentrations. In 1984, under the auspices of the Environmental Protection Agency, Wisconsin joined with the three other states bordering Lake Michigan to develop a more comprehensive health advisory. This advisory will continue to be updated as new information becomes available (see Figure 7).

The rationale for stocking the current mix of fish species in Lake Michigan is a complex blend of manager intuition, cost of raising fish, availability of a species, and commitment to lake trout rehabilitation. Both the federal government and the lake states are committed to reestablishing the lake trout as Lake Michigan's natural predator, yet this species is most likely to concentrate organic contaminants in high levels. The current advisory recommends that no one eat lake trout larger than 25 inches. However, PCB levels in fish samples are declining, which gives rise to the hope that by the year 2000, all but the largest

Figure 6

Health advisory for Lake Michigan fish eaters

Wisconsin Department of Natural Resources

May, 1985

Pollutants have contaminated many Lake Michigan fish

Varying amounts of PCBs (polychlorinated biphenyls), pesticides and other environmental contaminants are found in fish worldwide. These contaminants are also found in Lake Michigan fish.

Eating contaminated fish poses a health risk

State health officials believe that eating even small quantities of contaminants found in fish or other food, in drinking water or from elsewhere in the environment poses a potential risk to public health.

Even fish that contain only low levels of contaminants can pose a health risk if you eat them often enough. That's because some of the contaminants found in fish eventually reach your body fat, where they may remain for many years.

Right now, the risks these contaminants pose to your health are not well-defined. However, long-term exposure to some contaminants found in fish can cause cancer, birth defects and reproductive

problems in humans and other mammals. Children, infants and human fetuses are especially vulnerable.

Reducing this health risk is up to you!

The easiest way to protect your health from contaminants is to limit your overall exposure to them in the first place.

In the case of Lake Michigan fish, you have several options: eat fewer fish, eat fish less often, eat only smaller fish or give up eating Lake Michigan fish entirely.

This decision, however, is yours alone to make — with help from a new advisory.

New advisory lists which fish are the least risky to eat

Wisconsin, Illinois, Indiana and Michigan have prepared a new health advisory (explained in the chart below) that tells you which Lake Michigan fish are the least risky to eat.

The advisory applies throughout the entire lake, so the health advice is the same no matter where you catch fish in Lake Michigan.

Which Lake Michigan fish are safest to eat?		
 Group 1	 Group 2	 Group 3
Yellow perch Smelt Coho salmon Lake trout under 20 inches in length Rainbow trout	Chinook salmon 25 inches or longer* Lake trout 20 to 25 inches long	Brown trout** Lake trout 25 inches or longer Carp
Eating Group 1 fish poses the lowest health risk. Trim all skin and fat from these fish before cooking them.	Pregnant women, nursing mothers, women who wish to bear children, infants and youngsters should not eat Group 2 fish. All other individuals should limit their consumption of Group 2 fish, and trim all skin and fat from these fish before cooking them.	No one should eat Group 3 fish.

- * Not enough samples of chinook salmon smaller than 25 inches have been collected to adequately establish contaminant levels in this species.
- ** Brown trout show wide, geographic variations in contaminant levels.

Note: Not enough brook trout samples have been collected to adequately establish contaminant levels in this species.

lake trout will be below current FDA guidelines (Figures 7a-7d).

Other management strategies that will increase the percentage of "clean" fish in the sport harvest will be developed: stocking more coho salmon, rainbow trout and brook trout, for example, and encouraging sport fishers to eat smaller fish. Information on how to clean and cook Great Lakes fish to minimize chemical intake also has been provided.

When the New York State Department of Health banned stocking and possession of seven species of Lake Ontario fish in 1976 because of high contamination, New York anglers strongly objected. The ruling was repealed one-and-a-half years later. The Department's policy, formulated with the Wisconsin Department of Health and Social Services, is to accurately inform the public on the risks of consuming Lake Michigan fish. Our objectives are to maintain a diverse sport fishery that includes trophy fish; to conduct extensive testing and provide up-to-date information; to advise sport anglers and citizens of the potential health risks of eating contaminated fish, and to allow informed individuals to make their own choices, regarding fish consumption.

Figure 7a

CHINOOK SALMON: LAKE MICHIGAN
(AVERAGE PCB CONCENTRATION: FILLETS)
1974-1984

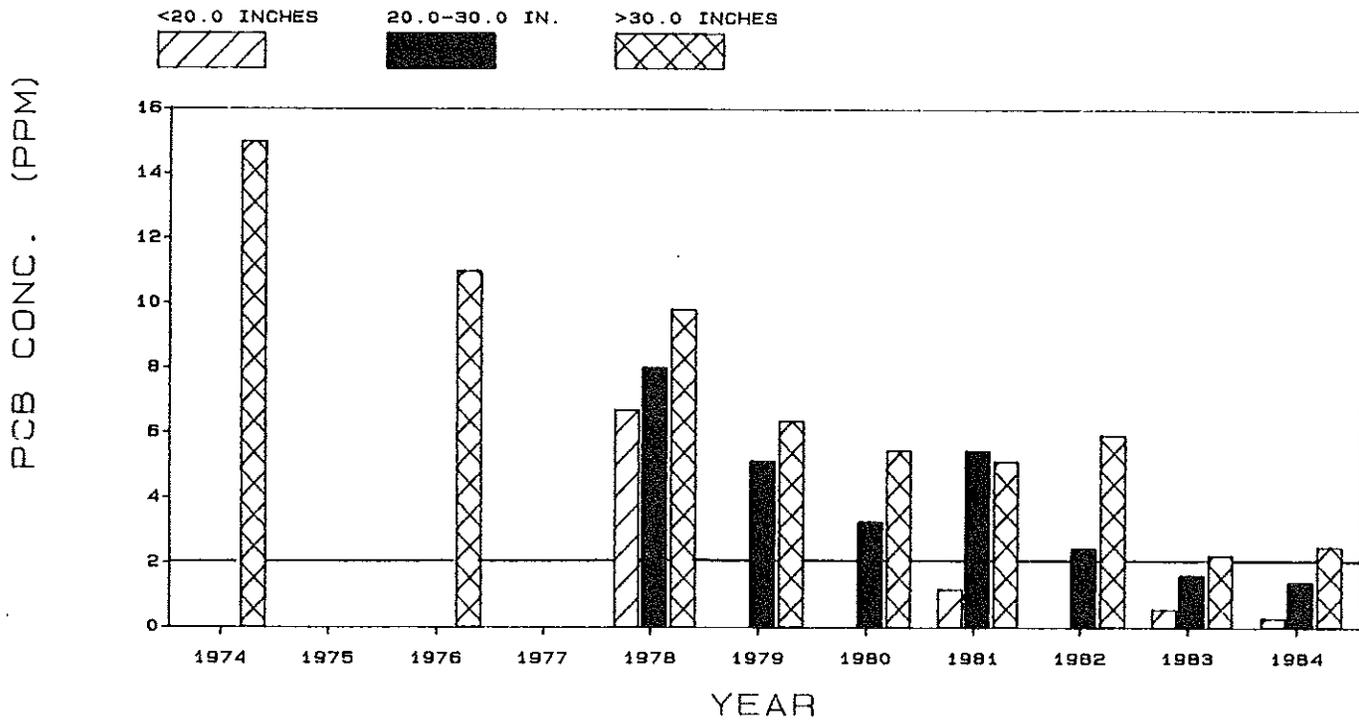


Figure 7b

COHO SALMON: LAKE MICHIGAN
(AVERAGE PCB CONCENTRATION: FILLETS)
1974-1984

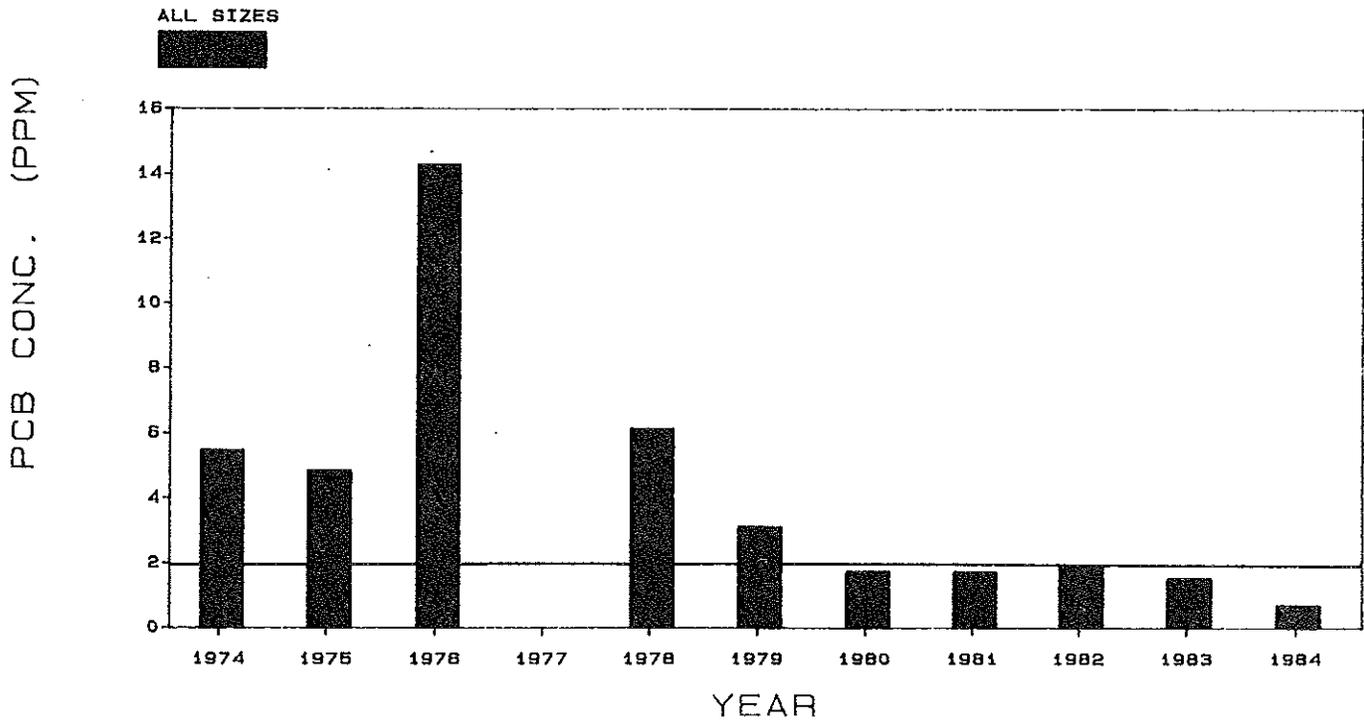


Figure 7c

LAKE TROUT: LAKE MICHIGAN
(AVERAGE PCB CONCENTRATION: FILLETS)
1974-1984

PCB CONC. (PPM)

