MDNR

Strategic Plan – 2002

Fisheries Division

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Strategic Planning

Introduction

This document presents a draft strategy for managing Michigan's fisheries in the 2000s, prepared by the Fisheries Division, Michigan Department of Natural Resources. It will enable interested citizens and staff of the Fisheries Division, other divisions in the Department of Natural Resources, and other organizations to participate in further planning.

Most organizations perform better when they choose an explicit course of action and concentrate attention and effort on pursuing that course. A strategic plan defines a course of action to achieve high purposes over a substantial period. It should provide the main focus of an entire organization's efforts but does not detail all the work that must be done by that organization.

In its final form, the strategy described here will become the main focus of the Fisheries Division in the 2000s.

The first section of the plan concerns the mission and goals of the Fisheries Division. These define the highest and broadest purposes of the strategy. The mission and goals are based on the nature of Michigan's fisheries and are designed to meet the needs of various publics. The second section describes the Division's publics and their relationships to the Division.

The third section of the plan briefly describes the Division's programs. The Division will pursue each of its goals through one or more specific programs. These programs are the broadest statement of the Division's strategy. Each program is supported by an annual legislative appropriation of funds that may be used only in that program. Programs are therefore the primary way in which the Division assigns efforts to specific purposes. Programs do not necessarily correspond to organizational units of the Fisheries Division, but many of the Division's employees are assigned to only one program.

Each of the Division's programs includes an integrated set of activities that relate directly to the program's goal. We define the relationship of these activities to the goal by a set of "key results" which we intend to pursue. If these key results are obtained, the program should make satisfactory progress toward its goal. The key results are long-term purposes of the Division's programs and will require continuing, organized effort over a long period. Key results will become the focus of objective setting, performance measurement, work planning, and routine activities in the Division. The skill requirements and work effort needed to achieve each key result will be the basis for organizing and staffing the Division.

The fifth section of this plan addresses current program issues and directions. As we have examined our future direction, certain public concerns and technical problems in fishery management have shaped the strategy we propose. These issues justify many of the key results and specific objectives which we need to achieve.

The final section of this plan describes the objectives and activities which we expect the Division to pursue in the near future. Objectives should state specific accomplishments which are to be completed by specific times. Some of the objectives described in this draft plan need to be further refined so that they are finite and achievable. A target completion date is needed for

each objective, such that expected progress is balanced with available funds and staffing. Improving the draft objectives is the primary purpose of this draft of the Division's strategy.

All elements of the strategy are subject to change as public needs change or the Division finds better ways to pursue its goals. Objectives, however, evolve simply as a result of progress in the Division's programs. As objectives are completed, we will refine the remaining objectives or identify new ones.

The Fisheries Division has established a program committee for each of the programs described in this plan. These committees are charged to revise the objectives in the respective programs, both now and in the future. Assignments are focussed on improving the current objectives, setting dates for their completion, and developing means to complete them. In subsequent years, the committees will recommend changes in objectives as progress and changes in public need warrant.

The objectives defined in the Division's strategic plan will be implemented through the Division's annual work planning processes. The program committees and Division management will assign responsibility for various objectives to various units. Units will incorporate assigned objectives in their work plans. Management review and adoption of work plans will be based in part on verification that objectives are adequately addressed.

Michigan’s Fisheries

The State of Michigan contains 11,000 lakes, 36,000 miles of rivers and streams, and 43 percent of the Laurentian Great Lakes which contain more than 20 percent of the world's fresh water. These waters contain a variety of fish communities representing most of the types found in North America. These extensive resources in proximity to the large human population of Michigan and nearby States provide unmatched fishing opportunities.

Recreational fishing is the largest and highest-valued use of the State’s fishery resources. Approximately two million Michigan residents and 334,000 non-resident tourists fish in Michigan each year. These anglers fish over 25 million angler days per year. Net value of fishing to these fishermen has been estimated at $950 million. In fishing, anglers spend $850 million per year with impact on tourism and fishing equipment sectors of Michigan's economy of $2.0 billion per year. This produces value-added of $900 million annually with associated employment of 31,000 persons.

Michigan ranks in the top four nationally, following Florida, California, and Texas, for revenue and economic impacts of fishing in the following categories: Economic Output, Earnings, Jobs, and Federal Income Tax. Michigan ranks first in State Income Tax associated with fishing at over $20,980,000.

Commercial fishing in Michigan's Great Lakes waters produces approximately 16 million pounds of whitefish, chubs, perch, lake trout, catfish, and other species with a landed value of about $10 million each year. Wholesaling, processing, and retail sales after landing produce another $9 million in economic activity annually. These activities provide employment for about 1,000 Michigan residents. Approximately two-thirds of the landed value is taken by tribal fisheries; the remainder is landed by State-licensed fishermen.

However, Michigan's fisheries resources are also fragile, are subject to heavy fishing, and other human impacts. Thus they require fairly intensive protection and management. Without management beyond statutory fishing regulations and habitat protection, the State’s fisheries would quickly degenerate and would support no more than 40 percent of present fishing. Management of Michigan's fisheries began with establishment of the Michigan Fish Commission

in 1873. The Fisheries Division of the Department of Natural Resources, which evolved from that commission, is now the second oldest administrative agency in the State's government.

Mission and Goals

Michigan's fishery resources are held in trust by the State for benefit of its citizens. As trustee, the State has special, more demanding obligations beyond its general responsibility to act for the public benefit. Indeed, the State's constitution declares "The conservation and development of the natural resources...to be of paramount public concern..." and enjoins the government to act in this interest. Act 17, P.A. 1929 charges the Department of Natural Resources to "provide for the protection and propagation of game and fish..." The State's responsibilities as trustee of the people's fishery resources are largely discharged through the Fisheries Division. Thus the doctrine of the public trust in natural resources is fundamental to the Division's mission and goals.

Statutory and judicial application of the public trust doctrine has established five guiding principles:

1. Public trust resources are a special form of public property. They may not be transferred to private ownership unless such transfer will serve a significant public purpose. They particularly should not be disposed of at less than market value unless there are obvious public reasons for such a subsidy.
2. The interests of future citizens of the State are as important in resource management as those of present citizens. Present citizens have only the right of use and must pass the trust on to the future without diminishing its value. If trust resources are degraded, as were the Great Lakes fisheries, then the State has an obligation to rehabilitate them if it is possible.
3. The State has an obligation to provide for the broadest possible benefits from use of public trust resources. Thus, the State must favor recreational over commercial fishing and should provide for public access to the State's waters where these can produce significant public fisheries. Restriction of public use of the public fisheries must demonstrably enhance public health, safety, or welfare.
4. Government must act to develop natural resources and promote their use in the interest of the general welfare. It is not sufficient to conserve resources and provide for their use; rather, where possible, new resources and new uses should be created so as to increase the common wealth.
5. Resource managers must seek to define and serve the broad public interest as against narrower, more focused interests. They must actively identify and respond to public needs and concerns rather than simply providing for public participation in management decisions.

In light of the public trust doctrine and the interests of the major stakeholders in the State's fishery resources, the Department of Natural Resources adopted the following mission and goals for the Fisheries Division.

The mission of the Fisheries Division, Michigan Department of Natural Resources, is to protect and enhance the public trust in populations and habitat of fishes and other forms of aquatic life, and promote optimum use of these resources for benefit of the people of Michigan. In particular, the Division seeks to:

- protect and maintain healthy aquatic environments and fish communities and rehabilitate those now degraded;

- provide diverse public fishing opportunities to maximize the value to fishermen of recreational fishing;
- permit and encourage efficient and stable commercial fisheries which accommodate Indian fishing rights and do not conflict with recreational fisheries; and
- foster and contribute to public stewardship of natural reources through a scientific understanding of fish, fishing, and fishery management.

Constituencies and Interests

The Fisheries Division's mission and goals reflect the broad interests of the people of Michigan in a healthy environment, ample opportunity for outdoor recreation, creating wealth, and just treatment of the State's citizens. However, the Division must consider and balance a variety of more concrete interests expressed by a variety of constituencies and interested publics. Thus, an understanding of these constituencies and publics is valuable in gaining a deeper understanding of the Division's mission and goals.

In addition to the general public, the Division's principal publics include anglers, angling-related businesses, boating interests, riparian and near-shore residents, water users and managers, commercial fishing interests including Native American tribes with fishing rights, Great Lakes resource agencies, various general agencies of state government, local and regional agencies, various communications agents, and fisheries and related professionals.

The largest of the Division's constituencies encompasses those Michigan citizens who fish for recreation. Anglers usually have intense interest in those fishing opportunities they use and general interest in the conservation and sound management of all of the State's fisheries. Most anglers do not belong to formal angler's organizations but the organized groups often reflect their interests.

Anglers' interests often focus on fisheries near their residences or second homes. Lake or stream associations or local conservation clubs often reflect these interests. Some local governments or local businesses may also actively reflect fishing interests tinted by commercial interests.

Some anglers may also have specific interests in kinds of fish or fishing. Organizations such as the Michigan-Ontario Musky Club, the Lake St. Clair Walleye Association, various bass fishing clubs, Trout Unlimited, Michigan Steelhead and Salmon Fishermen's Association, and the Federation of Fly Fishermen reflect such interests. Such groups often are as interested in "program balance" and special fishing opportunities as they are in local fisheries. Special interest groups of this type often highlight issues or concerns which are more diffuse among the general population of anglers, but they do not represent the whole of the angling constituency.

Many anglers and groups support regional and statewide organizations whose aims include influencing government policies and programs. Such groups as the Michigan United Conservation Clubs, Michigan Steelhead and Salmon Fishermen's Association, Michigan Bass Federation, Michigan Council of Trout Unlimited, and Northern Michigan Sportsman's Society serve to distill and filter local opinion.

Many groups of anglers also become stewards of particular resources or management projects. They donate labor, materials, and funds to aid Fisheries Division efforts in return for the Division's continuing attention to their projects.

Businesses which serve anglers usually have interests which closely relate to, but may not be consistent with, anglers' interests. Tackle and bait retailers, fishing license agents, equipment

and tackle manufacturers, charter boat operators and fishing guides, and fish cleaning station operators all have a direct interest in angling activity. Many resorts, motels, campgrounds, marinas, boat rental services, restaurants, gas stations and other travel-related businesses have great interest fisheries which attract tourists to their area. These interests are expressed through state and local chambers of commerce, local governments, community service clubs, regional tourist councils, the Great Lakes Charter Boat Association, Michigan Retail Hardware Dealers Association, Michigan Boating Industries, American Fishing Tackle Manufacturers Association, and the Michigan Travel Bureau.

Since much fishing is done from boats and much boating is done to engage in fishing, there is considerable correlation between the interests of anglers and boaters. Both anglers and boaters need access to the water and prefer clear, clean water and pleasant settings. However, there are also significant conflicts between boaters and anglers. Intense boat traffic on lakes and rivers and canoe traffic on streams disrupts fishing. High speed boating is particularly incompatible with fishing. Boaters often view anglers as obstructions to boat traffic. Angling and non-angling boaters compete for limited facilities in some areas. Boating interests are also biased toward larger boats than are used by many anglers. The State Waterways Commission, the DNR Parks and Recreation Division, and the Michigan Boating Industries Association reflect boating interests.

Riparian landowners and managers and near-shore residents often have a direct interest in fishing but also have many correlative interests. Many private riparian and near-shore residents live near water in part because of their interests in fishing. Public riparian agencies, including the U.S. Forest Service, various DNR Divisions, and local governments, make specific efforts to accommodate fishing. Private riparian, however, also find intense public use disrupts their interests. They often oppose public access because of concerns about trespass, congestion, and noise. Such concerns may extend to near-shore residents and communities. Riparian activities such as weed control, water level management, beach maintenance, dredging, seawall construction, and dockage can completely dominate shoreline and eliminate critical fish habitat. Erosion, nutrient loading, and water use by riparian can profoundly affect fish habitat in lakes and streams. The Department of Environmental Quality Land and Water Management Division manages most riparian activities that affect fisheries.

Industrial and agricultural users of surface water and agencies that manage water and its use have important effects on fisheries interests. Water users may be significantly constrained by protection of fish and fishing. Water withdrawal, especially by steam electric and hydroelectric plants, often kills fish by impinging them on screens or as they pass through the facility. Water withdrawal from streams also has a profound effect on their capacity to support fish in affected reaches. Drainage management can have similar effects. Dams affect water flow, temperatures, and fish movement and hence fish populations. Discharge of wastewater from municipalities, industry, and agriculture can also significantly affect water quality. Users of water are numerous but are regulated by a few key agencies with whom Fisheries Division works. These agencies include the DEQ Land and Water Management and Surface Water Quality Divisions, U.S. Environmental Protection Agency, U.S. Army Corps of Engineers, Federal Energy Regulatory Commission, and county drain commissioners.

Commercial fishing is an important use of fisheries resources that can be of economic benefit to the State and of particular value to traditional fishermen, especially Native Americans. Commercial fishing businesses express their interests directly to the Division and through the Michigan Fish Producers' Association, Michigan Bait Dealers' Association. Tribal commercial fishing interests include the Bay Mills, Grand Traverse, Keweenaw Bay, and Sault Ste. Marie tribes, the Chippewa-Ottawa Tribal Management Authority and the U.S. Department of the Interior. The tribes have a specific interest in tribal governance of their fishing. In those areas of

the State where commercial fishing dominates recreational fishing, local communities and businesses are supportive of the commercial fishery. Commercial fish consumers do not express their interests through any specific organization.

The Great Lakes fall within the jurisdiction of Canada and the United States, further subdivided among the province of Ontario and eight states. Each of these jurisdictions has several agencies concerned with Great Lakes resources. The Fisheries Division works cooperatively with these agencies to protect fish habitat and manage fish stocks of common concern. The Great Lakes Fishery Commission established by convention between the United State and Canada provides the principal forum for such cooperation. The International Joint Commission established by treaty between the United States and Canada is responsible for water level, use, and water quality management in the Great Lakes.

As an agency of State government, the Fisheries Division must work within the guidance and management systems defined by various general agencies of State government. The Legislature, Governor, Attorney General, Natural Resources Commission, and DNR Executive Office give considerable policy direction. DNR Executives, the Department of Management and Budget, the Governor, and the Legislature determine the Division's budget. The Department of Civil Service, Office of the State Employer, and Michigan Equal Employment and Business Opportunity Council, as well as DNR executives and personnel office establish personnel policies and management systems. The Department of Management and Budget controls administrative management systems, particularly purchasing and accounting. These agencies have a large influence on the magnitude of the Division's efforts and the efficiency of its performance.

The Fisheries Division has substantial influence on many of Michigan's citizens. Many local governments, regional planning commissions, economic development councils, local business organizations, and State legislators recognize this influence. They have emerged in recent years as a major clientele group for the Division. Great Lakes port communities and small communities near major inland fisheries have concentrated on the economic impact of the fisheries. Larger cities have shown particular interest in increasing recreational opportunities for residents. Local interest in fisheries can be a boon to anglers when channeled into improved facilities and services. However, the Division must also deal with competition between localities.

Several societal institutions are devoted to communicating information to interested people. The press and broadcast media, schools, and extension services have specific interests in communicating about fish, fishing, and fisheries management. The outdoor press and MSU Extension Service also communicate opinions back to the Division. These communications agents can be an important public for the Division.

The last of the Division's major publics are fisheries and related professionals. These professionals and the Division mutually contribute to the scientific understanding of fish, fishing, and fishery management through professional journals, conferences, and society activities. Those professionals who work in Michigan and nearby jurisdictions have closest association with the Division, but major agencies and universities around the world are also significant cooperators. The Division's primary emphasis is on work with the American Fisheries Society, International Association of Fish and Wildlife Agencies, Michigan State University and University of Michigan, scientists and managers working on the Great Lakes, and scientists and managers working in the Pacific Northwest. The Division's close relationships with Michigan State University and the University of Michigan are critical to the excellence of the Division's research efforts and hence in fishery management.

Emerging Issues

Ecosystem Management

The Fisheries Division of the Michigan Department of Natural Resources has been an aggressive proponent of "Ecosystem Management". We believe that fish communities and fisheries are parts of, and in a sense--products of, complex aquatic ecosystems. Great Lakes and tributary fisheries resources have changed dramatically over the past century. Indigenous fish fauna of these lakes consisted primarily of a coregonine complex, lake trout, burbot and Atlantic salmon. As the human population increased in the basin, these fisheries changed from subsistence to commercial fisheries and, most recently, to an emphasis on recreational fisheries. Concurrent with these changes was a significant alteration of the landscape in the region. These changes resulted in a collapse of the historic fisheries, eutrophication of the lakes, contamination of their biota and spread of exotics into the basin. The future sustainability of the Great Lakes and tributary fishery resources depends on our ability to manage these ecosystems effectively.

Healthy aquatic ecosystems exhibit efficient energy transfer through the food web, and have communities that are resilient to disturbance and stable through time. Healthy ecosystems provide many important environmental functions, such as purifying water and attenuating floods. These same functions provide clean, cool, well-oxygenated waters and other habitat conditions that support healthy fish communities and valued fisheries. Aquatic ecosystems can be viewed in terms of structure and function. Structure is defined by the trophic structure of its component biota while functions involve patterns by which energy, water, sediment, nutrients, and toxic chemicals are processed.