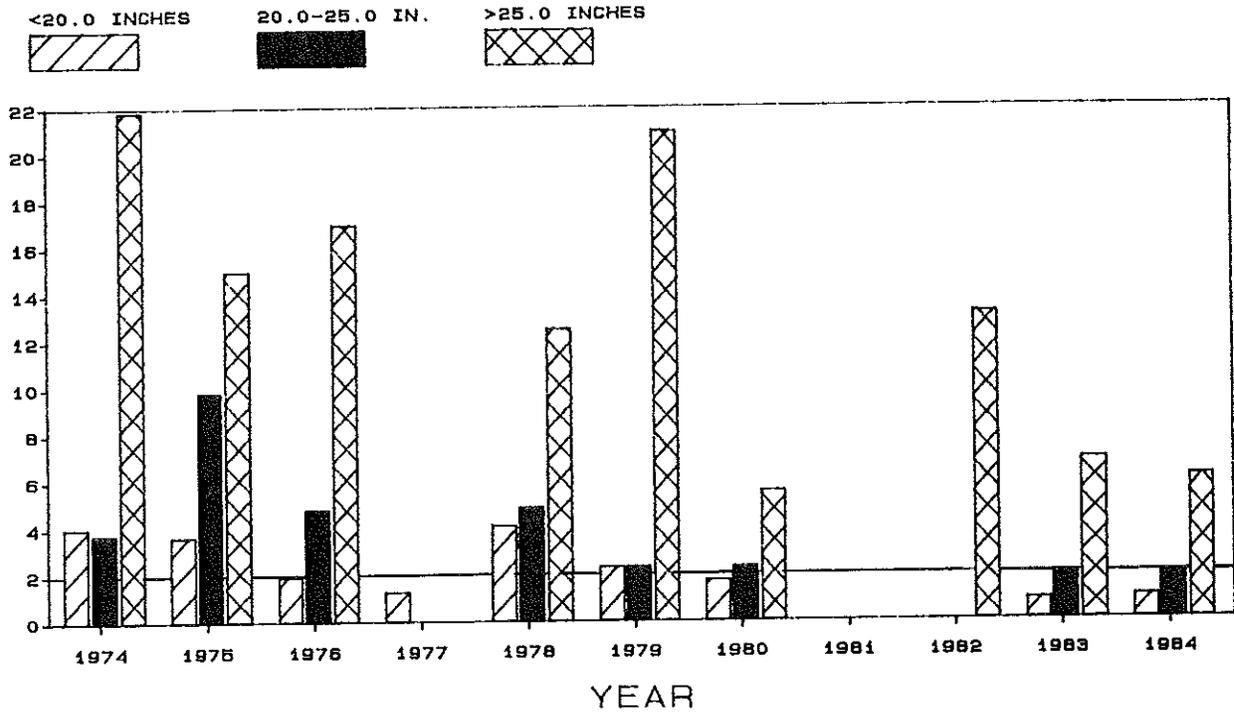
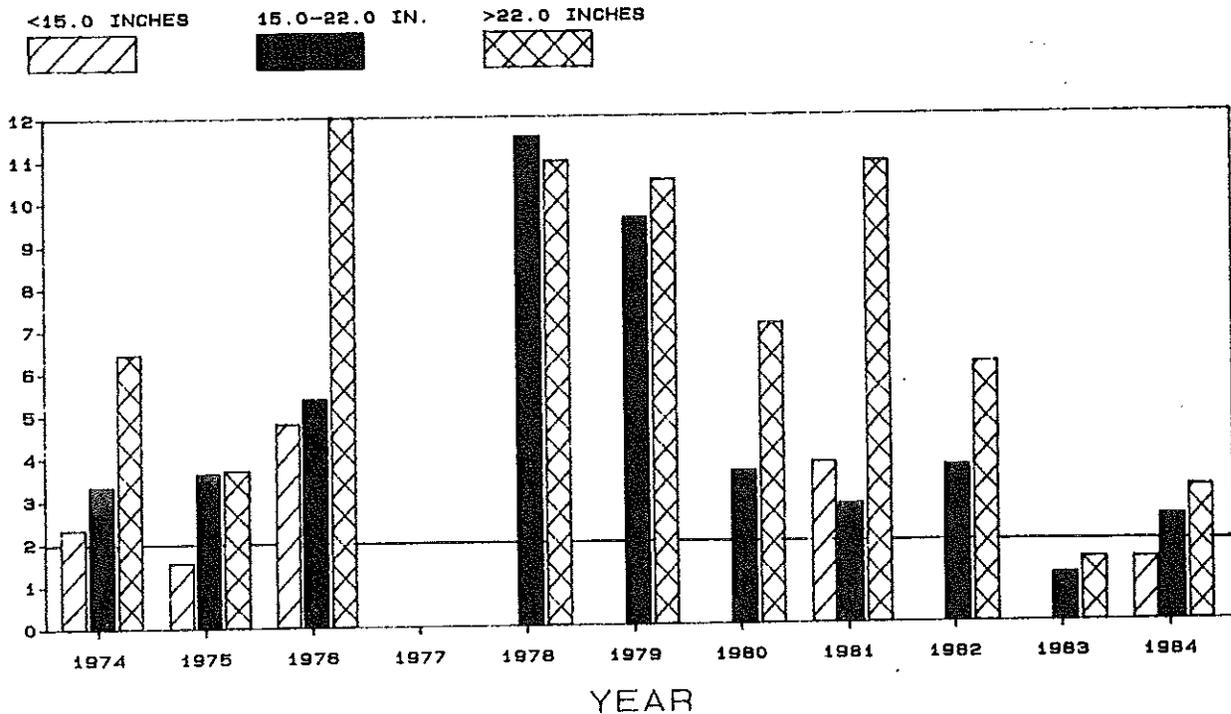


Figure 7d

BROWN TROUT: LAKE MICHIGAN
(AVERAGE PCB CONCENTRATION: FILLETS)
1974-1984

PCB CONC. (PPM)



PUBLIC PARTICIPATION

Rationale

As discussed in the Introduction, the Department is required to: establish long range plans, provide for both sport and commercial fisheries, manage for maximum public benefit, and coordinate with other states and federal agencies. Why, then, was extensive citizen participation in the development of the Plan necessary?

The ecological realities governing bodies of water like Lake Michigan call for compromise among the lake's users: 1) Lake Michigan's productive capacity is limited; 2) all of Lake Michigan's fisheries components interact with one another, and 3) while diversity of community structure and function is the key to overall fishery stability, the Lake Michigan ecosystem is not controllable, and variability should be expected.

For example, the average historical production of lake trout from the Wisconsin waters of Lake Michigan was 2,650,000 pounds per year, or 0.56 pounds per acre. Today's sport fishery alone has more than doubled this production: the average annual production of sport-caught salmonids (trout and salmon) from 1982 through 1984 was 6 million pounds, or 1.3 pounds per acre. This boost in production can only be explained by the additional feeding ranges--pelagic, surface, and inshore--inhabited by the five species and numerous strains of stocked trout and salmon. The lake may be close to peak production, and while society may demand more from it, the lake cannot deliver. In the future, a good deal of management will involve allocating Lake Michigan's limited fish production to the various user groups.

Currently, sport and commercial fishers not only compete for the same fishery resource (such as yellow perch) but also for space. Trawlers fishing near piers and breakwalls disrupt sport fishing. The fish also compete with each other: Pacific salmon will compete with other top predators, and alewife compete with other forage species, such as bloaters and perch.

The Plan therefore presents objectives that, at higher levels, may be mutually exclusive. The Department solicited public participation in selecting realistic objectives that maximized public benefit, yet fell within the lake's biological capabilities.

Plan Development

The Plan was originally conceived as a lake trout management plan. In June 1981, the Department sent a letter outlining lake trout management problems and alternatives to all user groups. Those contacted--especially the organized sport fishing groups--responded heartily. Their responses often raised questions that

went beyond a plan dealing with lake trout alone. Consequently, the Department recast the plan so it included all species of fish in Lake Michigan.

Department biologists and planners drafted the new plan's goals and objectives, which were based on scientific data and sport and commercial catch figures. In June 1983, this draft was taken back to the public for review and discussion. From July 1983 through April 1985, Department fish management personnel met with 21 groups along the Lake Michigan shore. Nearly 700 people attended the special presentations made at meetings of sport, commercial, and charter fishers; chambers of commerce, and the Conservation Congress.

Suggestions received at each presentation were recorded and evaluated, and many suggestions were written into the Plan. The attached examples of letters from both sport fishing groups and the commercial fishing association indicate how thoroughly these groups reviewed the Plan, and how much they contributed to it (see Appendix).

The review process was completed in June of 1985. The Department and the user groups did not achieve total consensus; the catch objectives failed to completely satisfy both sport and commercial user groups. Particularly controversial are the lake trout goals and objectives, and the portion dealing with use of the forage base.

The Plan does represent the best possible compromise. It is a logical and necessary framework on which to build the future management of Lake Michigan. Though printed in final draft, the Plan is not meant to be carved in stone, and will be reviewed regularly so it accommodates the changing ecology of Lake Michigan. If modifications of the Plan are required, the Department will seek public input.

LAKE MICHIGAN FISHERIES MANAGEMENT PLAN

Goals

THE GOAL OF FISH MANAGEMENT IS TO PROVIDE OPPORTUNITIES FOR THE OPTIMUM USE AND ENJOYMENT OF WISCONSIN'S AQUATIC RESOURCES, BOTH SPORT AND COMMERCIAL. A HEALTHY AND DIVERSE ENVIRONMENT IS ESSENTIAL TO MEET THIS GOAL AND SHALL BE PROMOTED THROUGH MANAGEMENT PROGRAMS, (NR 1.01(2)).

- A. Manage for a diverse, multi-species commercial fishery to allow an optimum sustained harvest.
- B. Manage for a diverse, multi-species sport fishery to allow an optimum sustained harvest and to provide a variety of angling opportunities.
- C. Reestablish self-sustaining lake trout populations to allow an optimum sustained sport and commercial harvest.

"Optimum sustained harvest" is defined as the yield that will provide the people of Wisconsin with the greatest overall benefit in food production and recreational opportunities, taking into account the effects harvesting has on dependent or associated species.

These goals must be achieved without curtailing the opportunities for non-fishery-related user groups. Each of these goals has an equal priority for achievement.

Objectives

- A. 1991 Commercial Fishery
 1. Manage the lake whitefish populations at levels that will allow a sustained annual harvest of 650,000 pounds.
 2. Manage the chub populations at levels that will allow a sustained annual harvest of 4 million pounds.
 3. Manage the yellow perch populations at levels that will allow a sustained annual harvest of 600,000 pounds in Green Bay and 200,000 pounds in Lake Michigan.
 4. Manage the round whitefish populations at levels that will allow a sustained annual harvest of 40,000 pounds.
 5. Determine the status and trends of the Lake Michigan forage populations including, but not limited to, alewife and smelt. Limit trawl units to the number that is currently

fishing these stocks until the effects of this gear are better understood.

6. Describe and characterize the northern pike population in Green Bay.
7. Encourage the development of a fishery in Lake Michigan and Green Bay to harvest burbot, carp, suckers, and other underutilized species.
8. Develop and implement management tactics to minimize or eliminate incidental catch mortality of all nontarget species.

B. 1991 Sport Fishery

1. Maintain the 1982-1984 average annual harvest of 650,000 trout and salmon within the capacity of the forage base.
 - a. Reduce lake trout harvest to 82,000 fish or less and reduce harvest in streams to zero.
 - b. Increase rainbow trout harvest from 25,000 to 50,000 annually.
 - c. Increase the harvest of the remaining salmonid species to compensate for lake trout harvest reductions.
 - d. Produce a limited trophy fishery for chinook salmon that exceed 50 pounds.
2. Manage the redeveloping perch sport fishery in Lake Michigan and Green Bay.
 - a. Manage Green Bay for an annual sport harvest of 1.2-1.9 million yellow perch that average 4-5 fish per pound.
 - b. Manage Lake Michigan (outside of Green Bay) to sustain an annual sport harvest of 350,000 - 400,000 yellow perch at 4 fish per pound.
3. Manage the Green Bay walleye fishery to provide an annual sport harvest of 50,000 fish from a population that has 10 age classes.
4. Maintain the angling opportunities at the current level for the remaining sport species until their population status can be determined.

C. 1991 Lake Trout Rehabilitation

1. Provide a naturally reproduced year-class of lake trout that is detectable at the yearling life stage.
 - a. Manage fisheries mortality of lake trout to provide an average annual total mortality of not more than 40 percent lakewide.
 - b. Develop lake trout populations of hatchery origin in two primary rehabilitation areas that exhibit seven mature age classes, and either:
 - i) an October spawning density of 4 trout per acre of spawning reef, or
 - ii) an annual egg deposition of 3,000 fertilized eggs per acre of spawning reef.
2. Provide an evaluation report of progress toward objective 1 by 1991 to determine the status of lake trout rehabilitation.

Rationale

A. 1991 Commercial Fishery

1. LAKE WHITEFISH

Since 1973, the lake whitefish harvest in Wisconsin waters of Lake Michigan has averaged 1.1 million pounds annually. For the 60 years preceding 1973, the annual harvest averaged less than 400,000 pounds. According to an ongoing university study, the current harvest, combined with the harvest by Michigan fishermen in Green Bay, may be at or near the maximum safe harvest limit for this shared stock. Furthermore, history suggests that the unusually long series of strong year classes that has supported abundant harvests in recent years will not continue.

The 1991 goal of 650,000 pounds was set at a conservative, intermediate level, based primarily on the above factors. Management will be geared toward stabilizing the population, and thus the harvest. Managers will view harvests dropping below the 650,000-pound optimum as indicators of potential problems with the fish stock, which may require additional regulations.

For the past ten years, more than 100 fishers annually have reported harvesting whitefish. However, the combination of lim-

ited entry and license fee increases could reduce the number of fishers by at least one half by 1991. Those remaining would probably be the serious, full-time fishers who currently report the highest individual poundage. In addition, calculations indicate that these fishers will probably be the most efficient. The net result should mean less gear fished and consequently a reduced incidental catch of salmonids.

2. CHUBS

From 1935 to 1975, the annual commercial catch of chubs in Wisconsin waters of Lake Michigan averaged about 4 million pounds. The chub fishery remained fairly stable over the years, until the early 1970s, when lamprey predation, alewife competition, and fishing exploitation caused a dramatic lakewide decline in chub stocks. The chub fishery was closed lakewide in 1976 because of the sharp decline.

Between 1976 and 1978, the chub stocks were monitored closely and a strong year class was produced in 1977 and 1978. During the closure, the stocks showed signs of improvement. This improvement in stocks, coupled with the strong 1977 and 1978 year classes, led the Department to reopen the chub fishery under quota management in 1979. The 1979 quota was set at 1 million pounds. Continued increases in stock size and successively stronger year classes from 1977 through 1981 caused the Department to increase the quota to 3 million pounds in 1984. Given the pattern of recovery that chub stocks have shown since 1979 (growth and year-class strength), Wisconsin's Lake Michigan waters should be able to produce 4 million pounds annually.

3. YELLOW PERCH

Green Bay

From 1914 through 1964, commercial yellow perch production in Green Bay averaged approximately 1 million pounds annually and coexisted with a substantial sport fishery. From the mid-1960s to the mid-1970s, commercial yellow perch production averaged approximately 450,000 pounds annually and by the late 1970s, averaged approximately 521,000 pounds annually. Initiation of a quota-controlled fishery to allow development of a more normal age structure will produce an increased average weight-per-fish-harvested (increased yield per recruit). This quota system, combined with reduced mortality due to modifications in fishing nets and a more stable spawning population, will allow maintenance of a more abundant population. Since the 600,000-pound goal is only 15 percent higher than the recent average catch, and considerably lower than the historic average, it is a realistic and achievable goal under current conditions.

Lake Michigan (excluding Green Bay)

From 1953-1964, the commercial production of yellow perch from Wisconsin's Lake Michigan waters (excluding Green Bay) averaged more than 1 million pounds per year. Some years, the lake's perch production exceeded that of Green Bay. In 1965, production in both the lake and Green Bay crashed, and Wisconsin's Lake Michigan production fell to only 54,000 pounds per year from 1965-82.

Lake Michigan's perch population has been increasing since 1980, however, especially along Wisconsin's southeast coast. In 1983, commercial production exceeded 100,000 pounds for the first time since 1965. With the apparent decline of the alewife population and the recent stronger year-classes of perch, populations should continue to recover. This recovery, accompanied by proper management, should allow an annual commercial harvest of 200,000 pounds.

4. ROUND WHITEFISH

Round whitefish, or "menominee," has never been a primary commercial species for large-scale commercial fishers. For the past 80 years, the annual harvest has averaged less than 60,000 pounds. The conservative goal of 40,000 pounds for 1991 was derived from three factors: population abundance, fisher attrition, and future gear regulations.

Harvest information from catch reports indicates that the annual catch rate has remained relatively stable. It is possible that the species could tolerate a significantly higher harvest, but more research on the biology of this species is needed to substantiate this. Also, markets are quite limited and local, and likely could remain so.

Most round whitefish are harvested by relatively few fishers who use the species as a "fill in" between lake whitefish and chubs. The rest of the harvest is taken by "rowboat" commercial fishers or as incidentals to the yellow perch fishery. By 1991, there will probably be a substantial drop in the number of fishers currently harvesting round whitefish, due to a combination of limited entry and license fee hikes.

The fishery for round whitefish primarily occurs inshore with small mesh gill nets. In the future, this inshore fishery may be restricted to provide additional protection to salmonids, especially lake trout.

5. FORAGE FISH POPULATION

Population Trends

Forage fish are those species of fish that consistently are eaten by larger fish. These species collectively make up the forage base. Before the 1900s, the forage base consisted primarily of chubs, herring, and emerald shiners. Today, the bulk of the forage base consists of chubs, smelt, and alewives. Sculpin, stickleback, suckers, troutperch, herring, shiners, and smaller yellow perch are also eaten, but in significantly lesser quantities. Smelt and alewife are exotic species that have inhabited Lake Michigan since the early 1900s.

In the past, gains made by any one of the forage fish populations have apparently been at the expense of one or more of the other forage fish populations. Since two of the currently dominant forage species (alewife and smelt) are exotic to the lake system, periodic and often dramatic shifts in the various population levels should be expected. As these forage population levels vacillate, predator diets--and perhaps growth rates--should likewise be expected to reflect these changes. Lake Michigan's forage base is of special concern because many of the predators utilizing the forage base are stocked. Over 6.5 million salmonids are annually planted in Lake Michigan's Wisconsin waters alone. Michigan, Indiana, and Illinois also stock salmonids in Lake Michigan. More important than the standing stock of any one of the forage populations at a given point in time is the status of the forage base in general. Of equal importance is the ability of the various salmonid predators to adjust to the shifting forage base.

Currently, lakewide forage fish populations are estimated from fall assessment trawling conducted by the U.S. Fish and Wildlife Service at eight stations on Lake Michigan. From the assessment trawling, estimates of fall standing stocks available to bottom trawls are calculated for chubs, alewives, smelt, and sculpins. Estimated fall standing stocks of alewives (adult and young of the year) available to bottom trawls from 1973 to 1983 have ranged from a high of 123,000 metric tons in 1974 to a low of 29,500 metric tons in 1983. During the same time period, the estimated fall standing stock of smelt (adult and young of the year) available to bottom trawls has ranged from a high of 32,770 metric tons in 1982 to a low of 11,070 metric tons in 1976. The chub population has continued to build from the lowest levels, which were observed in 1977. Adult chubs (yearlings and older) were 328 times more abundant in the 1983 trawl survey than they were in 1977.

Harvest and Utilization

Alewives: The harvest of alewives from the Wisconsin waters of Lake Michigan from 1974-1983 has ranged from a high of 43,823,000 pounds in 1977 to a low of 12,892,000 pounds in 1980, with a 10-year average of 28,402,000. During the past 10 years, pound nets and trawls have accounted for all of the alewife harvest. During the past five years, trawls have accounted for 96.4 percent of the harvest. More than 99.5 percent of the alewife harvests over the past 10 years was taken from statistical districts WM1, WM4, and WM5, with WM4 accounting for more than 60 percent (see Figure 8).

Alewives are harvested primarily for the pet food/fish meal industry, and yearly harvests reflect marketability more than they indicate population levels. The harvest can be separated into two distinct fisheries: deepwater and shallow-water. These distinctions are based on water depth, time of year, and incidental catches.

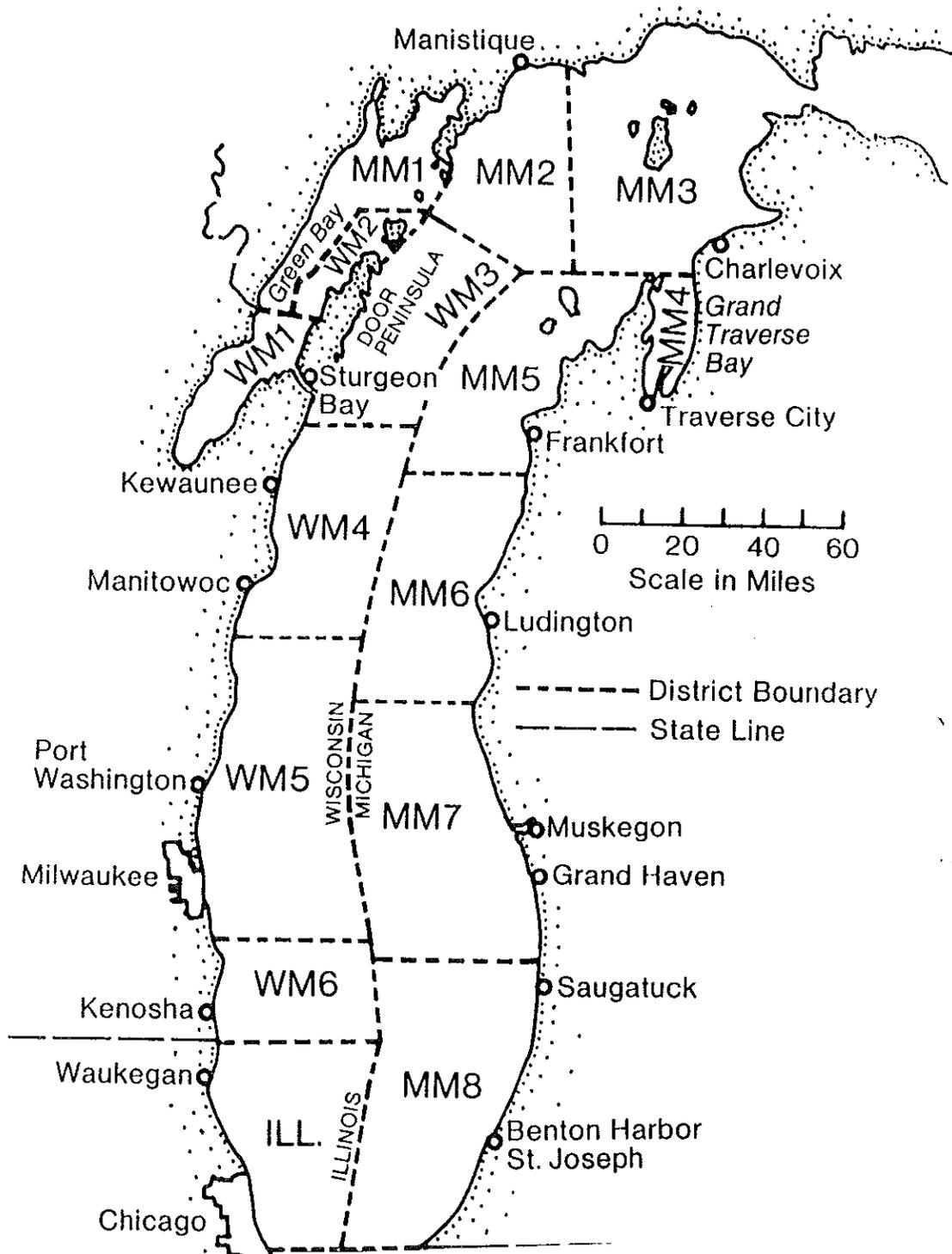
Smelt: The smelt harvest from the Wisconsin waters of Lake Michigan during the 10-year period from 1974-1983 has ranged from a high of 996,000 pounds in 1981 to a low of 118,000 pounds in 1977. Smelt harvest, particularly with trawls, has intensified during the last four years. Before 1980, a six-year average of 198,000 pounds of smelt were harvested annually. Twenty-two percent were caught with gill nets, 49 percent with pound nets, and 29 percent with trawls. 1980 marked the beginning of a dramatic shift in the smelt fishery. From 1980 through 1984, the average smelt harvest increased threefold to 594,000 pounds per year; 76 percent of the harvest was taken with trawls. Only 8 percent were caught with gill nets, and 16 percent with pound nets.

Analysis

Trawlers have operated on Lake Michigan since the late 1950s. Since the 1960s, trawlers have been used extensively for the harvest of alewife and, as of late, smelt. There is speculation as to how trawling affects target species populations and/or incidental species populations, but little documented evidence. Until now, the trawl fishery has been regulated without the benefit of detailed information.

In order to better understand the effect of trawling on target and nontarget fish populations and to allow for better-informed management decisions regarding the regulation of the trawl fishery, a project has been completed that characterizes the three major trawl fisheries: smelt, deepwater alewife, and shallow-water alewife.

Figure 8



6. NORTHERN PIKE

From 1944 through 1982, commercial northern pike production in Green Bay averaged 24,670 pounds annually, with a high of 90,000 pounds in 1953 and lows of 6,000 pounds in 1959 and 1982. Since 1967, there has been a trend of declining harvests, possibly due to lower abundance caused by habitat loss (less emergent vegetation), since current exploitation rates appear to be relatively low.