In attempting to improve the quality of our lives, humans unknowingly alter both the structure and functions of aquatic ecosystems. Many unique fish populations (including many valuable predators) have been lost due to habitat alterations or over harvest, while other exotic species have been introduced. Each population is a working piece of the system. The term "biodiversity" collectively refers to the pieces. As pieces are lost, the efficiency, resiliency, stability, and environmental functions of the ecosystem diminish.

Forest clearing, wetland draining, and development of land for agriculture and urbanization have changed (mostly increased) the delivery rates of water, sediments, nutrients, and toxic chemicals to aquatic systems. Increased stormwater flows and sediment loads have seriously degraded stream channel habitats. Dissolved oxygen levels and aesthetic values of lakes have been reduced by eutrophication. Physical alterations, such as channelization of streams or destruction of riparian wetlands, have changed how aquatic systems process these inputs. Many of these changes degrade fishery resources.

Restoration means to bring something back to a specific former condition. Whereas, rehabilitation means to return something to a state of health or usefulness; clearly, it is impossible to restore many of Michigan's aquatic ecosystems to conditions found prior to the arrival of European settlers. A number of species have become extinct. Important genetic strains of surviving species have been lost and are probably unrecoverable. Many exotic species have been established, both intentionally and unintentionally, which are currently thriving and cannot be exterminated. Human population increases have caused pollution, physical habitat degradation, and high fishing mortality rates. However, it is still possible to rehabilitate many of these aquatic ecosystems and in fact a large amount of rehabilitation has already been accomplished.

Ecological rehabilitation involves the reestablishment of ecosystem integrity by repairing the basic structure and energy dynamics of the trophic pyramid and returning the ecosystem to an unimpaired condition. The basic structure should consist of populations of autotropes, herbivores, and carnivores in proper balance to promote long term stability of the system. Ecosystem energy dynamics should be managed to maintain the fisheries in a state of health and usefulness. Ecological rehabilitation is not necessarily linked to specific fish species mixes at the different trophic levels. It is linked more to the larger scale operation of the ecosystem. In some cases, ecological rehabilitation can be accomplished by substituting exotic surrogates for extinct or impaired native species.

Physical, chemical and biological stresses may exist in most large aquatic ecosystems in Michigan which threaten ecosystem rehabilitation. Francis et al. (1979) identified 15 stresses of a physical or chemical nature that are relevant to the Lake Michigan ecosystem:

1. microcontaminants, toxic wastes and biocides, from industry and agriculture;
2. nutrients and eutrophication from sewage plants, agricultural and urban run-off;
3. organic inputs and oxygen demand from sewers, canneries, etc.;
4. sediment loading and turbidity, from agriculture, construction sites, and resuspension;
5. stream modification--dams, channelization and logging, changes in land use;
6. dredging;
7. filling, shoreline structure, offshore structure;
8. diking and draining of wetlands;
9. weather modification, mostly industrial;
10. water diversions between the Great Lakes basin and other basins;
11. entrainment and impingement in water-intake structures;
12. thermal loading from cooling water, mostly in electric power plants;
13. ice control for navigation;
14. major degradative incidents or catastrophes; and
15. acids and toxic chemicals transported by the atmosphere.

Biological stresses can be imposed as a result of introductions of non-indigenous species, indigenous and naturalized species, or by the elimination of species. In Michigan we see many of the following symptoms that we are experiencing system stresses most notably on the Great Lakes and our river complexes:

- restrictions on fish and wildlife consumption;
- tainting of fish;
- degradation of fish and wildlife populations (fitness);
- fish tumors or other deformities;
- bird or animal deformities or reproduction problems;
- degradation of benthos;
- degradation of aesthetics;
- degradation of phytoplankton and zooplankton populations;
- loss of fish habitat;
- extinctions; and
- presence of noxious species;

Each of the ecosystem stresses needs to be addressed using a comprehensive and systematic approach where the chemical, physical and biological issues are addressed in concert.

An additional stress factor can be labeled as "jurisdictional stress". Large ecosystems, like the Great Lakes and major river systems tributary to Great Lakes, frequently fall victim to this stress. The stress originates with specific demands of interests at specific locations on the system. Large systems can normally accommodate many interests, but more and more frequently, the number of interests exceeds the carrying capacity of the ecosystem. When conflicts arise over who has the "biggest" interest the result is "jurisdictional stress". Jurisdictional stress has been observed at individual, group, township, county, municipal, state, federal and, in Michigan, at the international level. Fortunately or unfortunately this stress most frequently results in a state of paralysis around the status quo. The cure for this stress is to make the resource the number-one customer and engage in collaborative management where the individual interest is subordinate to the collective interest. To balance the diverse demands placed on fishery resources we propose "ACME" (the Adaptive Collaborative Management of Ecosystems), a management strategy that facilitates effective consensus building. The focus of ACME is the Great Lakes Ecosystem and tributary watersheds, rather than a single jurisdictional unit. Using a consensus approach, ACME attempts to create a sense of the commons where everyone who participates gains greater benefits than those who choose isolation. ACME fosters collaboration between the governance structures in the Great Lakes and on tributary watersheds, to provide common goals to work towards enhancing the sustainability of these ecosystems.

For the past several years Michigan has been advancing a goal of ecological rehabilitation specifically aimed at Great Lakes resources and adjacent watersheds. As a result, we have undertaken major watershed assessment programs (26) and the development of fish community goals and objectives on Lakes Superior (complete), Huron (to be approved in 1994) and Michigan (in final draft).

The ecological and institutional complexity of fishery management on the Great Lakes and their watersheds requires agreement on guiding management principles. A set of guiding principles has been developed to establish a decision-making framework for rehabilitating and maintaining the integrity of these ecosystem fish communities. These principles are well-accepted, fundamental concepts, and recognized as having wide application. They are essential for defining a consistent approach for cooperative fishery management. The principles are:

1. Recognize the limits on productivity. The productivity of the lake's ecosystem is limited. Fish populations at all trophic levels can be endangered by factors causing excessive mortality, such as overfishing of top predators, stocking more predators than the forage base can sustain, or failing to control undesirable exotic predators. Historical levels of harvest and analysis of contemporary data provide indications of limits for different trophic levels.
2. Preserve and restore fish habitat. The physical and chemical integrity of Lake Michigan as defined by the Great Lakes Water Quality Agreement is important for achieving biological integrity. Identification of habitat impairments that impede the achievement of fish community objectives is specifically mentioned in the Strategic Plan. Rehabilitation of riverine spawning and nursery habitats used by Great Lakes fish is a high priority for the management agencies.
3. Preserve native species. Where possible and desirable, native fishes should be restored to their pre-settlement geographical ranges and abundances. In some cases, introduced species might substitute for extinct native species or be encouraged by management at some expense to native species. But where interactions between native and introduced species prove to be endangering native species, priority should be accorded to native

species. To help prevent any additional loss of species, the abundances of native fishes should always be maintained at levels well above those requiring their listing as threatened or endangered species.

4. Enhance natural reproduction of native and desirable naturalized fishes. Self-sustainability is important to the biological integrity of the fish community, because natural feedbacks between predator and prey can provide more effective self-organization and system resilience than can external controls. Changes in harvest or stocking are often too late because of the time required for detection. Also, genetic fitness of self-sustaining populations is likely to exceed that of stocked populations because they may undergo natural selection for adaptations to unique and specific conditions in localized environments. Thus, wild, reproducing populations can be expected to have better survival and productivity than stocked populations.
5. Acknowledge the role of stocked fish. Stocked fish are vital for continuing progress in restoring the biological integrity of the fish community, for developing spawning populations of species needing rehabilitation, and for providing fishing opportunities. As stated in the Strategic Plan, stocking must be conducted judiciously to provide a variety of needs identified by society.
6. Recognize naturalized species. A number of introduced fish have now achieved various levels of self-sustainability in Lake Michigan and should be considered regular components of the fish community. This includes rainbow trout, smelt, alewife, pink salmon, chinook salmon, coho salmon, brown trout, carp, and sea lamprey. Some of these introductions are considered desirable and their continued sustainability should be encouraged. Others, such as sea lamprey, need to be suppressed to tolerable levels.
7. Adopt the genetic stock concept. Genetic variation of locally adapted fish stocks should be protected. Outbreeding depression can occur when hatchery fish interbreed with wild fish (Figure 1). Although the total genetic diversity increases with interbreeding, fitness usually declines. Also, stocking fish in proximity to wild fish may attract fishing effort that is too high for the wild fish. The study of interactions between wild and hatchery fish is an emerging area of research that already suggests more effort will be required to protect wild stocks.
8. Recognize that fisheries are an important cultural heritage. Recognize that social, cultural, and economic benefits to society, including Native Americans, both in the present and in the future, are important considerations in making fishery management decisions.

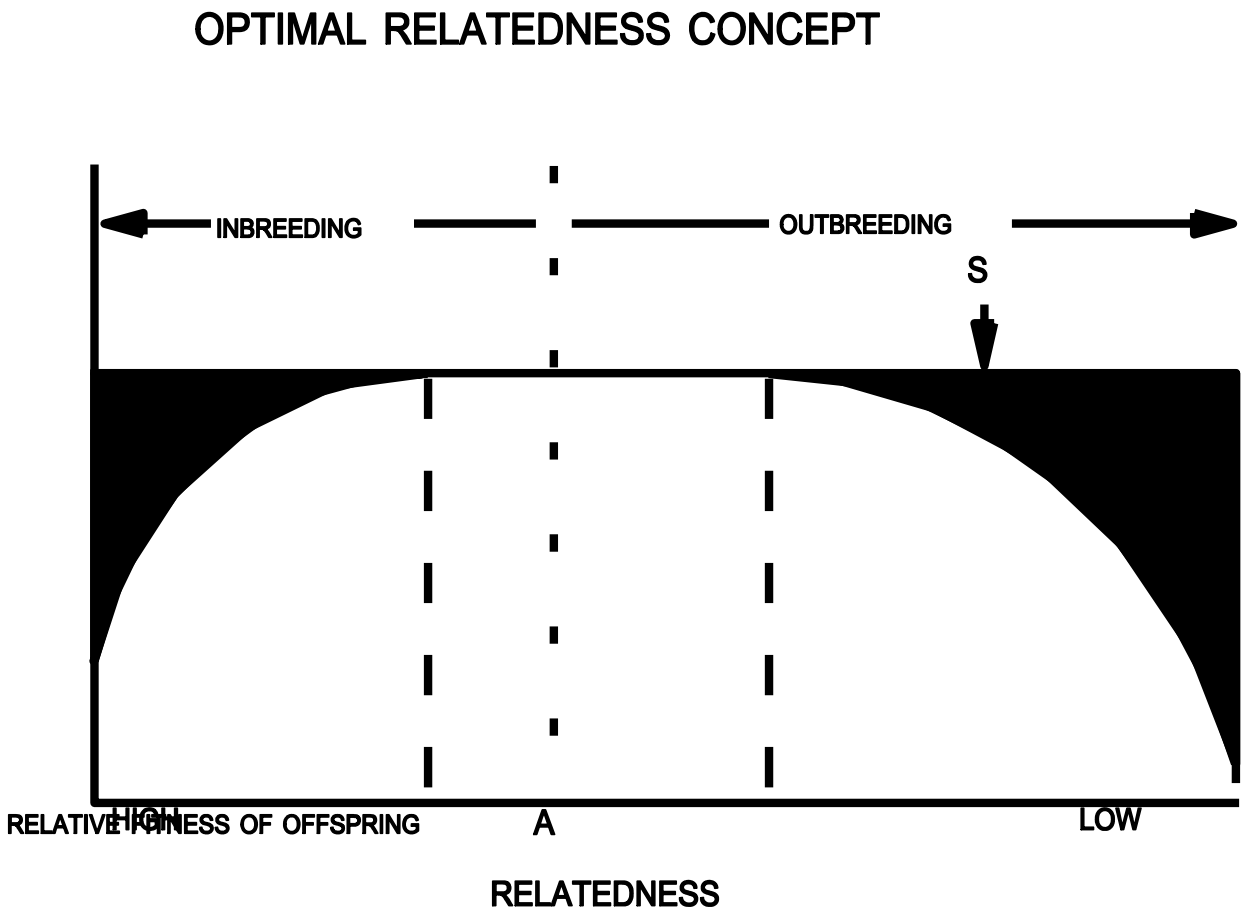

Figure 1. Genetic Stock Concept.

9. Prevent the unintentional introduction of exotic species. The establishment of exotic species through unintentional introductions has been devastating to the native fish communities of the Great Lakes. The impact of the invasion of sea lamprey and alewife is well documented, while the final impact of the zebra mussel, spiny water flea, and ruffe remains to be seen. The rate that exotic species invade the Great Lakes is directly related to human activities, such as the exchange of ballast water from ocean-going ships. Work should be done to identify and control human activities which lead to unintentional introductions of exotics. Where feasible, the spread of unwanted exoticsalready introduced should be prevented.
10. Protect and enhance threatened and endangered species. Loss of threatened and endangered fishes should be avoided. Five native species are now extinct from Lake Michigan proper and another three have disappeared from tributaries. Recovery plans should be developed for species that are threatened, endangered, or of special concern.

With an eye on improving and sustaining healthy fish communities and fisheries, the Fisheries Division aims to develop a better understanding of the structure and functions of various aquatic ecosystems. We need to appreciate the historical nature of these systems and understand the changes that have occurred. Using this knowledge we will identify opportunities that provide sustainable fishery benefits while maintaining (and at times rehabilitating) system structures or processes. We will develop and encourage programs to monitor status of the system as determined by indices of health including fish community structure, nutrient levels, and flow

rates. Addressing these ecosystem-level opportunities will require extensive collaborative interactions with other appropriate agencies and groups.

Ecosystem Management Training

A critical component in managing the State's fisheries resources is training. Training is essential to assure managers and support staff understand the principles and applications of watershed management. It is also essential to teaching them how to use the new technology available to ensure accurate and appropriate data is utilized to make the best possible management decisions. Without adequately trained staff, the best efforts in putting watershed management in place would not be possible.

Watershed Management

Fisheries Division has committed to implementing a management strategy focused on Great Lakes Basins and river watersheds as fundamental ecological units. This commitment parallels the Department's current move toward ecosystem-based management (Joint Venture). Conversion to watershed-based management has proven to be very challenging. Additional financial and personnel resources are required to properly implement watershed-based management. To the extent possible, management units have been reengineered and staff, work units, records and equipment deployed. It is now timely to execute the staffing plan as developed in the WART (Watershed Staffing Initiative).

To accomplish Fisheries Division goals, it is necessary to:

- thoroughly assess fisheries habitat in each watershed to identify and prioritize habitat protection and improvement activities (Watershed Assessment Initiative);
- provide a means to accomplish needed habitat improvements and to stimulate partnereships for work projects (Inland Grant Increase Initiative and Dam Removal Fund Initiative);
- reorganize and improve our resource inventory efforts to match our watershed approach to management (Resource Inventory Initiative and Great Lakes Survey Vessel Initiative);
- continuously evaluate the performance of hatchery fish after they are planted (Fish Marking Initiative);
- be more holistic in our managmeent and apply more effort to aquatic species that currently receive little attention (Aquatic Ecosystem Initiative);
- update our data systems and analytical tools (Geographic Information Systems Initiative); and
- increase training opportunities for our staff to assist them in the conversion to ecosystem management (Ecosystem Management Training Initiative).

These groups of initiatives are closely related, that is, one depends upon the others for success. Therefore, we present them as an integrated package and each initiative is described in more detail below.

Watershed Staffing

In order to provide the leadership and coordinaation necessary for effective management of the four Great Lakes Basins in Michigan, it is essential Basin Coordinators positions are established. Basin Coordinators would:

- help guide Fisheries Division in pursuance of its Strategic Plan by participating as a member of Division Management Team;
- coordinate Fisheries Division activities, including work and budget planning processes, within their respective Basin;
- assist in coordinating statewide activities between basins;
- help enable ecosystem and landscape-scale management within Basins, represent Division on Great Lakes Fishery Commission (GLFC), Lake Committees;
- help coordinate Division efforts on Department-level Eco-teams;
- represent Division and help organize PublicAdvisory Committee meetings;
- assist Area Managers in development of collaborative work between Fisheries Division and other groups and agencies; and
- develop partnerships with outside organizations and agencies to further Division watershed goals.

Watershed Assessment

The Fisheries Division needs to prepare thorough written assessments of each major river watershed in Michigan. The purposes are: 1) identify opportunities and solve problems concerning aquatic resources; 2) provide for public involvement in fishery management decisions; and 3) provide an organized reference concerning the fishery resource. Some river assessments have been completed, but progress is slow because they requiresignificant reassignment of staff time. Additional staff and funds for contractual services will greatly accelerate production of assessments.

Inland Grant Increase

Fisheries Division needs a means of addressing problems and opportunities identified by river assessment reports. Increasing the funding limit of the existing inland grant program would help satisfy this need and would allow the Division to effectively coordinate work with local units of government and fishing organizations. In addition, it will allow for educational support of this effort in both urban and rural areas of the State.

Dam Removal

Protection and restoration of river environments is essential for sustainable, diverse and productive stream fisheries. Watershed management is an approach to decision-making and action that takes a comprehensive approach to protection and restoration of water resources. Watershed management focuses on land uses that affect quantity and quality of waters in a drainage basin. For watershed to properly function, all of the stream segments must be connected and allow free fish movement. Complementing responsible and appropriate land use practices in the effort to restore stream conditions, is the need for direct intervention where river

configuration and habitat have been profoundly altered by being channeled, enclosed, dammed or diverted.

Over the last two decades, fisheries managers and ecologists have explored the changes dams cause in the ecological processes of river environments. Rivers emerging beyond a dam may be substantially altered from the character of the river entering an impoundment above a dam. Impounded waters may discharge at significantly higher or lower temperatures than normally encountered in the stream. Aquatic community health is closely linked to water temperature tolerances. Flow patterns reflecting normal high and low water conditions over time may also be fundamentally altered, affecting stream channel configuration, fisheries habitat and many other physical and biological processes. Water quality may decline in impounded streams if excessivenutrients, sediments and aquatic plants accumulate in the impoundment. Stream changes induced by dams and other watershed conditions are often reflected in the fish community. Native and desirable stream species are almost always displaced in river segments affected by dams. Dams also limit the normal movement of fish, other aquatic organisms and system organic material.

Dam removal restores the natural flowing character of a stream and restores essential ecological processes in the river. Large segments of previously inaccessible water may be open to use by a variety of fish species. In addition, dam removal and sediment management can restore buried fish spawning habitat and other critical stream habitat. Selective dam removal will be an integral component of successful watershed management initiatives since the response in the stream after dam removal is usually dramatic and lasting improvement. Fisheries Division is interested in fcilitating dam removal to improve fisheries potential in Michigan streams and rivers. Dam removal is among the most important techniques available to improve natural fish production in the State.

Priority for removal will be based on fisheries potential, but must also consider public health and safety issues, water quality effects, and other environmental considerations. No project will be pursued without dam owner and local support. We have also found that public interest in dam removal can go well beyond environmental and economic considerations to include historic values, community waterfront redevelopment, riparian property restoration, wildlfie and wetland benefits, and river recreational values. Funds are needed to allow the Division to rapidly respond to requests for technical assistance concerning the fisheries and environmental considerations at dam sites. Funds will also allow the Division to develop methods for assessing the potential and relative priority for dam removal; to educating dam owners, riparians and other interests about the options and implications of dam removal; to provide feasibility and cost estitmates for the dam removal option; and to facilitate owners in accessing Federal and foundation funding available for stream improvement projects. For this iniaitive, we need an annual appropriation of $1,500,000.

There is a backlog of dams that need to be dealt with because of dam safety and/or contaminant concerns. If we do not act on these dams, funds will likely be acquired from other sources to fix them eliminating a tremendous river rehabilitation opportunity and create a future need for additional money to maintain or remove the dams. Over 20 communities have requested assistance to remove dams because of significant dam safety problems. The MDNR owns three dams in Kalamazoo County which are rapidly deteriorating and have significant amounts of contaminated sediments that need to be deal with to prevent the release of these sediments into downstream reaches and the Great Lakes.

Resource Inventory

Resource inventory is a fundamental job of Fisheries Division. Managers must record and monitor the distribution and abundance of fish species and their habitats throughout Michigan. A good inventory allows managers to detect changes in populations and habitats, evaluate their causse, and devise corrective actions. It is also important to monitor and understand angler motivations and pattenrs of resource use.

In order to effectively inventory our resources in the most cost-effective manner, the following changes are essential:

- redesign the samplign scheme for biological and habitat sampling to focus on ecologically-based watershed and Great Lakes basin features;
- improve standardization of sampling gears on both inland and GreatLakes waters;
- develop a statewide catch and harvest survey to better evaluate inland fish stocking success (comparable to existing Great Lakes survey); and
- develop an angler survey instrument to help monitor and understand angler motivations and patterns of resource use.

This would produce a statewide resource inventory program that is scientifically designed and consistent from watershed to watershed. Annual report(s) would be produced describing results of biological and habitat sampling, provide estimates of catch and fishing effort on major waters receiving hatchery fish, and document the patterns of public resource use. Results of the program would help guide Division management decisions.

Great Lakes Survey Vessels

The Great Lakes survey vessels obtain important data on Great Lakes fishes that cannot be obtained in other ways, due to the large size of the lakes. We do gt important fisherires data from creel surveys and salmon weir operations, but these methods do not give us all the information needed for ecosystem management. For example, sport anglers target the larger game fish species and only mature adult salmon return to weirs. On the other hand, survey vessels can beused to target smaller, juvenile game fishes and non-game fishes. Knowledge of the juvenile fish is important for determining the health of the whole population of fish, becausse it can give an advance warning signal about problems in survival of hatchery fish and levels of natural reproduction. Survey vessels can also targetrare or threatened species of fish, such as lake sturgeon, to monitor their general health and rehabilitation status. Also, much of the data on growth rates, mortality rates, and natural reproduction of fish is obtained by the survey vessel crews. These data are vital for assessing performance of hatchery fish, evaluating the effects of fishing regulations, evaluating success of sea lamprey control efforts, and computing catch quotas for Tribal and other commercial fisheries. Fisheries Division currently operates four vessels from research stations located on lakes Superior, Michigan, Huron and Erie. The current Superior survey vessel is undersized for this large and potentially rough water. The vessel assigned to Huron is over 50 years old. Both vessels require replacement with suitable-sized boats and modern equipment.

Fish Marking

The Division uses hatchery fish to restore the balance in ecosystem function, to create new fisheries and to rehabilitate depressed fish populations. In order for the Division to determine if

our products are meeting their watershed management goals, we must improve our ability to evaluate the performance of our hatchery fish in our fisheries by improving the capabilities of our hatcheries to mark the fish they produce.

This would involve some redesign of holding and marking facilities in hatcheries, hiring more workers to mark and recover fish, and hiring more workers to process and analyze marks. Currently Fisheries Division marks only a small percentageof hatchery fish planted each year. Ideally every hatchery fish would carry an identifying mark. There are many new techniciques for mass marking of fish, such as immersion in oxytetracycline or heat shocking.

Some of the benefits of marking all hatchery fish are that we could continuously evaluate the:

- level of natural reproduction in population restoration efforts and everywhere else fish are stocked;
- performanceof idfferent strains of fish or lots of fish that were fed or raised differently;
- total abundance of fish in stocked waters by evaluating a sample of marked versus unmarked fish;
- benefits of our stocking program and performance of our hatcheries over time;
- contribution and suitability of various stocking sites or stocking practices;
- movements of hatchery fish; and
- exploitation and natural mortality rates of stocked fish.

Aquatic Ecosystem

In order to properly manage on a watershed basis, the Department must manage all components of the system including those species that are not important to anglers. While Fisheries Division must give priority to managing important game fishes, we are also legally responsible for protecting and enhancing populations of non-game fishes, turtles, snakes, lizards, frogs, salamanders, and shell fish. We do not currently have funds or personnel to properly evaluate the distributions and poulation status of non-game aquatic organisms. We want to develop more rehabilitation plans for threatened and endangered species; control plans for nuisance aquatic species and management plans for turtles, snakes, lizards, frogs, salamanders and shell fish, but the lack of funding and staffing does nnot allow us to fulfill this part of our mission.

Geographic Information Systems

The Joint Venture Annual Report for 1998 states “The most important component to successfully meet the (Joint Venture) goal and implement ecosystem management is the development and deploymenbt of new technologies.” Fisheries Division remains committed to placing the most advanced information technology tools, infrastructure and resourcespossible into the hands of resource management decision-makers. It is this commitment that will ultimately create the ability to make sound management decisions about ecosystems and the affects of aquatic and watershed management practices. Fisheries Division must obtain and maintain state-of-the-art Geographic Information System (GIS) applications that allow data analyses on large spatial and temporal scales. As part of Joint Venture, ViGIL was established to help coordinate GIS development between Divisions, but there remains much work to be done within each Division. The current ability to spatially reference, manipulate, and analyze data about aquatic resources is lacking. There is also a lack of integration of various data sets

across field disciplines and landscapes. These decision support tools, systems and methodology require professional, full-time staff in the Division with expertise in applying GIS to decision-making processes. This component of the technology management initiative includes the funding and establishment of three new full time employee positions to provide technical and administrative assistance in the development, integration and management of GIS, computer mapping and related technologies.

Need for an Informed Public

Americans have become increasingly knowledgeable and active about government in the last twenty years. They expect government agencies to perform efficiently and effectively, but they also demand greater responsiveness to individual interests than ever before. At the same time, public interests have become ever more varied and divided. Agencies can no longer act without actively seeking the informed consent of their publics. The Division's constituents are increasingly better educated about environmental and resource issues, and demand more information about their fisheries. They also are more interested in participating in fishery management decisions.

Fisheries management is a technical, complex practice in which many apparent options are not really feasible and many tradeoffs between values are not readily apparent. Hence, the Division cannot easily obtain the informed consent of its publics. Considerable effort is needed to educate interested publics about the available choices. Our professional roles must increasingly focus on our responsibilities to educate and inform. In this strategy, we commit the Division to preparing written fishery management plans for most of the State's major fisheries. These plans will keep the public better informed about their fisheries, enable them to participate more effectively in fishery management decisions, and help the Division work with other agencies more effectively.

In addition, educators and environmental professionals also realize that there is great need to educate young people about the environment in school and through informal activities. The Division has much knowledge to offer but does not have effective ways to communicate that knowledge to youth. This strategy contains the beginning of an effort to contribute to environmental education in Michigan.

An informed public is a valuable asset to the Division as it evaluates its programs. Performance evaluations will become increasingly important in the future as agencies seek to assess if they are doing the right things and the level of success of their programs. Public input in terms of evaluations and concerns is an integral part of this process. However, performance evaluations are meaningless if the public does not understand what the Division is doing and why.

Financial Management

Fisheries operating revenues are comprised of appropriations from the Game and Fish Fund (sale of hunting and fishing licenses), Dingell-Johnson (federal excise tax on fishing tackle), General Fund (State of Michigan tax revenue), and other miscellaneous sources. The Game and Fish Fund currently contributes 68% of the Division's funding. Fisheries' second largest funding source, Dingell-Johnson, was amended (Wallop-Breaux) in 1985-86 to include additional taxes on boats, fishing gear, and motor boat fuel. This additional revenue boosted Michigan's apportionment substantially. From 1984-85 to 1985-86, Dingell-Johnson revenues for operating increased 118%.

Currently Sport Fish Restoration Funds are 29% of the Division budget. Fisheries Division receives the least revenue from the General Fund for operating. Miscellaneous revenue comes from such sources as Soil Conservation Service, U.S. Army Corps of Engineers, National Oceanic and Atmospheric Administration, and private funds. In some years the Division has received over $400,000 in miscellaneous revenues but they are usually around $100,000. In 1988-89 they were only 1% of the budget and in 1993-94 they are 2% and expected to increase dramatically. The Division appropriations (total legislative authorization to spend) increased from $6.9 million in 1979-80 to $20 million in 1993-94 (Figure 2). When adjusted for inflation this amounted to an increase in purchase power of $3 million over the 14-year period (Figure 3). The difference in purchase power over this period has been largely due to increases in Sport Restoration Funds (Figure 4).

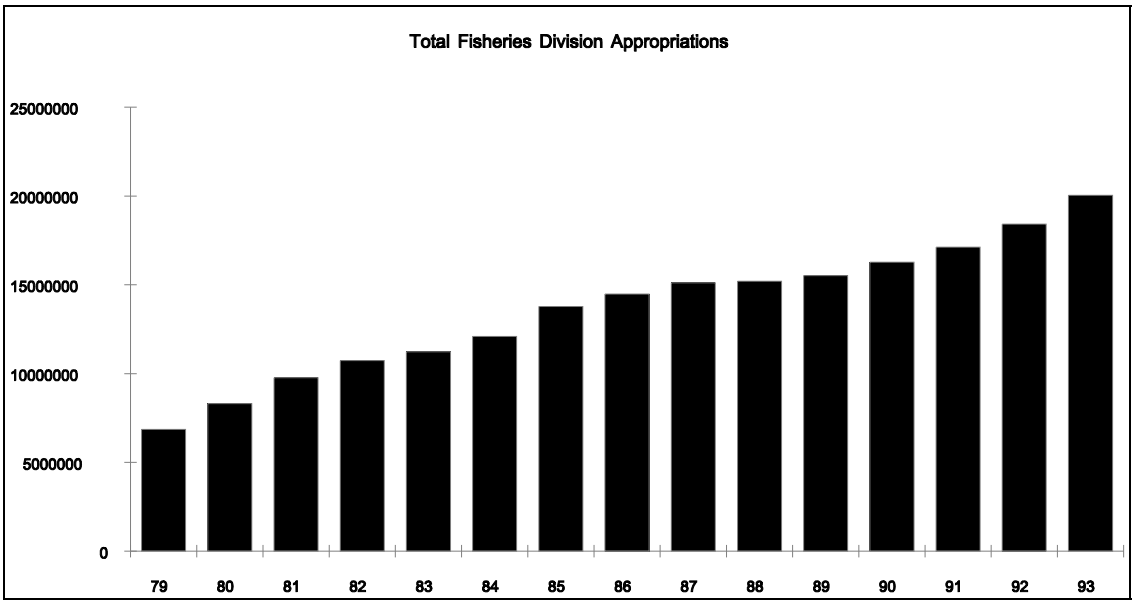

Figure 2. Division revenues for 1979-80 through 1993-94.

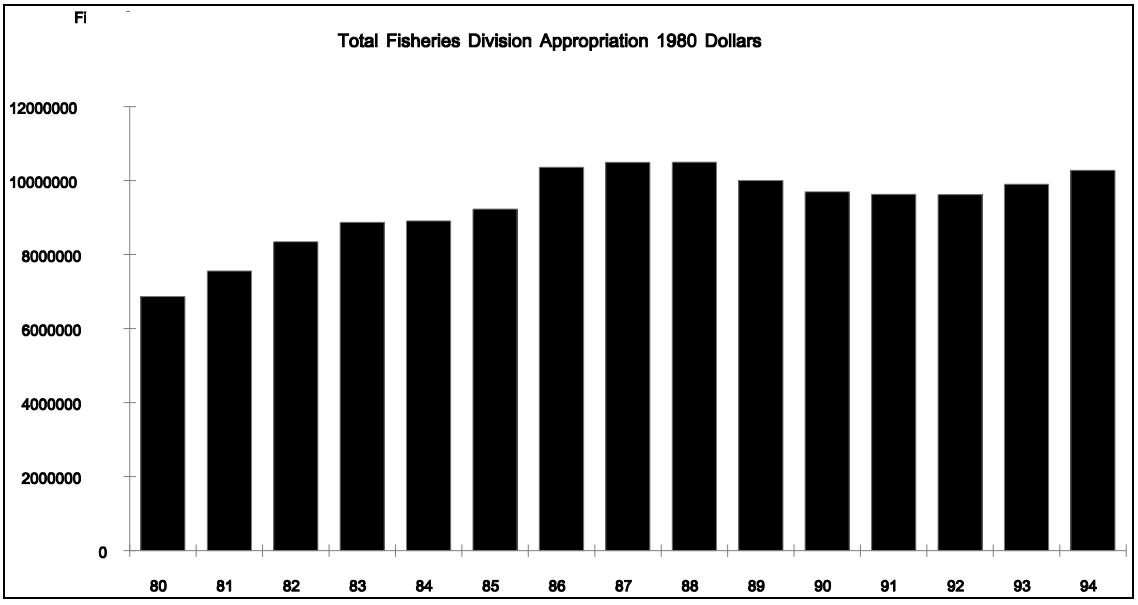

Figure 3. Division revenues adjusted for inflation (in 1980 dollars).

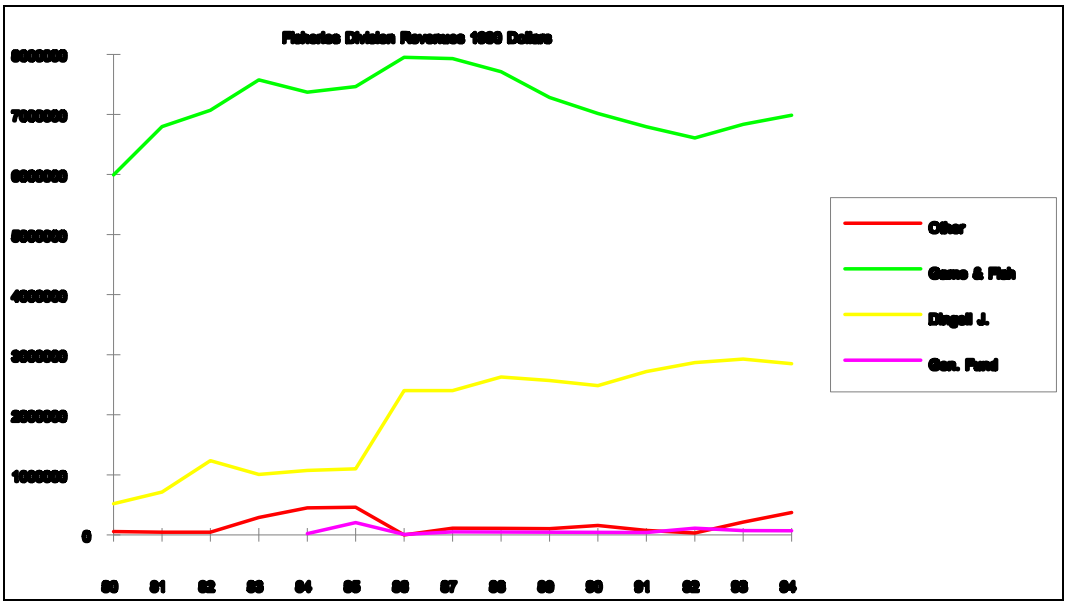

Figure 4. Division revenues adjusted for inflation (in 1980 dollars).