Approximately 40 percent of the 1981 northern pike harvest was incidental to the perch fishery. This species has a relatively low market value, with a 1981 dock-side total value of approximately \$1,500 for the 31 fishermen who reported landing northern pike.

7. UNDERUTILIZED SPECIES

The burbot population appears to be on the rise. Since 1944, commercial burbot landings have averaged 36,600 pounds annually, with a high of 166,000 pounds in 1977, and a low of less than 1,000 pounds in 1962. In the past three years, landings have increased from 28,500 to 36,500 to 74,500 pounds, and probably will jump again in 1983.

Abundant burbot populations may impact negatively on other high value commercial and sport species. Because of the low value of burbot, exploitation of the population is limited at the present time.

Carp and suckers are also abundant and may be competing with more desirable species for food and space. With an improvement in the market, these fisheries could provide additional income to the commercial community.

Should fisheries for underutilized species expand, great care must be taken to insure that the methods of harvest and the gear used do not contribute to excessive mortality of nontarget species.

8. INCIDENTAL CATCH

The incidental catch of nontarget species is one of the most serious problems confronting a multiple-use fishery such as that on Lake Michigan and Green Bay. This problem poses a real threat to both sport and commercial fishing objectives because it places them in conflict.

Every effort must be made to seek methods to reduce the impact of one fishery upon another. This is most difficult where species coexist in close proximity such as occurs with whitefish and lake trout, and with perch and walleye.

In some instances, the information needed to better manage a fishery simply does not exist and additional investigations are required. In other cases, the information exists, but traditional commercial fishing methods are difficult to change. It is clear that incidental catch will remain an important issue as competition between user groups escalates. This eighth objective--to minimize or eliminate incidental catch mortality--is an integral part of each of the previous commercial fishing objectives.

B. 1991 Sport Fishery

1. TROUT AND SALMON

The major objective--to manage for an annual harvest of 650,000 fish--is designed to maintain the 1982-1984 average annual harvest. This objective was deemed most important due to recent concerns about the health of the alewife population. Evidence from the Fish and Wildlife Service suggests that the alewife population has been declining in the last few years. Expanding stocking and harvest of game fish may jeopardize the current status of alewives. Substantial declines in the alewife population could affect the future of the Lake Michigan fishery.

- a. The first subobjective is to reduce the lake trout harvest to 82,000 fish a year--a prerequisite to achieving lake trout rehabilitation in Lake Michigan. The lake trout sport harvest from 1981 to 1983 averaged 137,000 fish. The 82,000 annual limit is based on a 40-percent reduction of that catch level, and on expected availability of federal fish. Forty-percent reductions in incidental mortality by the commercial fishery will also be necessary to achieve rehabilitation.
- b. A second subobjective is to increase the rainbow trout harvest in Lake Michigan. Based on creel census data, rainbow trout harvest has been declining while stocking has increased. This problem may be due to a shift in rainbow trout strains that are currently stocked. There is some evidence that the rainbow trout that are stocked do not home to tributary streams at spawning time. Since the fishery in the past has yielded greater numbers of rainbow trout, the objective might be achieved by planting different strains that have stronger homing characteristics. The increase in rainbow trout harvest will partially offset the reduction in lake trout harvest.
- c. The third subobjective is intended to offset the reduced lake trout harvest to maintain the 1982 catch level. This will be accomplished by continued investigation and use of

new or modified strains of salmonids that should provide a greater return to the creel than those currently stocked. Examples are Nipigon brook trout, Skamania rainbow, wild/domestic crosses of brown trout and earlier-returning coho salmon. It also includes refining and upgrading stocking techniques such as increased use of yearling salmonids which have a higher survival rate.

- d. The final subobjective is to produce a limited trophy fishery for chinook salmon that exceed 50 pounds. Satisfaction in a sport fishery partly depends on having a wide size-range available. The rare opportunity to catch an unusually large fish is an important aspect of any sport fishery. Recent techniques in the sterilization of salmonids may provide the management opportunity to develop a greater diversity in size of chinook salmon. The sterilization of chinooks may cause the fish to defer maturity indefinitely and to continue to grow several years beyond their normal life cycle.

2. YELLOW PERCH IN LAKE MICHIGAN AND GREEN BAY

- a. At the present time, the sport fishery accounts for approximately 15 percent of the yellow perch harvest from Green Bay. This objective would increase that to 44 percent of the combined harvest. This would be accomplished by limiting the commercial fishery through quota control, which would allow improved abundance and size distribution that in turn would increase sport fishing catch rates and/or participation, and improve the size distribution of the sport harvest.
- b. After the crash of the Lake Michigan perch population in 1965, the sport harvest of perch through the 1970s was very low. With the recovery of the perch population in the early 1980s, participation in the perch sport fishery has been increasing geometrically along southeast Wisconsin shores and piers. An annual sport harvest of 350,000 to 400,000 fish would provide perch anglers with hundreds of thousands of hours of enjoyment annually in many of the coastal urban areas, especially in southeastern Wisconsin.

3. WALLEYE IN GREEN BAY

The reestablishment of walleye populations in the Fox River, Sturgeon Bay, and the west shore of Green Bay has resulted from the stocking of over 1.7 million walleye fingerlings and 28 million fry since 1973. Population estimates for Sturgeon Bay (including its adjacent bays) and the Fox River total nearly 90,000 walleyes 11 inches and larger. Estimates for the west shore of Green Bay have not yet been developed.

While reproduction has been documented in the Sturgeon Bay area, it required the establishment of a minimum of seven year classes of walleye to achieve adequate spawning density. Establishing 10 year classes will increase the probability of successful natural reproduction under favorable conditions.

Successful natural reproduction has not occurred in the Fox River or along the west shore of Green Bay. However, stocking was not initiated in the Fox River until 1977 and large-scale stocking along the west shore did not begin until 1980.

The current annual sport harvest has been estimated at 37,000 walleye from all areas of Green Bay. With a continued stocking program along the west shore and the Fox River and with sustained successful natural reproduction in Sturgeon Bay, it is felt that a total harvestable population of 150,000 walleyes in the waters of Green Bay can be achieved by 1991. Allowing for an annual exploitation rate not exceeding 35 percent, an annual harvest of 50,000 walleye can be expected.

4. OTHER SPORT SPECIES

Limited data on species like smallmouth bass, northern pike, rock bass, white bass, catfish, crappie, bullhead, and muskellunge preclude our ability to set meaningful objectives for them. Until further studies on these species are conducted, our objective must be to maintain the angling opportunities for them at current levels.

C. 1991 Lake Trout Rehabilitation

1. POPULATION CRITERIA

Criteria based on population parameters were established to compare the rehabilitation potential of lake trout populations that develop from various management strategies. The criteria chosen were based on the characteristics of naturally reproducing, self-sustaining lake trout populations elsewhere in North America. Satisfaction of the following criteria should provide a naturally reproduced year-class of lake trout that is detectable at the yearling life stage:

- 1) An annual total mortality rate not exceeding 40 percent for the first 12 age classes.
- 2) A minimum of 7 mature age classes;
- 3) A spawning density of 4 mature trout per acre of spawning reef;

- 4) A minimum annual deposition of 3,000 fertilized eggs per acre of spawning reef;

The annual total mortality criteria was based on a review of mortality rates reported for populations across North America. Criteria 2 through 4 were based on data from the Lake Superior trout population that uses Gull Island Shoal as a spawning reef.

A simulation model has been developed for geographically specific zones within the Wisconsin waters of Lake Michigan (Figure 9). The zones were established based on differences in past stocking levels, sport and commercial catches, and the availability of spawning reefs (Table 3). The Kenosha-Kewaunee zone encompasses the area where the majority of lake trout sport angling occurs. The Mid-Lake zone includes an area of Lake Michigan that contains an extensive deep water reef area thought to provide some of the most productive spawning grounds in Lake Michigan. The Clay Banks zone includes reef areas where more than one half of the lake trout stocked (1980-1982) in the Wisconsin waters of Lake Michigan have been placed.

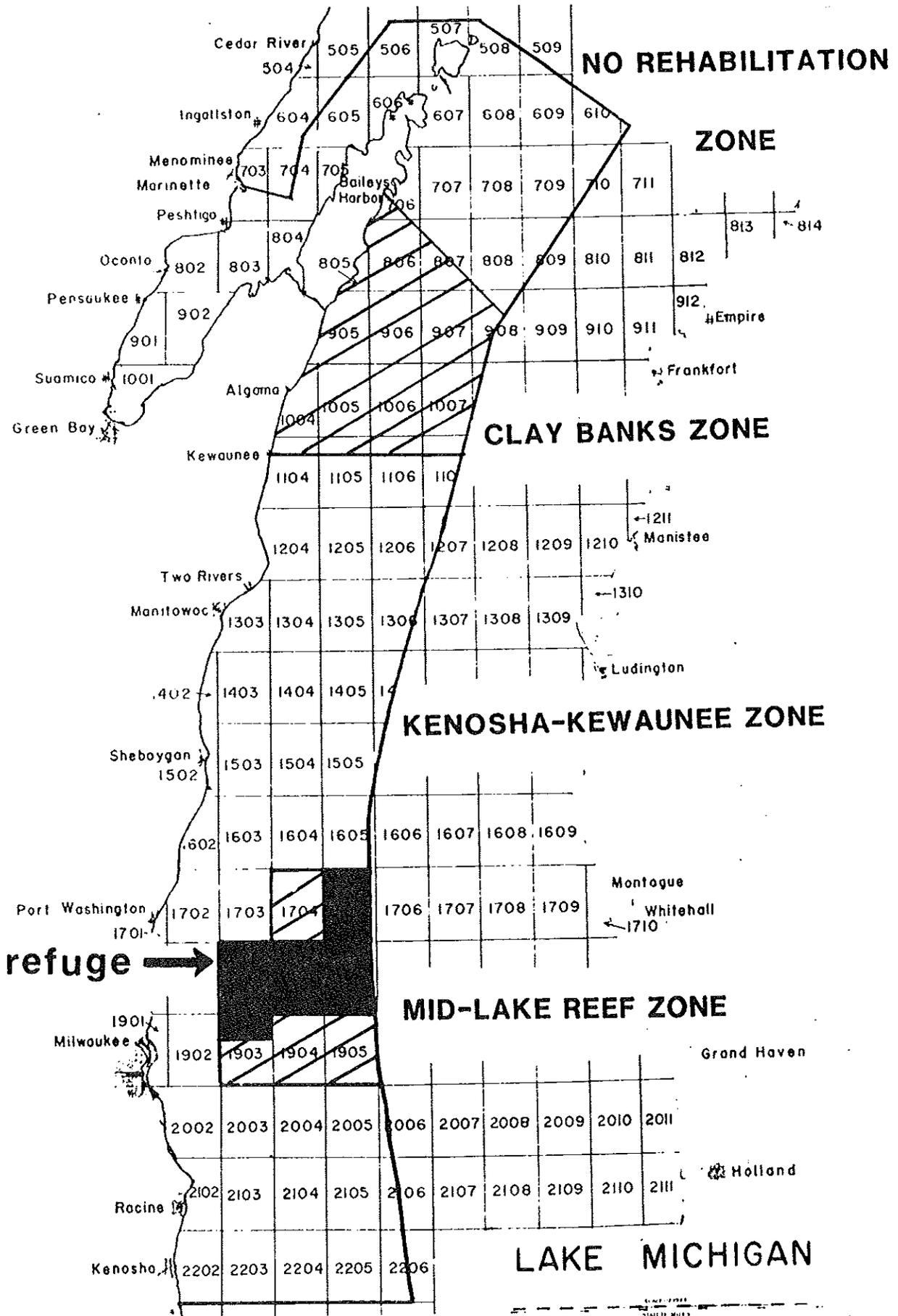
2. EVALUATION

Lake trout rehabilitation has proven to be far more difficult than originally anticipated. Twenty years of stocking has failed to produce measurable numbers of naturally produced lake trout. Exploitation rates by both sport and commercial fisheries have been extremely high, and the number of mature lake trout necessary to a viable spawning population has not developed. The rehabilitation program's lack of success has subjected it to intense scrutiny by the U.S. Fish and Wildlife Service and other states surrounding Lake Michigan.