Division budget and staffing were appropriated and expended by line items prior to 1983-84. Since then, the Division's funds have been allocated by program (Administration, Recreational, Great Lakes, Fish Production, Commercial, and Inland). All programs stayed relatively constant through 1984-85. However, the increase in Sport Fish Restoration Funds along with the stabilization of the Game and Fish Fund in 1985-86 through a license increase to cover inflation resulted in a major increase in the Inland Fish program in the following years (Figure 5). Figure 6 shows Division's expenditures by cost units in 1980 dollars.

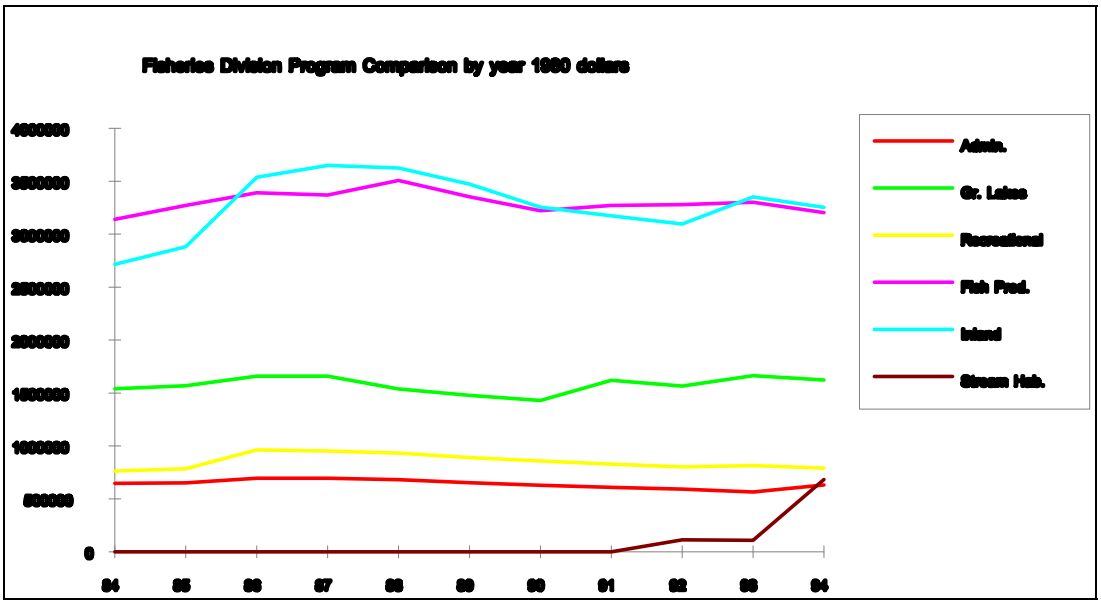

Figure 5. Changes to programs over time related to changes in revenue.

Revenue generated from license sales has steadily declined since 1987, and the future of license sales is not encouraging. National market research by the Sport Fishing Promotion

Council indicates that between 1987 and 1992 fishing license holders increased less than 1% while the U.S. population increased 5.3%. License holders totaled 12.5% of the U.S. population in 1987 and 12.0% in 1992. In Michigan, this trend has translated into a decrease of one million dollars in 1993 as compared to the 1987 license generated revenue level (Figure 7).

In addition to declining license sales, Sport Fish Restoration Funds allocated to Michigan are declining as a result of passage of the Clean Vessel Act in 1992 which costs Michigan $600,000 annually for a period of five years, Treasury adjustments in 1992 and 1993 totaling $350,000, and gas usage declines which average $230,000 annually. There is little hope that this declining trend in revenues generated by Sport Fish Restoration Funds will change in the short term; we know that the State apportionment will be down due to earmarking, sales of tackle and gas will decline in concert with declining interest in fishing, and there may be additional "raids" on the fund. The Fisheries Division projects a $1.6 million shortfall by fiscal year 1996.

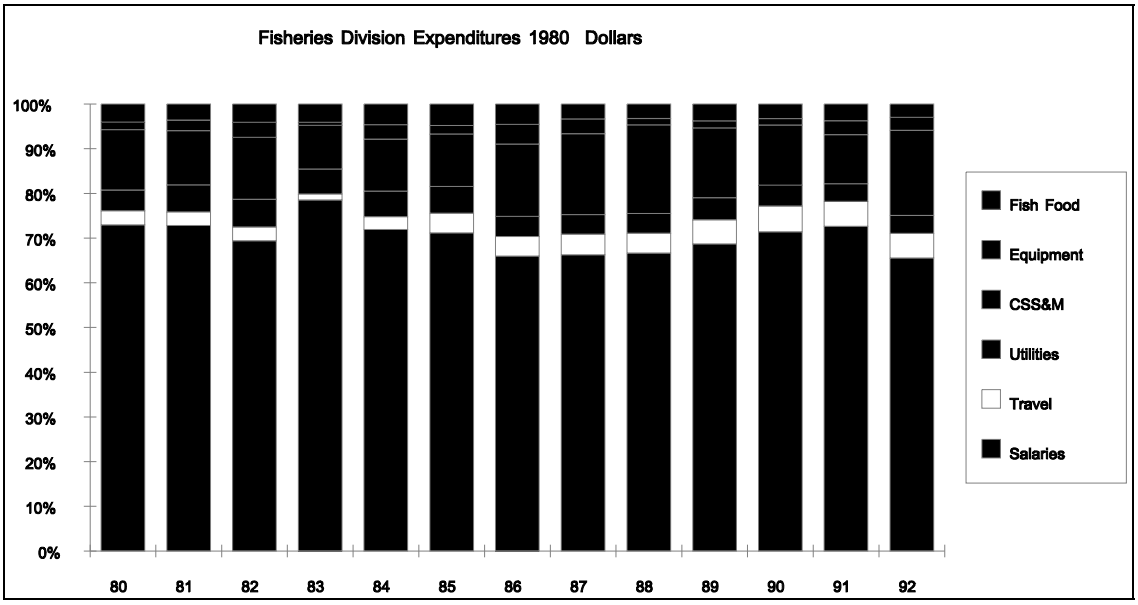

Figure 6. Division's expenditures by category in 1980 dollars.

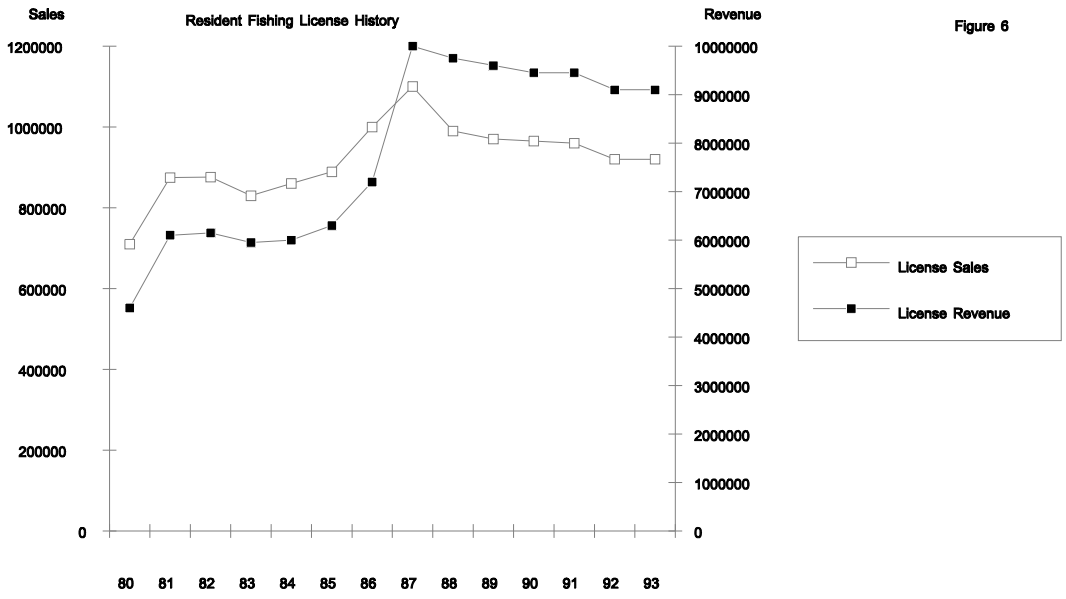

Figure 7. Trends in sales of licenses and revenue collected from 1980 through 1993.

Alternative funding sources have been a high priority for Fisheries Division since 1990. For example, the 1993-94 appropriation includes authorization for nearly $1.3 million of Consent Agreement funds and alternative federal source of funding. External funding sources have become necessarily attractive as the number of fishing licenses sold decreases. Outside sources of funding can be expected to become increasingly important to the Division in the future.

Programmatic efficiencies have been a major factor allowing the Division to respond to changes in priorities. Internal reprogramming has allowed for efficiencies that save money on an annual basis and on a "one-time" basis. For example, the Division has been able to "free-up" over $2.2 million annually and over $4.7 million on a "one-time" basis through staffing and program efficiencies.

The Game and Fish Fund, which provides 68% of Fisheries Division revenue, can no longer support the existing program level appropriations for Wildlife, Fisheries and Law Enforcement Divisions. Figure 8 shows this current year's problem, a 4.7 million dollar shortage. Fisheries Division was instructed to assume a 1.4 million dollar reduction from our current budget. Perusal of Figure 8 will show that the problem is to accelerate at a very rapid pace.

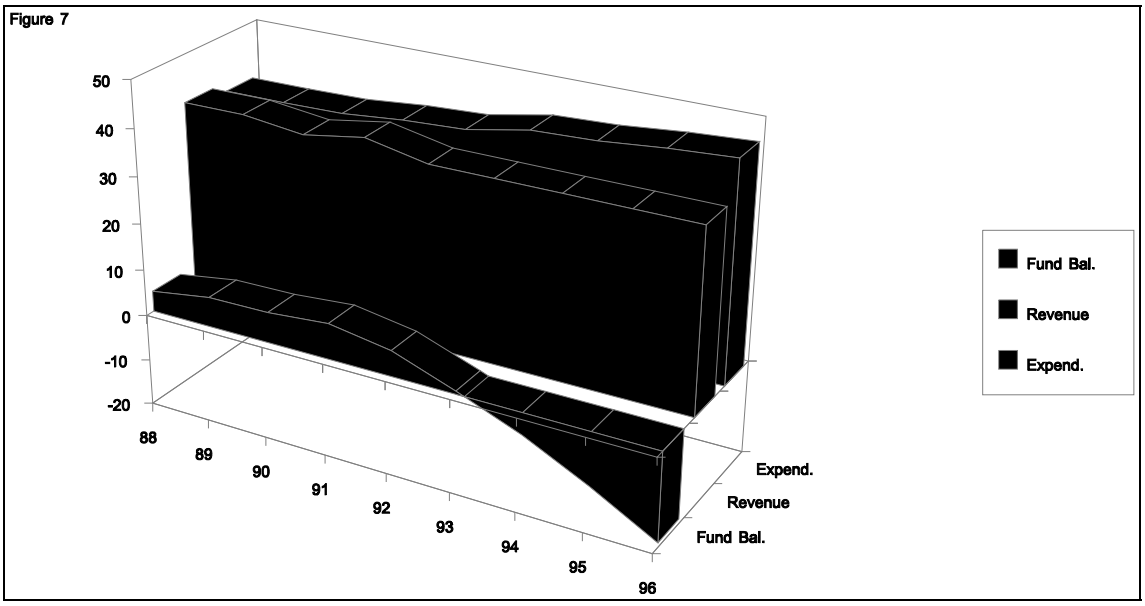

Figure 8. Revenues, expenditures, and fund balances in the Game and Fush Fund from 1988 through 1996.

The Department's Executive Office initiated the development of a 10-year strategy in 1990. While this problem has been predicted for several years, no specific plan has been proposed by the DNR to deal with either reducing program or increasing revenue to the funding source.

Budget needs for maintenance of existing programs and levels have been identified by the Division through the year 2010 (Figure 9).

	Game & Fish Funds					
	Operating	Grants	Capital Outlay	Sub-totals	Dingell/ Johnson	Totals
Fy92/93	$12470000	$200000		$12670000	$5483800	$18153800
Adjustments	$1000000	$0	$500000	$1500000	$0	$1500000
Adj Figures	$13470000	$200000	$500000	$14170000	$5483800	$19653800
FY93/94	$13874100	$200000	$500000	$14574100	$5483800	$20057900
Fy94/95	$14290323	$200000	$500000	$14990323	$5483800	$20474123
Fy95/96	$14719033	$200000	$500000	$15419033	$5483800	$20902833
Fy96/97	$15160604	$200000	$500000	$15860604	$5483800	$21344404
Fy97/98	$15615422	$200000	$500000	$16315422	$5483800	$21799222
Fy98/99	$16083884	$200000	$500000	$16783884	$5483800	$22267684
Fy99/2000	$16566401	$200000	$500000	$17266401	$5483800	$22750201
Fy00/01	$17063393	$200000	$500000	$17763393	$5483800	$23247193
Fy01/02	$17575295	$200000	$500000	$18275295	$5483800	$23759095
Fy02/03	$18102554	$200000	$500000	$18802554	$5483800	$24286354
Fy03/04	$18645630	$200000	$500000	$19345630	$5483800	$24829430
Fy04/05	$19204999	$200000	$500000	$19904999	$5483800	$25388799
FY05/06	$19781149	$200000	$500000	$20481149	$5483800	$25964949
Fy06/07	$20374584	$200000	$500000	$21074584	$5483800	$26558384
Fy07/08	$20985821	$200000	$500000	$21685821	$5483800	$27169621
Fy08/09	$21615396	$200000	$500000	$22315396	$5483800	$27799196
Fy09/10	$22263858	$200000	$500000	$22963858	$5483800	$28447658
Totals	$301922444	$3400000	$8500000	$313822444	$93224600	$407047044

Note: Forecasts include a three percent inflationary figure increase each year

Figure 9. Budget needs for maintenance of existing programs and levels through 2010.

Resource Protection and Mitigation

Although fishery regulation, stocking, and other fishery management measures can optimize fishery values of a water body, the values are ultimately limited by the productivity and features of the habitat. Our proposed strategy increases our emphasis on protecting habitat and mitigating habitat problems.

Over the next five years, most of the hydropower dams in Michigan will be licensed or relicensed by the Federal Energy Regulatory Commission. Such licenses are generally issued for 50 years. Their purpose is to balance the values of electric power generation with the many other values of water resources, particularly including fish and wildlife values and recreational values. Hydropower facilities are situated on most of Michigan's important rivers and have

profound influence on their fisheries. Thus the Division's participation in these licensing proceedings is particularly important.

In addition to hydropower dams, many other activities can severely impact fishery resources through habitat alteration as well as through directly killing fish. For example, steam electric plants which draw cooling water from Michigan waters are known to indiscriminantly kill large numbers of fish. Other activities which can be detrimental to fishery resources include: land-use patterns, logging, shoreline development, wetlands filling, storm water management, and mineral development. The Division should concentrate attention on both reducing losses and mitigating the effects of remaining losses on fishery values.

The Fisheries Division can also improve fishery habitats in much of Michigan by assiduous cooperation with the other DNR Divisions and the federal agencies who regulate the activities which affect those habitats. The strategy addresses greatly increased effort to work with these agencies.

Nonindigenous Species

A non-indigenous species can be defined as any species or other biological material that enters an ecosystem beyond its historic range. The introduction of non-indigenous species can severely impact native communities through the following mechanisms: habitat alteration, trophic alteration, spatial alteration, gene pool deterioration, and disease introduction. A recent analysis reports 127 exotic plants, animals, and disease agents established in the Great Lakes. One third of these were accidentally introduced through ballast water exchanges. The potential effect of these exotics was dramatically exhibited during the 1950s when sea lamprey predation led to the demise of lake trout populations causing the collapse of valuable commercial fisheries in the Great Lakes. Today, sea lamprey is only one of several organisms that threaten the stability of the fish community in the Great Lakes. Other current concerns include zebra mussels, ruffe, spiny water flea, and Eurasian water milfoil. The Division proposes to protect against the unintentional introduction of exotic and prevent where feasible the spread of noxious exotics already introduced.

Fish Contamination

The waters of many industrialized nations are contaminated with toxic chemicals which can bioaccumulate in fish tissues. The Michigan Department of Natural Resources maintains a Fish Contaminant Monitoring Program (FCMP) to quantitatively assess the degree of chemical contamination in fish from waters throughout the State. The program monitors the level of mercury and several organic chemicals in fish tissue because of a serious concern regarding the potential of these chemicals to accumulate to levels that could pose health risks to fish and the humans and/or wildlife that consume them.

Scientists have identified 362 contaminants in the Great Lakes ecosystem including the water, sediments, fish, animals, waterfowl, and humans. There are 32 metals, 68 pesticides, and 262 other organic chemicals which are mainly industrial substances and waste by-products. Of the 362 chemicals, eleven have been singled out by the Great Lakes Water Quality Board of the International Joint Commission, as critical or priority pollutants that have been found to accumulate in fish, harm fish and wildlife, or possibly threaten human health. There is a general feeling that work done to reduce concentrations of these chemicals in the environment will lead to a reduction in many other similar contaminants.

A recent report of the Michigan Department of Public Health's Division of Health Risk Assessment indicates an encouraging trend of reduced public exposure to mercury, DDT, PCB, Dieldrin, Chlordane, and Dioxin from consumption of sport caught fish harvested from Michigan lakes and streams. The Ontario Ministry of the Environment has monitored mercury levels in Lake St. Clair since 1970. Average mercury concentrations in Lake St. Clair walleye have dropped approximately 80% from 1970 to present (Figure 10). In addition, according to an Ontario Ministry of the Environment report, mercury levels in walleye in Lake Erie have returned to natural background levels (approximately) as documented by analysis of museum specimens.

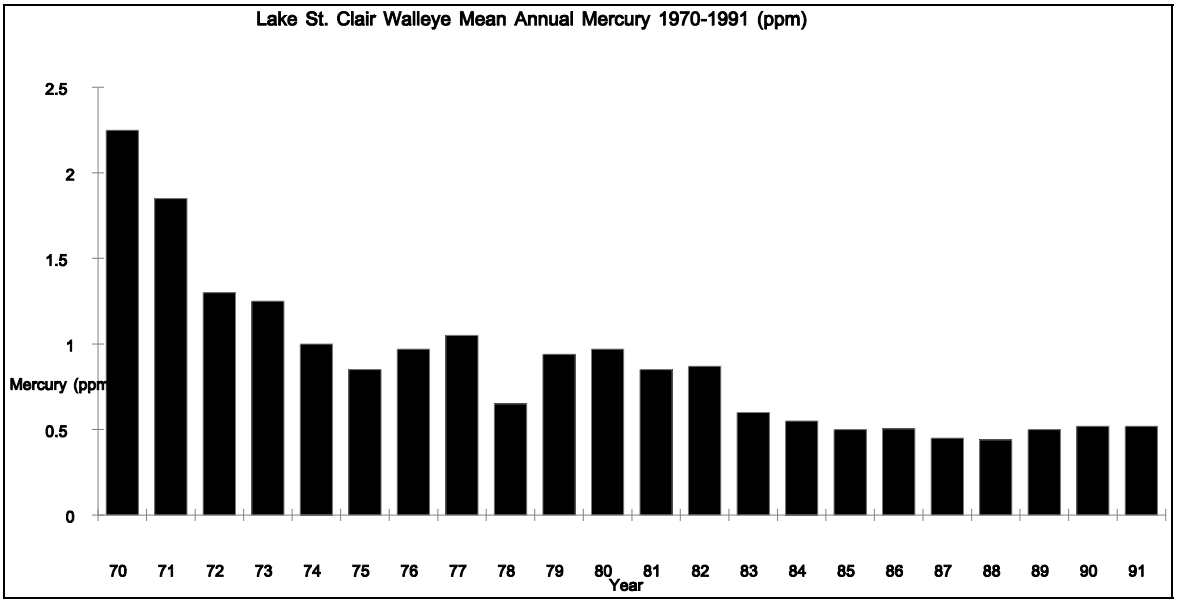

Figure 10. Average mercury concentrations in Lake St. Clair walleyes from 1970 to present.

The best data for trend analysis of other toxic chemicals is available from the Great Lakes National Program Office of the United States Environmental Protection Agency. Lake trout of similar size have been collected nearly every year from Lake Michigan near Saugatuck since 1970. Contaminant analysis is performed on whole fish samples. These analyses indicate that the level of DDT in lake trout has declined more than 90% (Figure 11).

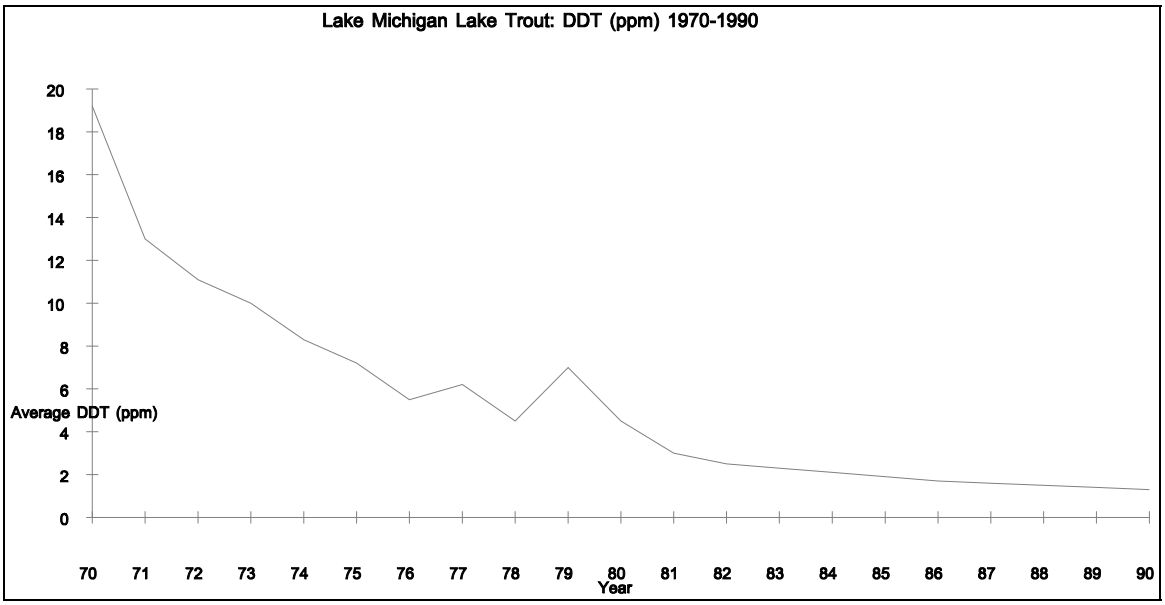

Figure 11. Concentration of DDT (ppm) in lake trout collected annually from 1970 to 1990 in Lake Michigan near Saugatuck.

The highest concentrations of PCB were reached in 1974 and 1975 prior to the first regulatory controls against use in 1976. Between 1975 and 1990, PCB concentrations in whole lake trout declined by approximately 87% (Figure 12). Similar declines have been observed in other Lake Michigan species. Further, chlordane and dieldrin, additional persistent pesticides belonging to the chlorinated hydrocarbon class, have been measured at levels warranting sport fish consumption advisories in Michigan waters of the Great Lakes. Registrations for most agricultural uses of these compounds were canceled in 1984. The U.S. EPA Saugatuck lake trout data indicates that measured dieldrin levels in 1990 are about 60% lower than in 1979 when this peaked (Figure 13). The use of chlordane for termite control was banned in 1988; to date a clear downward trend has not yet been documented in Great Lakes fish.

That toxic chemicals are found in Michigan waters at detectable levels is undisputed. The question of whether current contaminant concentrations have an ecosystem or biological impact remains to be answered. However, the concern that these chemicals may accumulate in fish to levels that may be harmful to human health creates an important issue for the Fisheries Division. Many people have altered their angling and fish consumption behaviors as a result of fish consumption advisories. In addition, the human health concern has caused agencies such as the International Joint Commission to question the Division's programs that stock fish into these waters. Their concern is that the Division is inadvertently creating an attractive human health hazard.

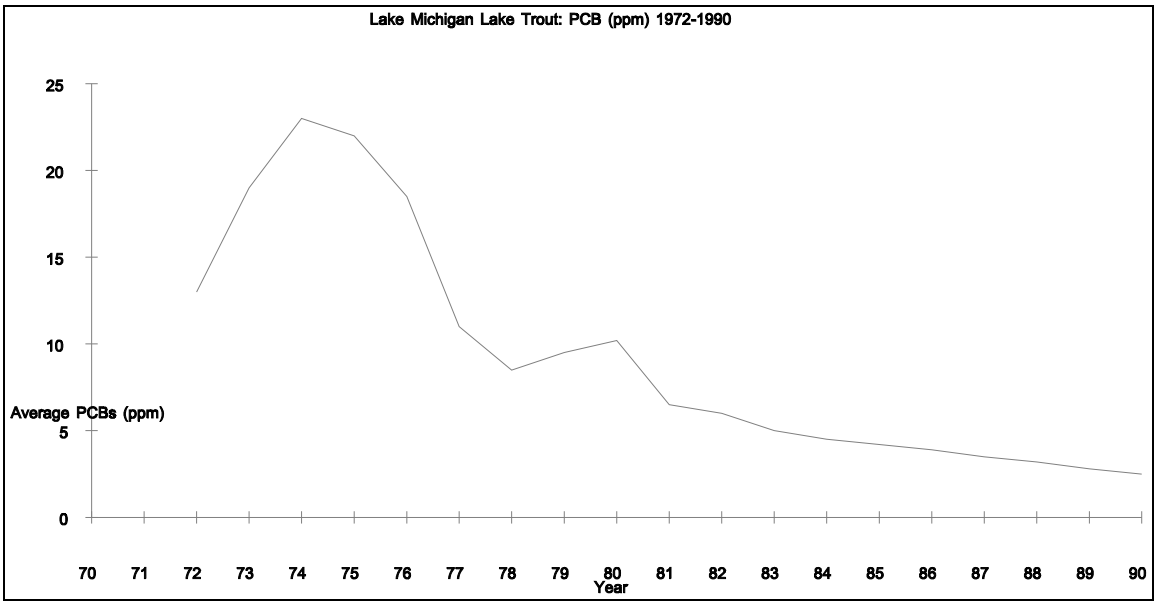

Figure 12. Concentration of PCB (ppm) in lake trout collected annually from 1970 to 1990 in Lake Michigan near Saugatuck.

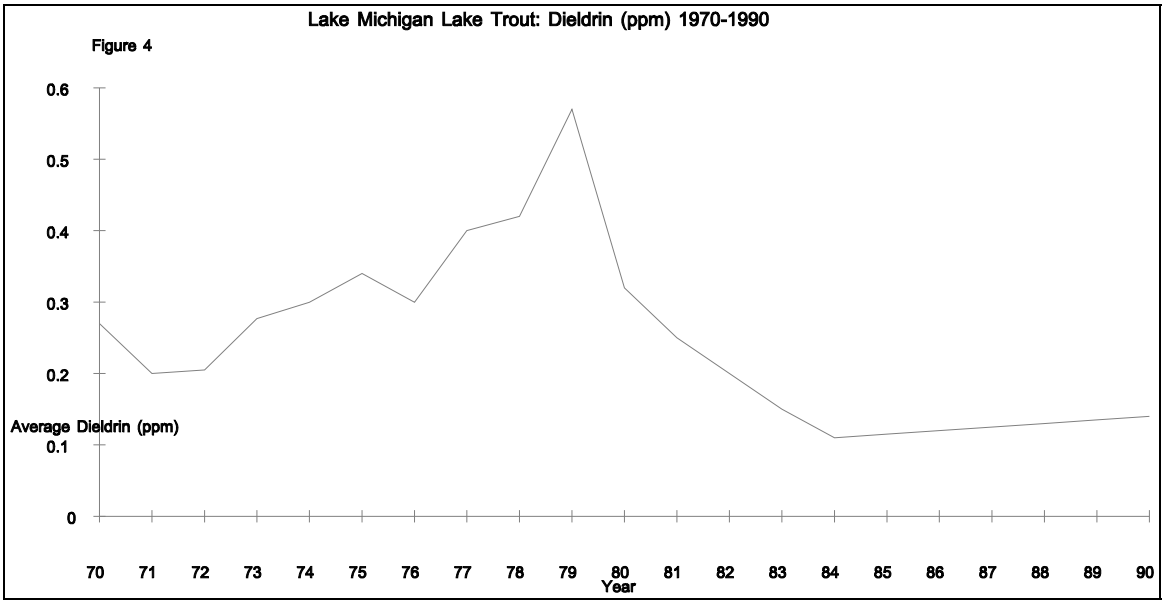

Figure 13. Concentration of dieldrin (ppm) in lake trout collected annually from 1970 to 1990 in Lake Michigan near Saugatuck.

The possible impact of fish contamination on human health poses several challenges to the Division's programs. The Michigan Department of Agriculture and the U.S. Food and Drug Administration have primary responsibility for regulating safety of food, including commercially caught fish. The Division is a proponent of the reduction and elimination of contaminants where possible to enhance fish survival rates and allow for the promotion of human consumption of safe fish. The Division's main focus is on recreational fishing throughout the State that people engage in for many reasons other than food acquisition. Should the Division seek to incorporate consideration of contaminant burdens in both tribal and State commercial fishery

regulations? These important questions must still be answered. Should recreational fishing programs be promoted for their recreational benefits regardless of contaminants burden? Should the regulation of recreational fishing incorporate consideration of contaminant burdens? Should the stocking (fish production) program be managed to produce these species which will have the least contaminant burden?

Economic Impacts of Recreational Fisheries

Growth of the Great Lakes and anadromous fisheries in the 1960's and 1970's dramatically displayed the economic activity associated with recreational fisheries. As a result, many businesses and local governments became interested in fishery management programs and demanded that these programs be directed with consideration of their economic interests. Having little experience with fishery management issues, these new constituencies sometimes misunderstood the likely effects of changes in fishery management practices. At that time, the Division was not prepared to address their concerns through appropriate economic analyses.

Considering the Division's public trust mission, the Division must act to develop natural resources and promote their use in the interest of the general welfare. As a result, the Division has actively promoted the more valuable recreational fishery over commercial fisheries. The Division has also developed some capability to analyze the economic effects of recreational fisheries and to address the concerns of businesses and local governments. However, as these constituencies learn more about fisheries, they want more services from the Division. In particular, many want data about recreational fisheries markets and expenditures to use in business planning and investment. However, the Division should concentrate efforts on educating the public as to the dynamic and widely fluctuating nature of fisheries that often result in periods of relative wealth followed by periods of shortages for those who invest in fisheries related businesses. Constituencies who understand the concept of fluctuating catches will be able to make the best decisions based on data provided by the Division on fishery status and trends.

The Division currently has many chances to forge partnerships with local economic interests in the development of fishing opportunities. Our strategy addresses these opportunities by providing market data and technical assistance to local interests. In addition, the Division provides opportunities for local interest to make contributions to fishery management efforts by providing grants for fishery management projects.

Angler Recruitment

Social and demographic changes occurring will play an increasing role in the level of sport fishing growth in the State. This level of participation is of key importance in providing economic growth to communities, adequate funding levels for management of the resource, public support for proper management of the resource, and an increased awareness of public stewardship in resource protection.

The period from mid-1950 through the 1970's was a period of explosive growth in sport fishing. Active anglers were motivated to fish more frequently, while non-anglers were inspired to take up the sport. This growth was a direct result of several factors including improved water quality, more leisure time, population increases, and greater disposable incomes. Presently, few of these factors can be capitalized on as greatly as they have been in the past.

U.S. population growth over the next several decades will continue to be greatest among minorities. An aging population, increasing urbanization, changes in family structure will also affect further growth. Older individuals fish at decreasing rates as age increases. Likewise urban residents fish at a much lower rate than their rural counterparts. In addition, only 16% of women in the United States are anglers. As the number of single parent families where women are the head-of-household increases, recruitment of children to angling decreases. These demographic factors will tend to drive fishing participation downward unless their effects are mitigated by special programs designed to overcome obstacles to fishing participation associated with age, race, residence, gender, and family status.

If growth in fishing participation is to continue, fisheries management must be carefully focused to best achieve that objective. Fisheries management geared towards the exclusive or experienced angler as exemplified by quality fly fishing only trout streams or trophy species fisheries is supported by highly active and vocal groups of anglers. A fisheries management system has evolved over time to respond to their needs and desires. Management strategies must be developed to determine and address the needs and desires of a larger public.

Fishing participation will only grow in the long term if the rate of recruitment exceeds the rate of dropout. Growth will likely not come from the ranks of the highly active and experienced groups of anglers who are probably fishing at their maximum level. Growth will come from urban areas, the less affluent, women and children. Opportunities must be created and programs must be designed to make fishing easily available to these groups.

Small Boat and Shore Access

Public access to fishing waters is obviously necessary for most citizens to enjoy angling opportunities. The State provides such access through the Department of Natural Resources Parks and Recreation Division. However, their access program is funded by taxes on fuel used by boats. Therefore, the provision of harbors and docks on the Great Lakes and the development of inland access sites on larger bodies of water are given priority. These sites are designed for trailerable boats and they are not built on waters which cannot support general boating use.