Numerous research projects have examined potential problem areas, such as contaminants, unsuitable strains of fish, pollution, habitat degradation, fish homing tendencies, and use of improper-aged fish. The results of these studies have been summarized, and a lakewide plan has been developed by the Lake Trout Technical Committee of the Great Lakes Fishery Commission. The lake trout objectives developed in this plan were in keeping with the technical committee's lakewide approach. Wisconsin relies on federal hatcheries for the 1 million lake trout yearlings it needs each year in order to reach its objectives. The State of Wisconsin cannot unilaterally, drastically alter its lake trout management without jeopardizing the cooperation it receives from the U.S. Fish and Wildlife Service.

At the same time, both sport and commercial fishers are justifiably questioning the feasibility of lake trout rehabilitation on Lake Michigan. The Department will provide the public with a detailed evaluation report by 1991 to help answer these questions. If the findings of the evaluation are extremely negative, the Department may need to consider a major redirection of lake trout management in Wisconsin.

Figure 9



Lake trout management zones in the Wisconsin waters of Lake Michigan.

Table 3

Lake trout stocking, catch, and reef area for the three lake trout management zones in the Wisconsin waters of Lake Michigan

Management Zone	Annual Stocking (numbers)	ANNUAL CATCH			Reef Acres
		Sport	Small Mesh	Large Mesh	
<u>Kenosha-Kewaunee</u>					43,714
Actual*	296,000	99,000	29,000	0	
Projected**	600,000	59,000	17,000	0	
<u>Mid-Lake</u>					140,486
Actual*	345,000	0	3,000	0	
Projected**	750,000	0	2,000	0	
<u>Clay Banks***</u>					14,451
Actual*	326,000	38,000	8,000	39,000	
Projected**	350,000	23,000	5,000	23,000	
<u>Total</u>					198,651
Actual*	967,000	137,000	40,000	39,000	
Projected**	1,700,000	82,000	24,000	23,000	

*Average for 1981-1983; 1981 sport catch adjusted for moored boats.

**Catches projected for 40% reductions; stocking projected for maintenance of lake trout rehabilitation objectives and contingent upon availability of federal hatchery fish. Stocking priorities are: 1) Mid-lake, 2) Clay Banks, and 3) Kenosha-Kewaunee.

***Includes Green Bay; 31% of Green Bay catches originate from Clay Banks stocking.

Problems and Tactical Solutions

A. 1991 Commercial Fishery

OBJECTIVE 1: MANAGE THE LAKE WHITEFISH POPULATION AT LEVELS THAT WILL ALLOW A SUSTAINED ANNUAL HARVEST OF AT LEAST 650,000 POUNDS.

PROBLEM 1: Discontinuation of UW-Stevens Point whitefish studies will result in inadequate data to manage the fishery.

TACTICS

- * Increase Department entrapment gear assessments of the whitefish population in spring and fall.
- * Apply models developed by UW-Stevens Point where appropriate.

PROBLEM 2: Overharvest of North-Moonlight Bay stock may result from excessive effort or weak year classes.

TACTICS

- * Identify when overharvest of stock is occurring. If overharvest occurs, develop and implement a management plan with Wisconsin whitefish fishers to control overharvest.
- * Work with other jurisdictions to prevent overharvest of shared stock.

OBJECTIVE 2: MANAGE THE CHUB POPULATION AT LEVELS THAT WILL ALLOW A SUSTAINED ANNUAL HARVEST OF 4 MILLION POUNDS.

PROBLEM 1: Unless the chub population expansion continues, the current population will not sustain a 4-million-pound harvest.

TACTICS

- * Maintain existing harvest controls that will achieve harvest goals without over-exploitation. Implement additional controls as required.

- * Continue existing sampling to develop a longer data time series.

PROBLEM 2: Excessive incidental catch of lake trout may prevent the fishery from achieving the chub harvest goal.

- TACTICS**
- * Implement regulations that are consistent with the lake trout objectives.
 - * Encourage alternative commercial harvest techniques to reduce incidental catch of nontarget species.

OBJECTIVE 3: MANAGE THE YELLOW PERCH POPULATIONS AT LEVELS THAT WILL ALLOW A SUSTAINED ANNUAL HARVEST OF 600,000 POUNDS IN GREEN BAY AND 200,000 POUNDS IN LAKE MICHIGAN.

Yellow Perch - Green Bay

PROBLEM 1: Inadequate age structure and abundance prevents attaining harvest objective.

- TACTICS**
- * Expand stock size and improve age structure through a quota-controlled fishery.
 - * Develop and implement alternate controls if quota system is ineffective.

PROBLEM 2: Excessive nonharvest mortality occurs in the drop net segment of the fishery.

- TACTICS**
- * Develop recommendations to reduce the mortality.
 - * Implement new regulations to reduce handling of sublegal perch.

PROBLEM 3: Short-term data base restricts predicting effects of regulations on the fishery.

- TACTIC**
- * Continue existing sampling to develop a longer data time series.

PROBLEM 4: Noncompliance with harvest quota will limit management effectiveness.

- TACTICS**
- * Encourage intensive enforcement.
 - * Monitor the catch via weekly reports to insure compliance.

Yellow Perch - Lake Michigan

PROBLEM 1: Inadequate data base prevents management decisions based on sound biological information.

- TACTICS**
- * Develop assessment techniques to characterize the yellow perch population and fisheries.
 - * Coordinate investigations on common stocks with Illinois and Indiana.

PROBLEM 2: Potential for increasing user group conflict increases as the commercial and sport fisheries expand.

- TACTICS**
- * Develop a management plan to provide information to the user groups.
 - * Develop and implement regulations to resolve user conflicts.
 - * Encourage intensive enforcement of regulations that are implemented.

PROBLEM 3: Excessive salmonid removal as incidental catch may put the expanding commercial fishery at odds with sport and lake trout objectives.

- TACTIC**
- * Encourage alternative commercial harvest techniques to reduce incidental catch of nontarget species.

OBJECTIVE 4: MANAGE THE ROUND WHITEFISH POPULATION AT LEVELS THAT WILL ALLOW A SUSTAINED ANNUAL HARVEST OF 40,000 POUNDS

PROBLEM: Adequate biological information on the harvested stock does not exist.

TACTICS

- * Continue fall population assessment.
- * Initiate on-board commercial monitoring to characterize commercial catch, including non-target species.

OBJECTIVE 5: DETERMINE THE STATUS AND TRENDS OF THE LAKE MICHIGAN FORAGE POPULATIONS INCLUDING, BUT NOT LIMITED TO, ALEWIFE AND SMELT. LIMIT TRAWL UNITS TO THE NUMBER THAT IS CURRENTLY FISHING THESE STOCKS UNTIL THE EFFECTS OF THIS GEAR ARE BETTER UNDERSTOOD.

PROBLEM 1: Inadequate information exists to determine the status and trends of the forage base.

TACTICS

- * Continue the trawler monitoring to determine the impact on target and nontarget species.
- * Develop techniques to use trawl monitoring data as an index of changes in the forage base.
- * Work with U.S. Fish and Wildlife Service, Sea Grant, and other agencies working on forage populations to better characterize lakewide population status.

PROBLEM 2: An expanded trawl fishery could negatively impact the forage base and nontarget species.

TACTICS

- * Limit trawl units in Wisconsin waters of Lake Michigan to the number currently fishing.
- * Restrict trawling to those areas of Lake Mich-

igan and Green Bay that have been trawled within the last 5 years.

PROBLEM 3: The current forage base consists largely of exotic species with unstable population characteristics.

TACTIC * Explore the reintroduction of native forage species, such as herring, emerald shiners, and other species of chubs.

OBJECTIVE 6: DESCRIBE AND CHARACTERIZE THE NORTHERN PIKE POPULATION IN GREEN BAY.

PROBLEM 1: Inadequate resource base information limits management effectiveness.

TACTICS * Develop surveys to assess angler pressure, harvest, population characteristics, and relative abundance.

* Inventory remaining spawning habitat, measure quality, and monitor trends.

OBJECTIVE 7: ENCOURAGE THE DEVELOPMENT OF A FISHERY IN LAKE MICHIGAN AND GREEN BAY TO HARVEST BURBOT, CARP, SUCKERS, AND OTHER UNDERUTILIZED SPECIES.

PROBLEM 1: Markets for most underutilized species are lacking, poorly developed, or limited by contaminant levels in the fish.

TACTICS * Encourage development and use of new fish products using underutilized species.

* Promote the harvest of underutilized species.

* Develop and implement incentives for harvest.

PROBLEM 2: Inadequate resource data base limits management effectiveness.

* Develop surveys to assess pressure, harvest, and population characteristics.

OBJECTIVE 8: DEVELOP AND IMPLEMENT MANAGEMENT TO MINIMIZE OR ELIMINATE INCIDENTAL CATCH MORTALITY OF ALL NONTARGET SPECIES.

PROBLEM 1: Additional information is needed to determine the incidental catch by each commercial fishery.

TACTIC * Identify specific problem areas and increase monitoring to improve information base.

PROBLEM 2: Harvest objectives may be unattainable if incidental catch problems cannot be resolved.

TACTICS * Determine the acceptable levels of incidental catch for each commercial fishery.

* Investigate and encourage alternative methods and gear modifications to minimize incidental catch.

PROBLEM 3: Traditional methods of commercial fishing are difficult to change.

TACTIC * Provide commercial fishers with incentives to use alternative harvest techniques.

B. 1991 Sport Fishery

OBJECTIVE 1: MAINTAIN THE 1982-1984 AVERAGE ANNUAL HARVEST OF 650,000 TROUT AND SALMON WITHIN THE CAPACITY OF THE FORAGE BASE.

SUBOBJECTIVE A: REDUCE LAKE TROUT HARVEST TO 82,000 FISH OR LESS AND REDUCE HARVEST IN STREAMS TO ZERO.

PROBLEM 1: Too many lake trout are removed by an increasingly popular sport fishery.

TACTIC * Reduce the sport harvest of lake trout (see lake trout objectives).

PROBLEM 2: Too many lake trout are entering streams to spawn where success is unlikely.

TACTIC * Prohibit lake trout stocking in or near tributary streams.

SUBJECTIVE B: INCREASE ANNUAL RAINBOW TROUT HARVEST FROM 25,000 TO 50,000

PROBLEM: Return to the creel has declined despite steady increase in number of rainbows stocked.

TACTICS * Stock and assess various strains of rainbow trout to maximize catch/stock ratio.

* Increase the number of stocked yearling rainbows and decrease the use of small fingerlings.

SUBJECTIVE C: INCREASE THE HARVEST OF THE REMAINING SALMONID SPECIES TO COMPENSATE FOR LAKE TROUT HARVEST REDUCTIONS.

PROBLEM 1: Predation by stocked salmonids lakewide may exceed the capacity of the forage base to sustain predators.

TACTIC * Link stocking levels to available forage and obtain agreement with other agencies regarding stocking numbers.

PROBLEM 2: Existing hatchery facilities may limit our abilities to produce alternative species.

TACTICS * Decrease propagation and stocking of species with low return rates.

* Expand existing hatcheries or purchase new facilities.

PROBLEM 3: Sufficient numbers of alternate species or strains may not be available from other sources.

TACTIC * Develop our own spawn-taking capabilities and/or brood stocks.

PROBLEM 4: Additional data on stocking is needed to provide direction to stocking policies.

TACTICS * Evaluate different strains of salmonids that will provide an improved rate of return.

* Evaluate different stocking techniques and locations to maximize returns.

SUBOBJECTIVE D: PRODUCE A LIMITED TROPHY FISHERY FOR CHINOOK SALMON THAT EXCEED 50 POUNDS.

PROBLEM: The four-year life cycle prevents chinook salmon from growing to 50 pounds.

TACTICS * Stock limited numbers of sterilized salmon to lengthen their life cycle to produce a larger salmon.

* Stock limited numbers of Alaskan strain (Kenai) chinook.

OBJECTIVE 2: MANAGE THE REDEVELOPING PERCH SPORT FISHERY IN LAKE MICHIGAN AND GREEN BAY.

SUBOBJECTIVE A: MANAGE GREEN BAY FOR AN ANNUAL SPORT HARVEST OF 1.2 - 1.9 MILLION YELLOW PERCH THAT AVERAGE 4-5 FISH PER POUND.

PROBLEM 1: The harvest is inequitably distributed between user groups.

- TACTICS**
- * Allow expansion of the sport fishery while restricting commercial harvest through a quota to achieve a more equitable harvest between user groups.
 - * Improve creel census coverage to assess harvest.

PROBLEM 2: The perch population size structure is inadequate to provide the creel with a sufficient number of fish of a desirable size.

- TACTICS**
- * Maintain a quota-controlled commercial fishery.
 - * Assess the impacts of predation and growth rates on size structure.

SUBOBJECTIVE B: MANAGE LAKE MICHIGAN (OUTSIDE OF GREEN BAY) TO SUSTAIN AN ANNUAL SPORT HARVEST OF 350,000-400,000 PERCH AT 4 FISH PER POUND.

PROBLEM 1: Inadequate data base prevents management decisions based on sound biological information.

- TACTICS**
- * Develop assessment techniques to characterize yellow perch population.
 - * Improve and expand creel census coverage to assess harvest and effort.

PROBLEM 2: The potential for user group conflict increases as sport and commercial fisheries expand.

- TACTICS**
- * Develop a management plan to provide information to the user groups.
 - * Develop and implement regulations to resolve user conflicts.

OBJECTIVE 3: MANAGE THE GREEN BAY WALLEYE FISHERY TO PROVIDE AN ANNUAL SPORT HARVEST OF 50,000 FISH FROM A POPULATION THAT CONTAINS 10 YEAR CLASSES.

PROBLEM 1: Current harvest levels have been achieved through maintenance stocking and additional walleye fingerlings are unavailable.

- TACTICS**
- * Continue maintenance stocking by increasing production, purchase, or reallocation from inland commitments.
 - * Limit the harvest to a level consistent with natural reproduction.
 - * Monitor the Green Bay commercial fishery and determine the extent of the incidental harvest.
 - * Continue a creel census of the walleye fishery to estimate the sport fishing harvest.

PROBLEM 2: The extent of natural reproduction has not been determined for all Green Bay populations.

- TACTICS**
- * Continue evaluation of reproductive success in the Sturgeon Bay area.
 - * Continue assessments which will identify natural reproduction in the Fox River and along the west shore of Green Bay.
 - * Determine the abundance of naturally reproduced year classes.

OBJECTIVE 4: MAINTAIN THE ANGLING OPPORTUNITIES AT THE CURRENT LEVEL FOR THE REMAINING SPORT SPECIES UNTIL THEIR POPULATION STATUS CAN BE DETERMINED.

PROBLEM 1: Population data for smallmouth bass, northern pike, white bass, muskellunge, and lake sturgeon is inadequate.

TACTIC * Initiate population studies for the above species.

PROBLEM 2: Loss of spawning habitat through shoreline development may be occurring.

TACTICS * Document critical spawning habitats.
* Reevaluate our input to Chapter 30 permits.

PROBLEM 3: Access may be a limiting factor in providing fishing for certain species.

TACTICS * Construct fishing piers.
* Secure funding sources to purchase access points.

C. 1991 Lake Trout Rehabilitation

OBJECTIVE 1: PRODUCE A NATURALLY REPRODUCED YEAR-CLASS OF LAKE TROUT THAT IS DETECTABLE AT THE YEARLING LIFE STAGE.

PROBLEM 1: An insufficient number of lake trout eggs are being deposited on ideal spawning substrate.

TACTICS * Develop an egg-taking operation or a brood stock as naturally produced lake trout begin to mature to enhance egg deposition.
* Map the spawning reefs designated for rehabilitation to identify ideal spawning substrate so that fish or egg planting can be made over the most ideal substrate.

PROBLEM 2: Knowledge of the relationship between microcontaminant levels and early-life mortality is insufficient.

TACTIC * Monitor micro-contaminant levels in lake trout closely, and periodically describe the survivability of eggs taken from Lake Michigan fish.

PROBLEM 3: It is difficult to detect young naturally reproduced lake trout.

TACTIC * Develop and utilize techniques for detecting naturally reproduced lake trout at an early life stage.

PROBLEM 4: Public support for the lake trout rehabilitation plan is weak.

TACTIC * Provide regular reports to user groups to keep them informed.

SUBOBJECTIVE A: MANAGE FISHERIES MORTALITY OF LAKE TROUT TO PROVIDE AN AVERAGE ANNUAL TOTAL MORTALITY OF NOT MORE THAN 40 PERCENT LAKEWIDE.

PROBLEM 1: Too many lake trout are being removed by sport and commercial fishers to maintain a less-than-40-percent annual mortality rate.

TACTIC * Reduce lake trout removal by commercial and sport fisheries by the following options:

Commercial

- Don't stock near fishery.
- Create restricted fishing areas by depth.
- Require low-profile nets in shallow water.
- Issue lake trout tags and close the season when lake trout are caught.
- Develop gear that selects against lake trout.
- Create refuge areas.
- Close fisheries.

Sport

- Don't stock near fishery.
- Reduce bag limit.
- Shorten the season.
- Issue lake trout tags.
- Create no-possession areas.
- Create refuge areas.
- Close the season.
- Set a size limit.
- Limit use of lake trout gear (wire lines).

PROBLEM 2: Lamprey continue to prey on lake trout and could become a major limiting factor.

TACTIC * Continue our support of the lamprey control program at the 1981-83 level or better.

PROBLEM 3: Present number of assessment surveys are inadequate to measure the mortality rate lakewide.

TACTIC * Conduct lake trout assessment surveys in representative areas lakewide in a consistent format, to collect adequate population data to determine mortality rates and spawning densities.

SUBOBJECTIVE B: DEVELOP LAKE TROUT POPULATIONS IN TWO PRIMARY REHABILITATION AREAS THAT EXHIBIT SEVEN MATURE AGE CLASSES AND EITHER:

1. AN OCTOBER SPAWNING DENSITY OF 4 TROUT PER ACRE OF SPAWNING REEF, OR
 2. AN ANNUAL EGG DEPOSITION OF 3,000 FERTILIZED EGGS PER ACRE OF SPAWNING REEF.
-

PROBLEM 1: There are inadequate numbers of mature lake trout spawning on suitable reefs.

TACTICS * Stock lake trout with rehabilitation as the main objective and with harvest as a secondary objective.

* Stock lake trout over ideal spawning habitat instead of from shore.

- * Investigate whether stocking lake trout at earlier life stages than the yearling stage would result in better homing of those fish as adults.
- * Construct an artificial spawning reef.
- * Determine locations of all suitable spawning reefs.

PROBLEM 2: The strain of lake trout stocked may be inappropriate for rehabilitation in Lake Michigan.

- TACTIC**
- * Begin to stock and evaluate the performance of the following lake trout strains as recommended by the Lake Trout Technical Committee: Lake Superior domestic, Gull Island Shoal and domestic cross, Wyoming strain, Green Lake strain, and Seneca strain.

Final Note

The preceding problems and tactics were developed from the Plan objectives under currently existing conditions in Lake Michigan. As more data becomes available, other tactics may be developed that will deal more effectively with the problems.

Some of the tactics have already been initiated, and those remaining must now be evaluated for their feasibility. Finally, they must be prioritized to enable fish management field work units to incorporate them into their biennial work projects. At this stage, the tactics must compete with other fish management field projects for budgetary allotments.

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Edited by Donna Mears.

APPENDIX



State of Wisconsin

DEPARTMENT OF NATURAL RESOURCES

Carroll D. Besadny
Secretary

BOX 7921
MADISON, WISCONSIN 53707

January 21, 1985

In Reply Refer To: 3600

Mr. Gary R. Goyke
22 N. Carroll Street
Madison, Wisconsin 53703

Dear Mr. ^{Gary}Goyke

This letter is our response to your review of our proposed Lake Michigan Fishery Management Plan which you submitted on August 1, 1984. As I indicated in my interim response, we also wanted to meet with the various groups of commercial fishermen on a face-to-face basis. Over the past 4 months we met with the fishermen at Milwaukee, Green Bay and twice with the Door County group. I gave copies of the minutes of these meetings to Gail for your information. Overall, I have been very pleased with the open minded reception that the fishermen have given the Lake Management Plan - they have listened carefully and asked many pertinent questions.

Some of the suggestions in your letter and some of the comments we recorded at those meetings are being incorporated into the next draft of the Plan. In an attempt to fully address all your comments of August 2 in an orderly manner, I have numbered them and included them in this letter.

Comment 1. There are many unknowns as the state charts ways to protect, maintain and enhance our fisheries. A consistent policy--applicable to sport and commercial fishermen alike--should be developed to deal with those situations in which we now have insufficient data to develop a rational policy.

DNR RESPONSE: We agree, and hope that the Lake Michigan Management Plan is a solid first step in developing a consistent approach to Great Lakes management for all users.

Comment 2. In implementing the plan, state officials should recognize the fragile and fragmented status of the commercial fishing industry. While no one would intentionally destroy the industry, actions which seem insignificant because they affect

only a small or isolated segment of the industry, would quickly cumulate to undermine the entire industry. The impact on the whole may be greater than the sum of any of its parts. We ask for actions consistent with the overall intent of preserving and enhancing commercial fishing.

DNR RESPONSE: We agree and are pleased to note that you recognize that we do not want to destroy the commercial industry.

Comment 3. For the fish management plan to succeed ultimately, we will have to reduce greatly the dumping of industrial pollutants into the state's waterways. The fish management plan should include as one of its goals the need to energize sport fishermen to demand an end to this dumping. All other goals of the plan will be undermined if this one is not included. Specific objectives in this area could include some limitations on the sport fishing of contaminated fish. Such limitations would do much to bring about the pressure needed to change the current dumping policy.

DNR RESPONSE: We agree, but the exact approach as to how we should address the contaminant issue in the Management Plan still eludes us. Since it is a Fishery Management plan, we dare not set goals and objectives for issues over which we have no control.

By other actions we believe the Department has taken a strong stand on contaminants. Letters written to the charter fishermen, for example, have clearly energized that group with regard to pollutants. Similarly, the consumption advisories issued to alert sport fishermen have created near pandemonium, and they, too, have thought about little else since the 2ppm PCB guideline was established.

Comment 4. In many instances it is more efficient and less costly to achieve the objectives of the plan by employing financial remedies rather than flat prohibitions or permissions. We urge the Department of Natural Resources to experiment with the use of economic initiatives and incentives in achieving the desired outcomes, rather than depending wholly on the blunt tools of prohibition and punishment.

DNR RESPONSE: We are always open to alternative approaches which will result in helping the Department attain its objectives. We hear your plea and understand your point.

Comment 5. The commercial fishermen of Wisconsin recognize that some sacrifices will be necessary from each of the participating groups in order to bring about a long-term healthy fishing environment. The commercial fishermen want to be good citizens of this state. We urge those responsible for the formulation and implementation of the plan's specific programs to consult with and regularly inform the commercial fishermen of their activities. We believe the final outcomes will be more satisfactory to all if the commercial fishermen are involved in the plan's implementation on a continuing basis.

DNR RESPONSE: Thank you for this comment. It was also voiced at Sturgeon Bay by Elaine Johnson and I replied that the Management Plan is a living document. We fully intend to include all users in its implementation on a continuing basis.

Comment 6. Definition of Optimum Sustained Harvest, (plan, p. 1) We believe that in situations for which there are no recreational fishing opportunities--e.g., the harvest of smelt and chubs--that the definition of optimum sustained harvest should be weighted in favor of the economic interests of the commercial fishermen. Any incidental catch associated with this harvest can be compensated for the payment by commercial fishermen of restocking costs.

DNR RESPONSE: We cannot exclude the sport fishery from the smelt and chub harvest. Smelt are an important addition each spring to the shore fishery, and both smelt and chubs do contribute directly as forage for the gamefish that sport fishers seek. Incidental catch associated with their harvest will have to be dealt with on a fishery by fishery basis. Economic interests of the industry will be considered, but not necessarily as the paramount interest.

Comment 7. Commercial Fishery Objective 1, relating to the lake whitefish harvest levels, (plan, p. 2) We request that the harvest limit be set at 1,000,000 pounds instead of 650,000 pounds. Of the 1,000,000 pounds, 800,000 would be in traditional whitefish grounds, and 200,000 pounds would be in experimental locations.