Many anglers fish primarily from shore or using small boats and desire to fish in smaller, more secluded waters lacking high speed boating and water skiing usage. A significant portion of Michigan's anglers would be better served by the provision of small boat and shore-fishing access. Carry-in boat access to small lakes is also very popular with a segment of anglers. We need to provide such facilities on properties managed by other DNR Divisions including Parks and Recreation, Forest Management, and Wildlife. We also need to assist access development by local governments and other agencies through existing grant programs administered by Fisheries and Parks and Recreation Divisions. We should aggressively defend existing public access wherever it is threatened by actions of local governmental agencies or property owner associations.

Access to river and stream fishing is also very important to many anglers. There is room for expansion of riverine fisheries provided that public access is assured. We need to aggressively advocate the legal acceptance of the recreational definition of navigability as opposed to the commercial definition which currently severely restricts public use of our rivers and streams. We also need to provide access facilities on properties managed by other DNR Divisions. Existing federal regulations mandate the provision of public access facilities in connection with hydroelectric power generation facilities. We should work with the power generation companies to assure that they meet this requirement.

Direct Services to Anglers

Traditionally, the Fisheries Division concentrated on fish populations and habitat. Increasingly, our constituents are demanding more direct services. Anglers who travel from urban areas to fish are less familiar with their options and request more information. Anglers and others concerned about management of specific waters are less willing to defer to fishery managers and demand more reports and explanations concerning fishery status and management options. The Division has been meeting these needs mostly through personal, custom services.

Personal custom services are usually more costly, less consistent, and lower quality than designed and managed services. The increased volume of direct services demanded by anglers now has reduced the staff time available for fishery management. We will address the demand for direct services by more systematic provision and management of these services. Our strategy addresses needs for fishing information, management plans, and public communications about management programs.

Intensive Fish Culture

Michigan's current hatchery system was developed with the primary goal of preventing fish disease. Prior to the rebuilding of three hatcheries in the late 70s and early 80s, all of Michigan's hatcheries were on open water supplies and disease problems were paramount. Diseases, like infectious pancreatic necrosis and whirling disease, although not common, were a constant threat. Bacterial kidney disease and furunculosis caused large losses of production fish and production levels were unpredictable.

The use of specific pathogen free well water would meet the goal of disease prevention, provided other criteria, such as quantity, aeration and degassing, could be met. Since well water is limited in quantity when compared to surface water sources and expensive to pump, more efficient use of the water was needed. A serial reuse system with aeration and solids removal between uses was tested. The results indicated that a four pass system was attainable and practical.

Aeration of the well water was initially going to be accomplished by using cascading water falls or packed columns. However, it was found that these methods aggravated the existing nitrogen gas supersaturation, which was unhealthy for fish. Additional tests were run using pure oxygen in a sealed column. This method effectively stripped the surplus nitrogen gas and aerated the water with oxygen to supersaturated levels.

The quality of the rearing environment ultimately begins with the water supply. The higher the water quality, the higher the production potential will be. As a consequence, water quality will greatly affect the design of rearing space. The objective is to obtain maximum production without seriously stressing the fish.

Two other aspects of hatchery design are production in terms of flow (loading) expressed as weight of fish (kg) per liter per minute flow (kg/l/min) and production in terms of space (density) expressed in terms of kg fish per cubic meter or rearing space (kg/m3). The effects of density and loading as fish stressors are probably the most controversial subjects in intensive fish culture. Impacts of these stressors were considered in designing Michigan hatcheries and a balance between design, densities and exchange rates set design capacities. Ultimately unanticipated variables changed the designed production levels at almost all facilities.

As more information and experience is gained on hatchery design and water treatment, Michigan hatcheries are becoming more efficient at rearing high quality fish. The high

technology level present in Michigan's newer hatcheries requires more intensive management and stricter controls than older hatcheries or hatcheries built at lower technology levels. However, the rebuilt hatchery system has accomplished its goal of reducing disease infections and improving the stability of the fish production program.

Fish Production

Fisheries Division is unable to meet all obligations and management needs relating to fish production. In past years we received funds to renovate our aging hatchery facilities and to develop world-class fisheries interpretive exhibits. However, we need to do more to ensure the long-term health and productivity of our hatchery system.

To meet the fish production needs of our watershed managers, we need to:

- expand our capabilities to produce coolwater species for stocking (Coolwater Fish Productio Initiative);
- improve the quality and health of the fish we produce (Fish Quality and Health Initiative);
- complete the weir project underway at Swan River (Swan River Egg Take and Weir Project);
- administer the harvest of surplus salmon (Surplus Salmon Harvest Contract); and
- administer the ongoing litigation (Platte River State Fish Hatchery Litigation).

Coolwater Fish Production

Presently, the Fisheries Divison is unable to meet increasing production requests for northern muskies, northern pike and larger sized walleye because of the lack of properly designed facilties to handle these needs. The lack of facilities also impairs our ability to produce Great Lakes muskeies and lake sturgeon to meet rehabilitation needs for these species. Our inability to produce these predators for our management units inhibits our ability to provide for ecosystem balance of predators and prey, and significantly impacts our plans to rehabilitate native species to prescribed levels. In addition to the biological impairment caused by the lakc of a properly designed coolwater fish producton facility, we also have significant safety concerns with our use of existing facilities to produce walleye fry, northern pike fry and lake sturgeon fingerlings as we have greatly overcrowded conditions when these species are being produced. We are also forced to use our fish quality laboratory (oour fish culture research lab) as a fish production facility which has effectively terminated our ability to conduct research to improve fish culture practices. Finally, the Fish Production Strategic Planning Committee and other Division committees have identified this issue as a high priority for the Division to address.

There are limited options to deal with the above needs. Option 1 would be to continue to perate as we have with the existing significant impairments to our program. Option 2 would be to build a series of small coolwater facilities at our existing hatcheries. This option would not be feasible at all sites because of space, personnel limitations, and effluent restrictions. It is also more expensive as it does not allow for any economies of scale that one achieves by building one dedicated facility. Option 3 would be to build a specifically designed coolwater fish production facility at a locaton that has nearly all of the expertise needed to operate the facility, which is the Wolf Lake State Fish Hatchery, This solution has many advantages and will alleviate the above discussed impairments. It is discussed in detail below. The best solution to these problems is to construct a specifically designed coolwater fish productio facility at the Wolf Lake State Fish Hatchery, adjacent to the existing coldwater fish facility. This location will allow us to use

existing water supplies and the new effluent treatment facility for this building. The provision of this facility will allow the Division to meet production needs for both coolwater predators and for the rehabilitation of coolwater species whose populations are depressed. It will also allow us to free up space to renew our fish quality program.

Disease Control

Overall, the past decade has shown some changes in the fish health picture in Michigan. Some are positive, such as the elimination of infectious pancreatic necrosis virus (IPN), and some are negative, such as the reappearance of bacterial kidney disease (BKD) in steelhead. The problems with the decline of the chinook fishery and now the early fry mortalities of several salmonid species, overshadow any positive gains we have made.

The most significant improvements in this decade include the elimination of IPN from all hatcheries and stocks, and the classification of three stations (Marquette, Oden and Harrietta) as pathogen-free. Also, the new viral disease epizootic epitheliotropic disease (EED) which caused serious losses of lake trout throughout the region in the 1980s has not been detected at Marquette Hatchery since the complete disinfection of the facility and Cherry Creek in 1988. Had we gone back to 1972 in this comparison, we would also have seen the elimination of whirling disease from our hatchery system through closure and burial of the only affected station.

The negative differences deal with feral broodstock and include downgrading steelhead from A-2 to B-BK and chinook from parenthetical furunculosis (BF), BK to positive for each pathogen.

The goal of the fish production system is to produce healthy fish for stocking. The Fish Health staff perform annual fish health inspections according to the guidelines established by the Great Lakes Fish Disease Control Committee, Great Lakes fish disease control policy and model program (Great Lakes Fish. Comm. Spec. Pub. 93-1: 1-38). All hatchery salmonid stocks and adult spawning stocks, both of captive brood fish and feral stocks, are examined annually for the parasitic, bacterial, and viral pathogens of concern as listed in the above policy. Routine inspections started in 1972, and hatcheries and feral stocks are classified according to the pathogens found in the statistical sampling of their fish stocks. Captive broodstock held at Marquette (lake trout, brook trout) and Oden (brown trout) are certified disease free. Parenthetical designations indicate that a particular pathogen was not found during the inspection but had been present the previous year or that eggs and/or fish were moved into the facility from another facility that had that particular classification, including eggs from wild stocks.

The long-range goal is to have all hatcheries specific pathogen-free (A-1 or A-2 classifications). An A-1 classification can be assigned where the hatchery water source is free of fish; an A-2 classification indicates that the hatchery receives some, or all, of its water from an open source with resident fish. Treating such water with ultraviolet radiation, ozone, or chlorine can destroy pathogens preventing potential infection from the source water. At present, there are no parasitic or viral pathogens of concern in State hatcheries, and only two major bacterial diseases that must be targeted, furunculosis and bacterial kidney disease.

Basic to disease control in Michigan hatcheries is rearing fish in optimum environments. Attempts to create these optimum conditions include pathogen-free water supplies, aeration and degassing, solids removal, high quality feeds and raceway covers. The three hatcheries currently classified as pathogen-free receive eggs and/or fish, only from disease-free certified stocks or hatcheries. The other three hatcheries have a positive disease classification because they rear eggs and fish from Great Lakes anadromous stocks (steelhead, chinook and coho)

that have a positive disease certification. Any other stocks brought into these hatcheries are certified disease-free.

There is still a need for additional disease control, especially as several stations utilize eggs from feral stocks with BKD, and BF continues to show up at Wolf Lake Hatchery, in spite of all efforts to control it. Other ubiquitous opportunistic pathogen, such as, Columnaris, coldwater disease and bacterial gill disease also occur in Michigan hatcheries and at times cause substantial losses.

The BKD associated decline of Lake Michigan chinook stock remain a serious problem, but the role hatcheries play in this decline is unclear. BKD has not been found during routine disease inspections of hatchery smolts, except during one year when low levels of the disease were found in smolts at two of the three hatcheries rearing chinook. BKD in chinook is not a problem in hatcheries and no epizootics have occurred. Efforts to control the disease in anadromous stocks focus on obtaining eggs with the lowest possible levels of BKD and rearing them under optimal environmental conditions. Even though hatchery smolts are planted with no signs of BKD, within two years mortalities have occurred in the wild and BKD is detectable in adult fish. This is also true for chinook reared from "disease-free" Lake Ontario eggs. In an attempt to control BKD in the environment and hatcheries, Fisheries Division developed a strategy to accomplish this goal. This document, "A Strategy for Dealing with Bacterial Kidney Disease in Great Lakes Salmon Populations" was adopted July, 1993 and can be applied, not only to BKD, but to all fish diseases. The goal of the strategy is to improve the quality and survival of salmonids in Great Lakes enhancement programs. It was developed with citizen advisory group assistance from Lakes Huron and Michigan. The strategy received positive and constructive comment from managers, researchers and industrial representatives at the 1993 Western Fish Disease Conference and that input has been incorporated where applicable. The primary thrust of the strategy is to rear no salmonids from eggs of parents testing positive for R.s. with the field enzyme-linked immunosorbent assay (ELISA) test. If the parents test positive and it appears they will be needed to meet egg goals, attempts are made to clean up the low positive testing adults with an antibiotic strategy prior to egg take, then eggs are taken only from fish testing negative after clean up. No salmonids testing above a set threshold level for R.s. with the quantitative ELISA (QELISA) are stocked.

This strategy is based on the principle that a continual infusion of clean hatchery salmonids into the Great Lakes system will dilute the present incidence of R.s. in the salmonid populations, over time, to a point where the potential for horizontal transmission will no longer be a serious threat to the salmonid communities in the Great Lakes. Absent a vaccine, this option appears to be the most prudent policy to immediately implement on, at least until its merits can be fully evaluated. It also has the potential to reduce further the decline in salmon survival due to BKD and improve fishing opportunities without undue delay. Results from this option should be measurable within two years after implementation utilizing a lakewide sampling program. Stocking of only R.s. free salmonids in the Great Lakes has been a recommendation of the Great Lakes Fish Disease Control Committee for a number of years. However, because of a multitude of difficulties involved in raising R.s. free salmonids for stocking, this recommendation has not been implemented in maintaining the Great Lakes salmonid enhancement efforts.

It is obvious that continuing to stock R.s. carrier salmonids is not good policy as such fish are highly likely to develop a lethal BKD syndrome even without undue stress. We in the Great Lakes are not alone in our concerns about the effects of BKD on the success of salmonid enhancement plans. In general, it appears that all large salmonid enhancement and extensive cultural programs (particularly those involving brook trout, chinook and Atlantic salmon) are now recognizing the problems BKD is and has been causing them.

The strategy attempts to improve the knowledge of causes and effects of BKD while, at the same time, improving the quality of the fish being utilized for salmonid management programs. It should be emphasized that the program stresses stocking of non R.s. carrying salmonids via a series of increasingly stringent quality control measures as problem areas are identified and found correctable. Further, it needs to be emphasized that this strategy may need to be modified as new research identifies areas where changes will improve the survival of salmonid fishes utilized for enhancement and rehabilitation programs.

Fish Quality and Health

The success of the Department's fish culture products is directly l inked to the quality of the product and processes to produce the fish necessary to meet watershed management needs. It is critical that the Department is at the forefront of fish culture research and fish diseases are held to a minimum to ensure that our watershed management objectives are met and we are positioned to take advantage of Joint Venture opportunities.

Currently, the fish quality section is not staffed and other overcommitted staff are collecting few of the quality assurance measurements; thus little of the critical culture research is being addressed at this time. The lack of fish quality staff has been identified as one of the top priorities to be addressed in fish production by the Fish Production Strategic Committee.

Disease outbreaks are frequently symptoms of larger ecosystem level problems that are stressing fish populations making them vulnerable to disease. Many of these diseases have multiple cuasative organisms and require very sophisticated and expensive equipment to detect. In addition, federal and state requirements for laboratory safety and sample disposal continue to become more stringent and expensive to meet. Presently, the Department has two FTE's devoted to fish health which is insufficient to meet the growing demand for fish disease diagnosis and research. We also expect that the present fish health lab will not be able to keep up with the latest in analytical equipment nor will it be able to keep up with future lab safety requirements.

There are three options to deal with these issues. Option 1 continues operations as they are presently using the current underfunded budgets and overcommitted staff to handle these duties. This option will continue the above-discussed impairments and will not allow the Division to fully take advantage of watershed level management opportunities. Option 2 is to fully staff both units using Department personnel and fully equipping the fish health lab to current analytical and safety standards. This option has the advantage of providing direct Department control over all of these functions. There are a number of disadvantages including high costs, both operationg and capital costs, and personnel cap limitations. Option 3 is to develop a joint Fish Quality and Health Unit that uses a PERM-like agreement with Michigan State University. This option provides for fish health and quality specialists on our staff and provides funding for staff at MSU. It provides access to fully equipped laboratories and the best available expertise at a lower cost than if the Division tried to provide these services by iself. This is the best option and is discussed below.

This proposal will develop a joint fish quality and fish health unit, using both department and Michigan State University resources. It requires the hiring of a fish culture operations researcher for our staff to conduct system research, coordinate research with fish health personnel, handle routine quality control work including reporting, and to oversee contractual research conducted by other parties. The proposal would also fund a new "PERM" type position at Michigan State University, Department of Fisheries and Wildlife. This position will handle larger culture research problems, which will require combining Department resources with

outside resources, using an individual with large facility aquaculture research interests and a strong background in fish physiology. We propose to contnue to fund a fish health specialist and a technician, to be shared with fish quality, on our staff to handle routine fish disease work, fish health research and contract oversight. We propose to contract most of our laboratory analysis to the Michigan State University Animal Health Disease Laboratory to take care of the above stated concerns with technology and laboratory safety. The contract should include provisions to ensure that we get the best service at prices that meet or are below the lowest sample prices available for each type of analysis. To handle larger watershed scale fish health problems, this proposal will fund a "PERM" type position with the MSU Vet School to fund a fish pathologist/epidemiologist who is trained in ecosystem level disease research. This individual will handle larger fish disease research problems such as why does IPN and BKD periodically reappear in Great Lakes systems, which will require both the Department's and outside resources to solve. Most problems of this type will require multi-discipline research and will involve the expertise within the fish health and fish quality groups. This individual will also provide oversight on fish disease samples that are being processed by MSU.

To solve dififcult and complex ecosystem problems that concern fish quality and health, a true multi-discipline approach will be required. The proposed unit will be able to handle our routine analysis of our fish culture products and will have the capability to answer large-scale ecosystem problems. This is a combined unit of two disciplines as fish health and quality really address the same concerns, and the problems of one group are frequently answered using the expertise of the other.