Comment 8. Subject: Commercial Fishery Objective 2, Problem 1, (plan, p. 17) The inadequacy of data regarding lake whitefish should not in itself be a reason to limit the harvest. The DNR should report on what it is doing to assure that adequate data on

whitefish will be available in the future. We see no reason to increase entrapment gear assessments. Our preferred solution is the payment of fees by commercial fishermen for entrapped fish. These fees would probably be sufficient not only to assure adequate restocking of the lake, but also to address research costs requested here.

DNR RESPONSE TO 7, 8:

The 650,000 pound whitefish objective is not a limit, but is a biological gauge or production target that Lake Michigan is capable of producing on the average. The whitefish fishermen at the Door County meeting were also concerned, but gave their support once they received our explanation. Southern Lake Michigan is open to entrapment gear now, so the avenue to increased production is open ended at this time.

Lack of data has not limited the harvest. However, we all know that the whitefish population in northern Lake Michigan is being heavily fished, and the Department cannot afford to lose the pulse of this fishery which is hovering at the brink of maximum exploitation. We feel strongly that we must continue the entrapment gear assessments to maintain the excellent data base begun by the U. W. Stevens Point in 1975. The alternative is to manage more conservatively with less data, which means establishing a quota. We do not see need for a whitefish quota at this time.

Comment: 9. Commercial Fishery Objective 2, relating to chub harvest levels (plan, p. 2) We support this objective as it is worked here. This quota should be imposed with no closed season. Alternatively, there could be no quota and open fishing with one month closed season. In order to reach the harvest levels allowed in this objective, we need additional research and data. We propose that funds be allocated for this purpose.

DNR RESPONSE: We appreciate your support for the chub fishery objective. We do not agree that the closed season is unnecessary, but we are working on an order to begin the chub season on March 15 for the 1985 season.

Quotas are still considered to be necessary by our biologists, but they are not sacred. If a suitable combination of regulations (i.e. a 35 fathom restriction) were incorporated as a package, it is likely that we could return to an open fishery for chubs. More research is needed here, and we are glad you concur.

Comment 10. Commercial Fishery Objective 2, problem 2, relating to excessive lake trout removal associated with chub harvesting, (plan, p. 18) Some of the "alternative commercial harvest techniques" suggested to reduce the incidental catch of nontarget species are of very high cost to the commercial fishermen. The alternative we prefer in all cases is the payment of a per fish fee for any incidental catch. This fee will more than cover the cost of restocking the lake with nontarget species. Economic incentives rather than punitive action is the appropriate remedy here.

DNR RESPONSE: We, too, would prefer economic incentives or another system which will work. But, the problem is that there are too many lake trout being removed. Until the incidental catch is reduced 20-40% as the 1983-84 Ad Hoc Great Lakes Task Force called for, we are dealing with a "non-incentive". Per fish fees will not accomplish this reduction.

Comment: 11. Commercial Fishery Objective 3, relating to the management of yellow perch populations, (plan, p. 2). The objective should allow the harvest of 600,000 pounds or more of yellow perch, and the Lake Michigan harvest limit would be the greater of 150,000 pounds or half the total allowable harvest. Again, any attempt to reduce the incidental catch should be dropped in favor of a per fish financial penalty imposed on the commercial fishermen. The fees could be used to restock the lake at levels in excess of the incidental harvest.

DNR RESPONSE: Based on population studies, the Green Bay harvest objective must remain at 600,000 pounds, but we have modified the Lake Michigan objective up to 200,000 pounds.

Attempts to reduce incidental catch of salmonids in the southern perch fishery are already being made voluntarily by the commercial fishermen through the use of low profile nets. Most, if not all, perch fishermen have switched to the use of low profile gill nets (15 to 25 meshes deep) along with their traditional perch gill nets (32 meshes deep). We are in the process of working up incidental catch rates for both types of gill nets and it is fairly apparent that low profile nets do catch fewer trout without catching lesser amounts of perch. From an economic standpoint, we don't believe the fishermen would stop using low profile nets in favor of a per fish financial penalty.

Comment 12. Commercial Fishery Objective 3, problem 2, relating to "excessive nonharvest mortality in drop net segment of the fishery," (plan, p. 19) We do not understand the problem to which this statement refers. Therefore, we request further information, and the right to comment after we have had time to evaluate it.

DNR RESPONSE: This problem has been discussed on numerous occasions with commercial fishing groups from Green Bay, and as part of the public information meetings. The last contact with Green Bay fishermen was in August when we met with a committee of Fishermen which included; Mark Maricque, Gene Marks, Val Drzewicki, Tom Hermes, and Tom Peters.

At present, sub-legal perch make up about half of the total perch catch in drop nets. The Sea Grant study of the problem in 1983 indicated a 36% mortality on sub-legal perch in their experimental nets. This problem appeared to be most acute from May 20 until late June, when the fish are weak from spawning stress and rising water temperatures. The delayed season opening appears to be helping, as indicated by much lower numbers of perch washed ashore and counted in shoreline transects which are run annually. Once a mesh size is established to reduce the sub-legal catch, we will consider moving the open date earlier again.

Comment 13. Commercial Fishery Objective 3, problem 3, relating to the available data base, (plan, p. 19) We strongly endorse the ongoing collection of data.

Comment 14. Commercial Fishery Objective 3, problem 4, relating to noncompliance with harvest goals, (plan, p. 19) We strongly endorse the ongoing collection of data.

DNR RESPONSE TO 13, 14: We appreciate your support.

Comment 15. Commercial Fishery Objective 3, problem 3, relating to "excessive salmonid removal as incidental catch," (plan, p. 20) Again, we want to reiterate our preference for a per fish financial penalty imposed on the commercial fishermen for the incidental catch of nontarget fish. These payments would promote the increase of nontarget fish in the lakes by increasing the state's ability to stock the lakes.

Comment 21. Commercial Fishery Objective 8, relating to tactics to minimize or eliminate the incidental catch mortality of all nontarget species, (plan, p. 2) The most workable, efficient and economical solution to this problem is to charge the commercial fishermen a fee for their incidental catch. Revenues from this charge would be used to stock the lakes with the affected species. Stocking efforts in the state could be significantly increased under this plan.

DNR RESPONSE TO 15, 21:

Your comments have been made before. We hear you loud and clear and understand your position on this subject.

Comment 16. Commercial Fishery Objective 5, relating to Lake Michigan forage populations and trawling units associated with their harvest, (plan, p. 2) The forage populations are not fished for recreational purposes. We think trawling unit quotas are totally uncalled for when 1) we do not know what is happening to these populations, and 2) when there is no sport use for this fish. Instead we propose that DNR establish an ad hoc task force to consider Lake Michigan forage populations. Commercial and sport fishermen should be included on the task force. Worldwide data sources should be tapped to provide adequate evidence for proper decision-making. To make a pre-emptive strike against trawlers before adequate information is available is not acceptable to us.

Comment 17. Commercial Fishery Objective 5, problem 1, relating to inadequate information on the forage base, (plan, p.22) We want the work suggested here as "tactics" to be done in the context of the task force suggested immediately above. We do not want to be nipped at piecemeal before we have a total picture before us.

Comment 18. Commercial Fishery Objective 5, Problem 2, relating to the potential negative impact of trawling on the forage base, (plan, p. 22) The proposed tactics suggested here assume that the dangers from trawling are well-documented. The language of the problem, itself, says that expanded trawl fishery "could" negatively impact the forage base. Until the task force we have proposed draws some firm conclusions, the "could" of the problem should not be read as "will."

DNR RESPONSE TO 16, 17, 18:

The forage fish population is an area of Lake Michigan management that has not received the attention it deserves. We do not view the forage base as "sport" or "commercial." Certainly there is a commercial harvest of forage fish species by the commercial industry, but there is also an indirect harvest of the forage base by sport anglers when they catch trout and salmon which have fed on forage fish. There is also direct harvest of the forage base by smelters each spring.

The "pre-emptive" strike you allude to is inaccurate. In context of comments received from other sources calling for a moratorium of all trawling, we view our position of limiting the number of trawl units to those currently fishing these stocks as a reasonable approach.

We agree with your concept of tapping other information sources and have included the essence of this idea in our third tactic under our first problem (work with U. S. Fish and Wildlife Service, Sea Grant, and other agencies working on forage populations to better characterize lakewide population status). We do not feel that an ad hoc task force is appropriate at this time. The work we are currently engaged in and have planned for the future should aid us in understanding how the forage base is changing and why.

Comment 19. Commercial Fishery Objective 6, relating to describing and characterizing the northern pike population in Green Bay, (plan, p. 2) We agree with this objective and hope that it will be accomplished as soon as possible.

DNR RESPONSE: Thank you for your support.

Comment 20. Commercial Fishery Objective 7, relating to the development of Lake Michigan and Green Bay fisheries of under utilized species, (plan, p. 2) We hesitate to "carp" at you about this one, but curiosity gets the best of us. Would you describe the Department's recent actions regarding Green Bay carp as your best attempt to develop the use of an under utilized species there?

DNR RESPONSE: We weren't happy about closing down the Green Bay Carp fishery, but our mandate gives top consideration to human health and we had no choice. We remain committed to utilizing carp wherever we can.

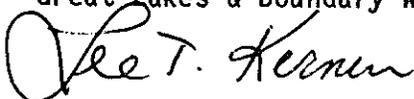
Comment 22. Sport Fishery Objectives 1-4 relating to sport fishing harvest levels, (plan, p. 3) We believe the lake management would be greatly improved if sport fishing of contaminated species were greatly limited. The sport fishermen of the state have enormous political clout, and only when they complain about losing their recreational source (and the economic benefits associated with the sport), will something be done about the state's major industrial polluters. Action to limit the emission of contaminants into the lake should be a key element to the management plan.

DNR RESPONSE: We discussed this under number 3.

Comment 23. Sport Fishery Objective 4, relating to maintaining angling opportunities for sport fishermen, (plan, p. 3) Contrast this objective for sport fishermen where we are encourage to maintain angling opportunities for sport species until their population status can be determine, with commercial fishing objectives where constraints and quotas are established first while waiting for population status reports. Sport and commercial fishermen should be treated alike on this matter. If there are no constraints imposed on sports fishermen pending population status reports, then similarly there should be no additional constraints on commercial fishermen under the same circumstances.

DNR RESPONSE: If both sport and commercial fisheries had the same potential to affect a fish population, we would support your final suggestion. The fact is, however, since commercial fisheries employ nets which are far more efficient than sport gear, the two fisheries cannot be treated as equals. History shows numerous occasions where a species was commercially over-harvested. Therefore, pending population studies, we must manage more conservatively where commercial fisheries are involved.

Sincerely,
Great Lakes & Boundary Waters Section



Lee T. Kernan
Chief

LTK:jeb:3075N



State of Wisconsin

DEPARTMENT OF NATURAL RESOURCES

Carroll D. Besadny
Secretary

BOX 7921
MADISON, WISCONSIN 53707

May 29, 1984

IN REPLY REFER TO: 3600

Mr. Bill Barton
Wisconsin Federation of
Great Lakes Sport Fishing Clubs
865 No. 13th St.
Manitowoc, WI 54220

Dear Mr. *Bill* Barton:

The Department of Natural Resources appreciates the interest and cooperation exhibited by the Wisconsin Federation of Great Lakes Sport Fishing Clubs in the development of a Lake Michigan Fish Management Plan.

Attached is the latest draft of that plan. I am pleased to say that we have incorporated many of the suggestions that were submitted in the Federation's response which we received on February 17, 1984. There were other suggestions that we thought were either inappropriate, or that could be handled differently.

In an attempt to address all of your comments in an orderly manner, I have gone through the Federation Draft and circled and numbered them. Each change is discussed individually, and includes a short explanation as to why we handled it as we did.

DNR action with regard to Federation Draft LMFMP

1. Good comment. This has been addressed by adding the term "optimum sustained harvest" to all 3 goal statements, then including a definition of that term which incorporates the effect of harvest on associated species.
2. We understand your intent, but DNR does not have the authority to exercise this. The DNR, will, however, do whatever it can within its mandate to protect the Great Lakes Resources.
3. DNR cannot support this because it is mandated by NR 1.04 which does not specify or favor economic impact.
4. "Lake" has been replaced by "their" for clarification so that streams tributary to Green Bay are included.

- 5, 6, 7, 8, 9. Good suggestions, but they were considered too bulky. They will be addressed in the definition of "optimum sustained harvest" on the first page of the plan. We then added a separate commercial objective (number 8) to emphasize the importance of your comments.
- 10, 11. We cannot recommend a moratorium on trawling at this time. We agree, however, that smelt and alewife should be treated together along with other forage species. In response we have greatly expanded the rationale for the forage fish population of Lake Michigan.
12. We agree, and this has been included as commercial objective 8.
13. This suggestion is too restrictive on the commercial fishery to be considered.
14. This suggestion is unrealistic and was dropped.
15. A sport harvest objective of 600,000 trout and salmon is considered as a minimum. Hopefully it will remain near the 750,000 fish but we cannot realistically expect to achieve that each year.
- 16, 17. We disagree. The data clearly indicates we must reduce lake trout harvest to 50,000 fish or less. We cannot guarantee bag limits.
18. We agree. This objective has been changed to increase the catch to 50,000 rainbows annually as you suggest which will include both stream and lake harvest.
- 19, 20. We agree. These two suggestions were incorporated into 1-c.
21. This is unrealistic. The DNR does not have a "sport fishing fund" which would allow this. It can only attempt to direct the funding toward the maximum users.
22. We cannot agree to this at this time. Yet, the possibility exists that lake trout could be produced in our current hatchery system if production of other species were dropped to make room. We will examine this potential, although the contaminant issue may be insurmountable under present conditions.
23. Good suggestion. This has been incorporated as a problem with a tactic under the lake trout objective No. 2. We agree that more evaluation and reporting is necessary.
24. This suggestion will be investigated as part of routine management programs, and we appreciate your concern regarding these species.
25. Law Enforcement objectives cannot be incorporated into a fish management plan, but, we agree that there should be a statement reiterating the importance of Law Enforcement.

This completes the analysis of the Federation comments.

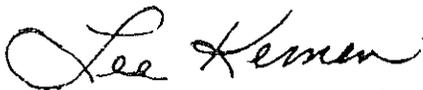
Mr. Barton - May 29, 1984

Page 3.

Several other changes were made during the review process. Among them was a revision of lake trout mortality rate objectives downward to 40%. This change was made to reflect the recommendation of the lake trout technical committee of the Great Lakes Fishery Commission.

The new draft plan includes problems which stand in the way of reaching the objectives, along with tactics which are designed to solve those problems. We invite you to again thoroughly review the entire plan and to respond to us by August 1, 1984. Following that response, we intend to write an introduction to the plan which will describe the process used to develop it. I would like to meet with your officers at least one time on this subject before it is formally published.

Sincerely,
Bureau of Fish Management



Lee T. Kernan, Chief
Great Lakes & Boundary Waters Section

LTK:jmh/2757N

cc: C. Higgs
G. McCutcheon
J. Addis
J. Huntoon
G. Goyke
Lake Michigan Commercial Fishing Board

LAKE MICHIGAN FISH MANAGEMENT PLAN

THE GOAL OF FISH MANAGEMENT IS TO PROVIDE OPPORTUNITIES FOR THE OPTIMUM USE AND ENJOYMENT OF WISCONSIN'S AQUATIC RESOURCES, FOR BOTH SPORT AND COMMERCIAL PURPOSES. A HEALTHY AND DIVERSE ENVIRONMENT IS ESSENTIAL TO MEET THIS GOAL AND SHALL BE PROMOTED THROUGH MANAGEMENT PROGRAMS. (N.R.1.01 (2)).

- A. MANAGE STOCKS OF COMMERCIAL FISH SPECIES TO ALLOW AN OPTIMUM SUSTAINED HARVEST, WHILE INFLECTING MINIMUM IMPACT ON NON-COMMERCIAL AND SPORT SPECIES. 1
- B. MANAGE FOR A DIVERSE MULTI-SPECIES FISHERY WITH A SUSTAINED HARVEST, TO PROVIDE A VARIETY OF SPORT FISHING OPPORTUNITIES.
- C. RE-ESTABLISH SELF-SUSTAINING LAKE TROUT POPULATIONS TO ALLOW AN OPTIMUM SUSTAINED SPORT AND COMMERCIAL HARVEST.

THE ACHIEVEMENT OF THESE GOALS MUST NOT BE TO THE EXCLUSION OF OTHER WATER USERS OF LAKE MICHIGAN, AND NO OTHER USE OF WATER SHOULD IMPACT THIS PROGRAM. 2

EACH SUB-GOAL HAS AN EQUAL PRIORITY FOR ACHIEVEMENT, EXCEPT THAT WHERE A SIGNIFICANT ECONOMIC IMPACT IS INCURRED, FAVORABLE IMPACT ON THE STATE AND LOCAL COMMUNITY WILL PREVAIL. 3

THIS SECTION WILL HAVE A DISCUSSION ABOUT THE GEOGRAPHIC SCOPE OF THE PLAN, I.E. LAKE MICHIGAN, GREEN BAY, AND LAKE TRIBUTARIES. 4

1991 COMMERCIAL FISHERY OBJECTIVES

1. To manage the Lake Whitefish populations at levels that will allow sustained annual harvest of 650,000 pounds. To be accomplished by means which will reduce the incidental mortality of trout and salmon to 50% of that estimated by the D.N.R. for the year 1982, while harvesting whitefish.
2. To manage the Chub populations at levels that will allow a sustained annual harvest of four million pounds. To be accomplished by means which will reduce the incidental mortality of trout and salmon to 50% of that estimated by the D.N.R. for the year 1982, while harvesting chubs.
3. To manage the Yellow Perch populations at levels that will allow a sustained annual harvest of 600,000 pounds in Green Bay. To be accomplished by means which will reduce the incidental mortality of trout and salmon to 50% of that estimated by the D.N.R. for the year 1982, in the Green Bay area. To manage the Yellow Perch populations at levels that will allow a sustained harvest of 150,000 pounds from Lake Michigan. To be accomplished by means which will reduce the incidental mortality of trout and salmon to 50% of that estimated by the D.N.R. for the year 1982, while harvesting yellow perch.
4. To manage the Round Whitefish populations at levels that will allow a sustained annual harvest of 40,000 pounds under a permit fishery system. To be accomplished with minimal incidental mortality of trout and salmon.
- 10 5. Establish a moratorium on trawling of alewife before January 1, 1986 unless a better management program is developed to ascertain the present alewife population and their future.
- 11 6. To manage the harvest of smelt while monitoring population levels and determining methods to reduce incidental mortality of salmonids. Limit the number of trawl units to the current number in operation.
7. To allow northern pike harvest only as an incidental catch to other commercial species.
8. To encourage the development of a burbot fishery in Green Bay.

1991 COMMERCIAL FISHERIES OBJECTIVES CONTINUED

- 12 9. DEVELOP SELECTIVE FISHING TECHNIQUES AS A MEANS TO MINIMIZE OR ELIMINATE INCIDENTAL CATCH OF ALL NON TARGET SPECIES.
- 13 10. TO ELIMINATE SMALL MESH GILL NET FISHING IN THE SOUTH EAST DISTRICT (ALL ZONES SOUTH OF GRID 1500) INSIDE OF 50 FATHOMS.
- 14 11. TO REQUIRE THE MANAGEMENT PROGRAM OF LAKE MICHIGAN COMMERCIAL FISHERY TO BECOME FINANCIALLY SELF SUPPORTING BY JANUARY 1, 1987.

1991 SPORT FISHERY OBJECTIVES

1. To MAINTAIN AN ANNUAL HARVEST OF ¹⁵ 750,000 TROUT AND SALMON BY THE COMBINED TROLLING (TRAIERED, MOORED, AND CHARTER) PIER, SHORE AND STREAM FISHERY.

1A. To MANAGE FOR A LAKE TROUT SPORT HARVEST OF ¹⁶ 120,000 FISH, AND REDUCE THE HARVEST IN STREAMS TO ZERO, ¹⁷ WHILE RETAINING THE THREE PER DAY LIMIT.

1B. To MANAGE THE FISHERY PROGRAM TO INCREASE THE HARVEST OF RAINBOW TROUT FROM 10,000 ¹⁸ TO 50,000 ANNUALLY.

¹⁹ 1C. To INCREASE COHO STOCKING, BY REDUCING PLANTINGS OF SPECIES, BY MANAGEMENT DISTRICT, WHICH ARE NOT BEING RETURNED TO THE CREEL, IN THOSE MANAGEMENT DISTRICTS.

1D. To ADJUST PLANTING PROGRAMS TO MAINTAIN THE 1982 LEVELS OF CATCH.

1E. To PRODUCE AN ANGLER CAUGHT CHINOOK THAT EXCEEDS 50 POUNDS.

²⁰ 1F. To MANAGE THE FORAGE BASE TO SUPPORT THE ABOVE GOALS.

2. To MANAGE GREEN BAY FOR AN ANNUAL SPORT HARVEST OF 1.2 TO 1.9 MILLION YELLOW PERCH THAT AVERAGE 4 TO 5 FISH PER POUND.

3. To MANAGE THE GREEN BAY WALLAEYE FISHERY TO PROVIDE AN ANNUAL SPORT HARVEST OF 50,000 FISH FROM A POPULATION THAT CONTAINS TEN YEAR CLASSES.

4. To MAINTAIN THE ANGLING OPPORTUNITIES AT THE CURRENT LEVEL FOR THE REMAINING SPORT SPECIES UNTIL THEIR POPULATION STATUS CAN BE DETERMINED.

²¹ 5. To DIRECT ALL SPORT FISHING GENERATED REVENUES TO SPORT FISHING BY JANUARY 1, 1987.

²² 6. To ESTABLISH A STATE LAKE TROUT HATCHERY PROGRAM BY 1991.

1991 LAKE TROUT REHABILITATION OBJECTIVES

1. TO MANAGE FISHERIES MORTALITY OF LAKE TROUT TO PROVIDE AN AVERAGE ANNUAL TOTAL MORTALITY OF 45 % LAKEWIDE.
2. TO PRODUCE A NATURALLY REPRODUCED YEAR-CLASS OF LAKE TROUT THAT IS DETECTABLE AT THE YEARLING LIFE STAGE.
3. TO DEVELOP A LAKE TROUT POPULATION IN TWO PRIMARY REHABILITATION AREAS THAT EXHIBITS AN OCTOBER SPAWNING DENSITY OF 4 TROUT PER ACRE AND HAS SEVEN MATURE AGE CLASSES.

-OR-

..... THAT EXHIBITS AN ANNUAL EGG DEPOSITION OF 3000 FERTILIZED EGGS PER ACRE AND HAS SEVEN MATURE AGE CLASSES.

- 23
4. TO PROVE THE FEASIBILITY OF NATURAL REPRODUCTION.

1991 RE-INTRODUCTION OF LAKE SPECIES

- 24
1. TO IMPLEMENT STOCKING PROGRAMS OF SPECIES NOT NOW COMMERCIALY OR SPORT HARVESTED. (LAKE STURGEON-HERRING).

1991 LAW ENFORCEMENT OBJECTIVES

25

1. TO CONTROL THE ANNUAL MORTALITY CAUSED BY ILLEGAL MARKETS OR VIOLATION OF EXISTING RULES TO LESS THAN 100,000 POUNDS ANNUALLY. (TOTAL OF ALL SPECIES).
2. TO REDUCE THE MORTALITY OF BROWN AND LAKE TROUT PRESENT IN STREAMS DURING SEPTEMBER AND OCTOBER, BY A SIGNIFICANT AMOUNT.
3. TO INCREASE THE ENFORCEMENT OF EXISTING LAWS, PROPOSE NEEDED ADDITIONS OR MODIFICATIONS TO EXISTING LAWS, AND PROSECUTE VIOLATORS OF SAME.
4. TO ENFORCE F.D.A. RESTRICTIONS ON LEVELS OF CONTAMINATION IN SALEABLE COMMERCIAL SPECIES.
5. ADOPTION AND ENFORCEMENT OF SENATE BILL 546 AND THE ADDENDUM RESOLUTION TO THE BILL (ATTACHED).