Swan River Egg Take and Weir Project

The Swan River egg take and weir project is currently under constructiton but additional funding is needed to complete the facility as originally planned. As background, the Swan River salmon weir is located near Rogers City on property leased from Michigan Limestone Operations. The MDNR has operated a salmon weir here continuously snce 1988. Surplus (to the sprot fishery) salmon and salmon eggs are collected here annually to maintain the statewide program. The project was established by work order request in October 1997 with a budget of $1,500,000. This budget included $750,000 in State funds, $375,000 in Fisheries grants and federal grants of $375,000. Due to problems with the federal grant and inflation, only a scaled down portion of the facility can be built this year. Fisheries Division is requesting an additional $1,500,000 in capital outlay funds to finish the project within the approved scope. The additional funds are required to rebuild the salmon blocking weir, add additional raceways, river pumps and construct an egg take and harvest building. The existing construction contract was issued to Gerace Construction of Midland in March 1999 and is valid for three years.

Surplus Salmon Harvest Contract

The MDNR Fishesries Division harvests about 110,000-130,000 salmon annually weighing from 500,000-800,000 pounds at seven state-owned weirs located on streams tributary to Lakes Michigan and Huron. Coho and chinook salmon are stocked in these streams to provide an offshore fishery, to provide ecosystem balance, and to insure that sufficient numbers of adult salmon return for egg take purposes. The salmon eggs collected at several of these weirs are cultured at State hatcheries, and then the smolts (3-18 month old fish) are stocked into the Great Lakes and tributaries to maintain the statewide program. Stocking is necessary because fish passage barriers, including hydroelectric dams, other dams and culverts, have been

constructed oveer most of the quality trout and salmon spawning habitat on streams tributary to the Great Lakes.

Due to market changes, most of the costs (about $200,000 per year) of conducting the surplus salmon program have been borne by Fisheries since 1996. These costs directly impair the ability of the divison to implement the watershed management and be a part of the joint venture opportunities. Prior to 1995, the State received a small annual income (a few hundred dollars) for the salmon. Weir operation costs were also covered by a contractor. During the 1990's large salmon harvests in Alasks and the growth of the aquacultue industry, featuring the pen rearing of salmon, depressed the market for Michigan fish. As a consequence, the MDNR entered into a salmon contract in 1999 that will cost Fisheres up to $200,000 per year during 1999-2001. Most of the cost of operating weirs is in salaries for watchmen and labor, fish transportation and utilities, etc. Contractors can operate the weirs more cost effectively than the agency. Although contracting is clearly desirable, MDNR staff continue to oversee (contractor) operations at all weirs each fall.

Managing Fish Losses

The loss of fish in aquaculture, as in any form of agriculture, is anticipated. The Division is dedicated to minimizing these losses while meeting production targets. The basic strategy used to meet production targets is to carry surpluses of all early life stages when rearing costs are low and then reduce surplus fish as fish size and production costs increase. In the past, a fall fingerling program was used to reduce surplus numbers of hatchery fish. However, with the decline of fall fingerling programs, hatchery managers have had to rely on better management practices to meet fish planting targets.

Three principal modes of fish loss in hatcheries are predation, disease and mechanical failure. Predation can be internal (other fish within the rearing unit) or external (avian and mammalian predators). Internal predation is controlled through adequate feeding of the proper size pellet. Grading may also be necessary with some fish from wild stocks because of large size variations. External predation is controlled through construction of raceway covers with board and screen sidewalls and ends. Currently Marquette, Harrietta and Wolf Lake have raceway covers. Oden and Thompson use netting suspended over the raceways to control bird predation but this netting does not deter mammalian predators. Platte River used monofilament fishing line stretched over the raceways at 2-foot intervals to discourage predation by gulls.

The use of pathogen-free water supplies and improved rearing environments via degassing and oxygenation of the water supply have reduced the incidence and impacts of disease on cultured fish. Currently five of six Michigan hatcheries use pathogen free well water for all or part of the rearing cycle. Furunculosis is the only serious pathogen which still causes substantial losses primarily at Wolf Lake in Atlantic salmon and brown trout. Bacterial kidney disease is present in feral broodstock and is found in coho smolts but it does not cause epizootic episode in any cultured fish. Better hatchery operation practices have also lead to lower incidence of the obligatory pathogens such as columnaris, coldwater disease and bacterial gill disease.

Mechanical failure has the potential to cause serious and massive losses at hatcheries. To protect against mechanical or power failure, all hatcheries have standby generators capable of running all critical operations during power failure and a certain level of redundancy and corresponding automatic switching gear is built into the hatchery design. In conjunction with emergency power, all hatcheries have alarm systems designed to monitor all critical functions necessary to maintain a healthy environment and notify a designated person if a malfunction occurs. A hatchery employee is "on-call" to respond to emergency situations 24 hours a day,

365 days a year at all hatcheries. An "on-call, call-back policy" has been developed to define the responsibility and authority of the person "on-call". We are also working on a set of hatchery alarm response guidelines delineating the kinds, amount and frequency of training on proper alarm response and related hatchery operations.

The total number of alarms reported by each hatchery for the past 5 years is shown in Table 1. Of the total number of alarms reported for each year, between 43% and 54% were reported as critical alarms which would have resulted in some level of fish loss if the malfunction had not been corrected. Only one of these critical alarms reported for the last 5 years resulted in a significant loss of fish leaving us unable to meet program targets. In this case the loss was the result of a response error by the employee "on-call" rather than a system failure.

Table 1. Alarms reported by each hatchery for each year, 1989 to 1993.

Hatchery	**1989**	**1990**	**1991**	**1992**	**1993**
Marquette	7	6	7	4	3
Thompson	45	56	29	33	23
Oden	7	5	13	15	23
Platte River	25	20	17	12	17
Harrietta	21	38	15	27	10
Wolf Lake	43	56	44	55	47
Total	**148**	**181**	**125**	**146**	**123**
Total critical	**71**	**97**	**63**	**63**	**52**

After any mortality involving hatchery malfunctions or employee error, a thorough review is conducted and a course of action is identified which will minimize the chance of a reoccurrence and result in improvements to the system and the culturists ability to prevent further losses. A case history in point is the report describing the losses of fish at Wolf Lake on May 21, 1993, and July 9, 1993. The first loss occurred when an employee opened the wrong valve and allowed unoxygenated water to flow into some rearing tanks. The change of valves was unsupervised and the affected tanks were not checked resulting in the loss of 74,000 Atlantic salmon and 52,000 skamania steelhead--the entire program for both species.

The second loss occurred during a major storm and power outage. In this case all emergency backup equipment operated properly but the person "on-call" failed to respond to an alarm properly. This failure to respond properly caused the standby generator to shut down resulting in the loss of about half of the 1.8 million Michigan steelhead on hand. There was ultimately no effect on the program number because most of the loss was surplus to our needs and we were able to get surplus steelhead from Indiana and Wisconsin to meet our program target of about 920,000 yearling steelhead.

During the past five years there have been 12 losses of fish that exceeded 10% of that production lot, but only two of these incidents resulted in planting fewer fish than targeted. Losses in hatcheries which drastically impact our ability to meet stocking targets are rare. In most cases we are able to obtain surpluses from other states or the Fish and Wildlife hatcheries. Michigan subscribes to the Fish and Wildlife Service Egg and Fish Hotline.

Privatization

In 1992, over the signature of the Governor, the Department of Management and Budget (DMB) initiated an evaluation of State service functions in an effort to determine where privatization might be a feasible and prudent alternative. DMB determined criteria on which to base decisions regarding privatization. Based on an application of these criteria, the Fisheries Division decided not to recommend privatization of its Fish Production Program.

The DMB's first criterion for privatization concerns the uncertainty of the task involved. If the task is uncertain at the outset and prone to revision, privatization is not recommended. Although the numbers of fish produced for State programs are fairly stable, the genetic composition, sizes, timing, and rearing process requirements change fairly often, as fish production is adjusted to improve performance in the waters in which they are stocked. In addition, fish stocking is adjusted continuously to meet changes in the fisheries or to respond to new information about performance. Thus, the task of fish production is under constant evaluation and revision.

The second criterion deals with valuation of the product. If the value of the production is hard to measure, privatization is not recommended. The value of fish produced is currently impossible to measure at time of release. Fish can vary greatly in their ability to survive and contribute to a fishery once released into natural waters. This variation can exceed three-fold, even when fish do not have detectable differences in quality. Further, quality is improved by evaluating results in the fisheries and using this as feedback to hatcheries concerning experimental changes in rearing practices. Consequently, the value of the product is impossible to measure directly at the time of stocking.

Criterion three addresses ease of switching contractors. Privatization is not recommended if it is very disruptive to switch contractors in mid-stream. Each hatchery is uniquely designed because of differences in water source, types of fish to be produced, and changes in technology. Michigan's hatcheries are approximately 10 years ahead of the industry in design concepts. Hence, even most professional fish culturists would be unable to take over and operate a hatchery successfully without two years of operating experience to develop necessary knowledge of the facility.

Privatization is not recommended if criterion four, "The unit of government knows the best means to accomplish the task", is true. The Michigan Department of Natural Resources is widely recognized for the excellence and cost-effectiveness of its fish production program. Fish production professionals from throughout the world visit our facilities to find out about the numerous innovations we have developed and adopted. These include: high-density rearing, which reduces capital costs of fish production; use of high water exchange rates and baffles to eliminate manual pond cleaning; injection of pure oxygen to eliminate harmful concentrations of nitrogen and increase hatchery carrying capacity and reduce water requirements; automated feeding calculations which increase efficiency of food use, and alarm and backup systems which enhance the reliability of production. As a result of these innovations, Michigan's hatcheries now produce fish for approximately 1/2 the operating costs and 1/4 the capital cost of conventional hatcheries which produce similar fish.

Finally, if the process is as important as the end result (criterion five), then privatization is not recommended for the hatchery program. Because there is not an established method for measuring fish quality at a point in time, quality assurance in hatchery operations is accomplished through process-based requirements and practices and assessed through production histories. Differences in production practices which cannot be observed as differences in fish at time of release can produce three-fold differences in survival in the wild and return to the fishery.

The fish production program therefore does not qualify for privatization based on the criteria set forth by DMB.

The Division has pursued, over time, the concept of sharing its role. This has traditionally been done through partnerships where non-governmental cooperators want to assist the Division in fulfilling their responsibilities. Many communities and organizations operate net-pen smolt acclimation and conditioning projects in the Great Lakes stocking ports. We have cooperative rearing facilities and hatcheries which produce fish for release in Great Lakes waters. We cooperate in over 100 outlying rearing pond projects which result in the annual releases of millions of coolwater species, primarily walleye, in both inland and Great Lakes waters. We are cooperating with Lake Superior State University in a joint research, production and evaluation initiative focused on Atlantic salmon in the Great lakes. We are finalizing a memorandum of understanding with West Shore Community College with the following objectives:

- Education - Enhance an undergraduate degree program capable of providing fish culturists and fishery technicians annually, for employment in federal, state, province and tribal fishery programs nationwide. Program participants would receive training in fish culture, fish pathology, fish health, fish transportation, facility operation and maintenance and product performance. Secondly, the facility would provide public fishery education through scheduled seminars and other teaching formats as appropriate.
- Research - Conduct fisheries research in the field of fish aquaculture and fish pathology. Various fish culture techniques and products would be evaluated both in terms of production standards and product performance. Research programs will be coordinated with the MDNR, Michigan State University and other agencies and projects will be selected on area and basinwide needs.
- Service - Provide fish pathology services to the Michigan aquaculture industry through facility and fish health inspections as required by State law. Explore the development of quarantine facilities on closed water systems for disease free certification of potential stocks for introduction into Michigan and other Great Lakes watersheds.
- Stocking - Provide up to 100,000 fingerlings or yearling fish annually for stocking in public waters under the direction of the MDNR. A portion or all of which may be marked for product evaluation/research purposes.

Limits on Fish Stocking

Fish stocking is a tangible, easily measured element of fishery management. Stocking has also been spectacularly successful in rehabilitating the Great Lakes fisheries and some inland fisheries. Hence, there is much public demand for fish stocking. However, stocking is neither a panacea nor an unqualified good. Healthy fisheries rarely need stocking. Waters can be stocked too heavily, reducing fish growth and survival. There is particular risk of over-stocking the Great Lakes where several jurisdictions and many stocking locations and species compete for a common forage base.

Stocking is also very expensive, even with Michigan's unusually efficient fish production program. Our proposed strategy increases the Division's emphasis on defining the limits of stocking. More attention will go to measuring fishery contributions of stocked fish through fish marking, fishery sampling, and stock assessment. Lakewide limits on Great Lakes stocking will be set and revised through management planning.

Native American Fishing

Tribal fishing rights in large areas of the Great Lakes have been established. The challenge of the next decade will be to accommodate these tribal fishing rights while protecting fish stocks, both commercial and noncommercial, from depletion. Recovering endemic stocks, such as lake trout and lake sturgeon, are especially vulnerable to depletion. Tribal fishers prefer to use gill nets, which require relatively low capital investment. Gill nets, however, inflict high losses to nontarget fish such as lake trout. The Fisheries Division must therefore encourage conversion of tribal fisheries from gill nets to less lethal entrapment gear. While the State of Michigan cannot delegate its role of trusteeship, tribal authorities will be encouraged to embrace the responsibilities for stock management and protection that are implicit with their fishing rights. Where depletion of fish stocks occurs, even if in tribal fishing waters, the State must exercise its stewardship role, as defined by the Public Trust Doctrine (see pages 4-5), to protect the affected stocks from over exploitation. The current consent agreement pertaining to management of fishing rights of the Treaty of 1836 with the Ottawa and Chippewa Indians expires in the year 1999. It is incumbent upon the Division and the Department of Natural Resources to secure a continuing understanding with the tribes that accommodates fishing rights while protecting stocks from depletion.

Conflicts Between Commercial and Recreational Fisheries

The Division has largely resolved historical conflicts between commercial and recreational fisheries regarding stock and space allocation in the Michigan waters of the Great Lakes. However, conflicts continue in several locations, and the Division will continue to work fishery by fishery to resolve these while promoting the interests of recreational fisheries.

Fishing is the second most popular recreational pursuit in the U.S., and Michigan's aquatic resources attract over two million anglers annually. The total impact of recreational fishing on Michigan's economy is estimated at $1.4 billion annually while Michigan's commercial fisheries produce $19 million in economic activity annually. Thus, the Division believes that commercial fishing should be displaced to accommodate recreational fishing which generates more value for society. However, commercial fishing privileges so displaced should be purchased at fair market value and preferably through voluntary transactions by both seller and buyer.

Problems in Commercial Fishery Regulation

Commercial fishing in Michigan, other than by tribal fishermen, is pervasively regulated. Our regulations have been effective in rehabilitating and protecting commercial fish stocks and making room for an important recreational fishery.

However, Michigan's commercial fishing regulations rely on administrative decisions about individual fishing licenses to change the fishery. Such decision-making about individual enterprises conflicts with traditional notions of civil liberty. Thus it is difficult to accommodate or institute to change the fishery without either being or appearing to be arbitrary. Unnecessary rigidities in our regulation of the fishery foster economic inefficiency. A variety of adjustments which have been made as we accommodated Native American fishing leave us with a patchwork of rules, licenses, and permits. We propose to resolve many of these problems by seeking legislation to create a marketable, quantitative usufruct (right of use) in State-licensed commercial fishing. We will then adjust the fishery through voluntary economic transactions

using bidding or other open market procedures. In addition we propose to revise our policies and procedures to more consistently address recurring issues.

Aquaculture Regulation

Fish prices, adjusted for inflation, have been steadily increasing worldwide since landings leveled off in the early 1970s. This fact combined with consumer demand for better quality fish products has led to increasing interest in commercial aquaculture in Michigan. The Department of Natural Resources recognizes aquaculture as a legitimate field of business which may further develop in Michigan as a result of private enterprise. The Department of Natural Resources is also a substantial operator of aquacultural facilities which are operated for the restoration and propagation of valuable wild fish populations.

Currently, the Department of Natural Resources recognizes that aquaculture practices can create certain environmental and public natural resource risks. Aquacultural operations often act as point sources of pollution which can degrade the public aquatic resource. Aquaculture operations generally produce organisms that are essentially wild in character and can survive if released from the facility. Thus, aquaculture can introduce species that may threaten the integrity of the natural ecosystem. In addition, a greatly increased aquaculture operation will increase the risk of fish disease introduction and propagation. The use of public waters for private aquacultural operations may be inconsistent with the general public policy of the State of Michigan.

Federal and state agriculture and commerce programs are being developed to promote and support development of an aquaculture industry. The Division is currently participating with other agencies in developing a State aquaculture plan. However, the Division's role in regulating or supporting commercial aquaculture has not been clarified.

Promoting Responsible Conservation

The perception by the general public that conservation and preservation are the same can create obstacles for natural resource managers. As defined by Webster's dictionary, conservation is "a careful protection of something; planned management of a natural resource to prevent exploitation, destruction, or neglect". Preservation can be defined as "to keep safe from injury or harm". Conservation has been used as an umbrella term that includes utilitarian use, management for multiple use, and preservation. Preservation is a very "hands-off" approach and is one mechanism that can be used to conserve natural resources. The public must be educated so that they understand that management is an integral part of natural resource conservation (for example, without explicit management strategies, many endangered species would be lost).

As land use and human behavior patterns change in the State of Michigan, it is ever more important for the Department of Natural Resources to take a strong stand in defense of the traditional values of resource management and the sustainable productivity of our land and water resources. The environmental and natural resource challenges we face in the next several decades require changes in individual behavior and acceptance of individual responsibility to preserve and protect, as well as to allocate, scarce resources. Our governmental response to these issues will reflect the values of the individuals who lead our agencies and the public who supports them. The Department has the opportunity and responsibility to inform and educate the citizens of this State concerning the options available in the public policy arena, so that responsible, deliberate choices can be made. Preserving the full

range of resource uses and opportunities that have been made available to this State will depend upon a knowledgeable and supportive public.

Animal Activism

The philosophy of animal rights became popular in 1976 when the book Animal Liberation was written by Peter Singer. Animal rightists believe that animals have inherent rights analogous to human rights and that "speciesism", the exploitation by any one species by another, is morally wrong. Although we may not agree with the values of these activists, as a public agency, we must take them seriously. Animal activists represent one of our more vocal constituents, and they are very skilled at delivering their message to the media and the public. An increasing number of articles focusing on animal rights have appeared in the popular press including The Wall Street Journal, U.S. News and World Report, Glamour, USA Today, Newsweek, and Science. Animal rights and anti-management themes have appeared in popular cartoons such as Teenage Mutant Ninja Turtles, Sebert the Seal, Bloom County, and on MTV. Public familiarity with the animal rights movement has impacted fish and wildlife management programs across North America. Fish and wildlife agencies are increasingly being challenged over traditional uses of fish and wildlife such as hunting, fishing, and trapping.

Although recent surveys indicate that 9 out of 10 Americans do not support the animal activist agenda and 8 out 10 feel that hunting should remain legal, animal rights as a movement is growing and well funded. It has been estimated that 400 animal rights groups exist in the United States alone with many of these groups belonging to sophisticated national and international networks. The three largest animal rights organizations in the United States, The Fund for Animals (FFA), People for the Ethical Treatment of Animals (PETA), and the Humane Society of the United States (HSUS), have over 1 million members and their combined annual budgets exceed $27 million.

Current demographic trends may contribute to attitudes that could become more receptive to a philosophy such as animal rights than to traditional fish and wildlife conservation. First, the percentage of people living in metropolitan areas has increased from 56% in 1950 to 78% in 1990. Urbanization tends to insulate people from traditional fish and wildlife use and recreation. For example, desertion from hunter ranks is positively correlated with urbanization, and most urbanites' contact with fish and wildlife is through nature shows and cartoons. Second, changing family structure is having an adverse effect on fishing and hunting initiation and continuation. Traditionally, children have learned wildlife recreation skills from male role models. Only 2% of women in the United States hunt and only 16% fish. As such, the current increase in single-parent families where women are the head-of-household will affect children's attitudes toward fish and wildlife. Third, the average amount of leisure time has decreased 37% since 1973. Hence, fish and wildlife recreation activities are competing with many other leisure time activities which may be more readily accessible to the urbanized population. Finally, the public's concern about air pollution, toxic wastes, and deforestation may foster a belief that human activity can only harm the environment, and that human manipulation of any system is inherently bad. These trends may create a public that is more willing to accept the animal activist agenda than traditional fisheries and wildlife conservation.

Animal activists are not only a serious constituent group, but also contribute to the pool of future fish and wildlife managers. However, there is an even larger pool of people who do feel neutral toward fish and wildlife management. For example, in 1985, 16.7 million people hunted and 58.6 million fished while 134 million participated in non-consumptive wildlife associated recreation. The Division should focus more attention on this neutral group in an effort to promote the ideas of natural resource stewardship and conservation. This initiative does not

mean abandoning traditional supporters of fisheries and wildlife programs, it means implementing new programs in addition to current programs.

Social Responsibility

Like many other agencies and businesses, the Fisheries Division is subject to increasing public demands to protect the environment from the adverse effects of our activities and for more equitable services to, and employment of, certain classes of citizens including handicapped, racial minorities, and women. Opportunities exist to provide fishing opportunities for and to recruit anglers from different demographic and socio-economic groups. These groups include single parents and their children, citizens of urban areas, people with low incomes as well as the handicapped, racial minorities, and women. As the traditional base of interested anglers diminishes (as demonstrated through decreasing license sales), increasing fishing opportunities and promoting recreational fishing to these other demographic groups will become more important in maintaining and enhancing the Division's programs. In addition, meeting the needs of these population segments through targeted fishing programs relates directly to the Division's mission of creating fishing opportunities that increase the common wealth. Our proposed strategy increases the attention we give to these social responsibilities.

Government Efficiency and Accountability

Citizens have always been concerned about efficiency and accountability in government. Government agencies are generally not subject to market competition. Recipients of government services usually do not pay directly for those services. Citizens find it hard to determine whether agencies provide good value for their expenditures. These concerns are particularly acute during periods when government budgets are seriously constrained.

The Fisheries Division is funded through fishing licenses and taxes on fishing tackle and supplies and is therefore closer to its customers than most government agencies. However, anglers are compelled to pay license fees if they wish to fish and the revenue is not directly allocated to serving their interests. The public's concerns about efficiency and accountability of the Fisheries Division are much like their concerns about other government agencies.

We address these concerns both by working to be efficient and by accounting for our efforts. These concerns are spread throughout the Division's program objectives but are the primary focus of Division management. Special effort will be taken to automate information management functions, increase employee involvement and focus in the Division's programs, and properly maintain the Division's equipment and facilities. We also plan to improve our accounting for accomplishment and costs.

Technology Improvement

Fisheries Division is committed to make management decisions based on the best science and technology available. This requires a major effort to maintain or increase our electronic equipment and to provide efficient electronic access to our valuable historic records. We must maintain up-to-date computers and computer peripheral devices (Computer Equipment Replacement Initiative). We must convert our valuable historic documents on fish populations, habitats, and management activities to electronic format for efficient retrieval and analysis (Document Management Initiative). Each initiative is described in more detail below:

Computer Equipment Replacement

The key component to successful deployment of any software-based technology implementation is the technology infrastructure in which it is expected to function. Proactive measures must be taken to assure the computing environment is maintained to the capacity and standard necessary to support ongoing and anticipated demands. Fisheries Division is faces with the realization that 51% of computers now in use are subject to failure, or will be severely under-powered by the end of FY2001, and all computers now in use will not be adequate past FY2002. This is based on the model that a computer's technology life expectancy is 3-4 years. To prevent the high cost of computer replacement in a single fiscal year, a replacement schedule is proposed that will put computer replacements on a four-year rotation schedule. This component of the technology management initiative estabblishes the financial resources necessary that will allow for the cyclically replacement of computers and related technology-based equipment to occur on an ongoing basis.

Document Management

The primarily scientific and professional make-up of Fisheries Division has resulted in an extremely large collection of reference materials. This information takes on a variety of forms including paper copy, electronic files, photographs, slides, and video. The Institute for Fisheries Research Library houses over 54,000 reference documents alone. In addition, a majority of the 20 Fisheries Division work locations maintain informational material that is of high value to staff and ecosystem management activities across the department. The missing link between this informational material and the knowledgeable worker is knowing what material exists, its location and how to obtain it – document management. Putting this link in place allows for a true integrated knowledge base and amechanism for sharing information amongst ourselves as well as the other resource Divisions. A portion of this technology management request is earmarked for the development and implementation of a new Division document management system. This project will encompass document control, tagging, cataloging, imaging, library management, archiving and search and retrieval for Fisheries Division's extensive collection of reference materials.

Human Resource Management

Over the next decade, effective management of human resources will become even more essential for effective fishery management. Most of the easy tasks in managing Michigan's fisheries have been accomplished. Further development of the State's fisheries, or even successful protection and maintenance, will require more intelligent management rather than greater activity.

The passing of baby boom employees into their middle working years and into retirement will create a labor shortage which will increase the costs of staffing. Accompanying cultural shifts are already requiring all employers to give greater attention to safety, personal development, and many constraints on living and working locations. Increasing diversity of the workforce will challenge work relationships and practices, but will also bring greater diversity in held values about fish and fishing.

Traditional weakness of resource professionals as organizational managers will not be acceptable as the workforce changes and as demands for efficiency increase. Management development must be addressed before the current generation of managers retires. Hence, the

Division will give great emphasis to becoming a flexible and adaptable organization of people who learn and develop rapidly.

Urban Initiatives

The percentage of citizens living in metropolitan areas has increased from 56% in 1950 to 78% in 1990. They are also the areas where people are most alienated from the amenities of the natural world and where it is most difficult and most expensive to provide citizens access to the natural wonders of our State.

In this strategy, the Fisheries Division will continue its emphasis of the last five years on managing fisheries in southern Michigan. We will continue to advocate acquisition and development of shore fishing and small boat access to waters in southern Michigan. Urban residents are expected to make significant use of the improved fishing information services we propose in this strategy. We will continue to pursue and participate in developing comprehensive management plans for each of the major rivers in urban areas of the State. Our efforts along these lines will be coordinated with the efforts of other Divisions under the DNR Southern Michigan Recreation Initiative.

Fishing Information and Education

Due to the development of new Inland Trout regulation, Fisheries Division is faced with the production of two fishing guides. In previous years only one guide was produced (1.5 million copies) to cover all regulations. With passage of new inland regulations, the task is in essence doubled. It is important to bear in mind that these guide(s) are put into nearly every angler's hands at some point through the year.

Fisheries Division is looking to update and advance its information and education efforts. With the change to watershed management, it is importantthat all Division publications be reviewed for consistency and accuracy.

Trout Fishing Guide

After several years of study and consideraton, the Department will be issuing new inland trout fishing regulations. These new regulations will affect both inland lakes and streams and will utilize an entirely new classification system. Under this system, lakes and stream reaches will be placed into one of 7 color coded classes. To implement this system, Fisheries Division will be producing a new and additional fishing guide devoted solely to Inland Trout regulations. The guide will consist of a series of maps of the State showing all classified lakes and streams. This publication will be in addition to the annual fishing guide produced. This additional expense is estimated at $150,000.

Popular Publications

Fisheries Division maintains and produces a number of popular publications ranging from instructions of how to identify Great Lakes Trout and Salmon to a Southeast Michigan Fishing map. Unfortunately, many of these publications are out of date and/or in short supply. The Division is seeking funds to update these publications and the development of new souorces of

information for the public. The change over to watershed boundaries will also require the revision of specialized publications previously oriented to district boundaries.

Tribal and Commercial Fishing

In 1979, the U.S. District Court of the Western District of Michigan rules that certain Native American tribes did not have to comply with Michigan laws regulating State-licensed commeercial fishing in the Great Lakes. The U.S. Court of Appeals upheld that decision and the Supreme Court declined to hear a further appeal. In 1985, the State, the Federal Government, and three Tribes entered into a court ordered agreement to allocate fish stocks among tribal and State-licensed commercial fishers and recreational fishers. More recently, two additional tribes hae been recognized in the 1836 treaty-ceded territory. The current Consent Order will expire on May 31, 2000 and a successor agreement must be negotiated and/or litigated. By 2001, significant funds and staff time will be required to manage the Great Lakes fishing agreement.

These same five tribes are expected to claim a treaty right to inland fishing and hunting. The State will need to challenge that right and ask for a determination by the Federal Courts as to the existence of a right to fish or hunt in inland areas. The inland case could begin at any time, but will certainly be fully underway by 2001. If the courts determine that a right exists, the extent of the right will also need to be determiined and a settlement agreement reached through negotiation and/or litigation. The State of Minnesota faced a similar court challenge several years ago. They needed 7 to 10 full-time FTEs working for two years in order to handle the case.

To effectively deal with this issue, the Division needs to:

- achieve a negotiated and/or litigated settlement of Great Lakes treaty fishing issues and to coordinate Fisheries Division's involvement in implementation of the settlement agreement;
- further reduce State-licenced commercial fishing effort in Great Lakes treaty-ceded waters; and
- reduce State-licensed commercial fishing effort in non-treaty waters of the Great Lakes.

Litigation and Tribal Fisheries Management

We need to fund and manage litigataion of the inland fishing and hunting issue to: 1) determine if a treaty right exists; 2) determine the extent of the right; 3) negotiate and/or litigate a settlement of inland treaty fishing and hunting issues; and 4) coordinate Fisheries Division's involvement in implementation of the settlement agreement. To accomplish these things we need to hire additional Fisheries Division staff (5 FTEs) frund Attorney General staff, fund legal and historical research, and acquire high caliber expert witnesses. Financial needs are expected to reach $1,000,000 per year 2001. Financial and staff needs will continue after the court cases are settlement, because we will need to manage, coordinate and help enforce implementation of the agreements.

Commercial Fishing Effort Buyout

Certain Michigan Indian tribes retained fishing rights that predate the use rights of existing State-licensed commercial fishers. Through a 1985 U.S. District Court Consent Order, the

commercial use of a large portion of Great Lakes treaty-ceded waters was dedicated to treaty fishers. Within the next two years it may be necessary to further accommodate treaty commercial fishers in some of the remaing Great Lakes treaty-ceded waters. Since 1969, the State's policy has been to compensate State-licensed commercial fishermen when opportunities are lost and these funds are needed to acquire the commercial fishing effort and impoundment fishing equipment of non-treaty fishing enterprises.

In addition, areas of the Great Lakes (notably Green Bay and Saginaw Bay) have more licensed commercial fishing gear authorized than is needed to harvest the available surplus of fish. This causes two significant problems: 1) excess commercial fishing gear occupies an unreasonable amount of space and, as a result, conflicts with the recreational fishery; and 2) the cost of using excess gear reduces the value of the fishery because excess gear does not result in increased harvest. These proposed funds are needed to purchase small moutns of licensed commercial fishing effort each year. Current policy application would endorse reducing effort by acquisition. We estimate that it will take a $1,000,000 appropriation per year for ten years to complete the process. Small transactions, over a number of years, will have the same effect as a single large transaction; however, the impact on the fishery is reduced.

Facilities Maintenance

Fisheires Division must protect past investmetns in State-owned buildings and other structurs. It is critical that we establish a rigorous maintenance schedule to ensure the safe and productive use of these facilities, and to provide the longest payback period for the life of these facilities. We must establish a rigorous maintenance schedule to ensure the most productive use of these facilities.

The Fisheries Division must maintain a number of facilities to support its programs ranging from six large fish hatcheries to fish ladders to storage buildings. The total capital value of these facilities is in excess of $90 million dollars. Currently, the Division allocates $400,000 for major maintenance projects on these facilities, evenly split between resource management and fish production, and this amount is still well below the normal depreciation allowance of 1-2% of the capital cost of the facilities. All other maintenance must come from the Division's operating budget greatly impairing the Division's ability to implement watershed management and to take advantage of Joint Venture opportuniites. Additionally, many of these fisheries management structures are unsafe and badly in need of repairs. It is critical that additional maintenance monies be made available to maintain these facilities and prevent the expenditure of large amouonts of capital outlay monies to completely rebuild structures.

There are two options to alleviate this management impediment. Option 1 is to contnue to underfund maintenance at their current rate and to request $4-$10 million dollar capital outlay projects every five years to reconstruct structures. This amount will eventually replace all structures over a 40-50 year timeline but will not alleviate safety concerns and leave us legally liable for damages in the interim. Option 2 is to increase the existing facility maintenance budget by $600,000 annually. This will allow the continuous modification and maintenance of existing structures. The requested amoount follows normal business practices for maintenance and should minimize the Department's exposure to legal liability cocnerns. The additional monies for this area will also free up the Division's resources, allowing the Division the budgetary flexibility to implement watershed management and Joint Venture opportunities.

Division Programs

The Fisheries Division pursues its mission and goals through four programs--Recreational Fisheries, Commercial and Native American Fisheries, Fisheries Resources, and Fish Production--guided by Division Support. These programs are defined by the principal decisions and services they produce and are not organizational entities. They have characteristic goals, decisions, and activities. The decisions, services, and essential activities in each program are characterized as "key results". Certain personnel and units in the Division have lead roles in each program. Certain cooperators are also involved in each program.

In formulating this program structure and the Division's organization, the Division has sought to satisfy four broad concepts. First, the Division must be responsive to the public interest, especially in the management of resource use. Thus separate programs focus on the principal users. Most fishery management decisions are based in management districts whose supervisors are charged to assure that the Division involves and is responsive to the public. Second, the Division must have a sound empirical basis for its decisions. Key results in each program include measurement and analysis required to support the major decisions in the various programs. Third, basic ecological principles require management of ecosystems and not just fish species. The management of fishery resources is broadly organized by Great Lakes and inland ecosystems with the focus of each program being on whole water bodies and their watersheds. Fourth, the Division can be most effective in pursuing its mission by entraining the efforts of others. The Division seeks active collaboration with certain agencies and institutions in each program.

The key results sought in each program define the most stable part of the Division's strategy. These key results and their basic rationale are described for each program in the following sections.

Recreational Fisheries Program

Goal

Through the Recreational Fisheries program, the Division seeks to provide diverse public fishing opportunities, maximize the value of recreational fishing, and contribute to public stewardship and understanding of natural resources.

Key Result Areas

- Angler Recruitment and Aquatic Resource Education: Conduct and encourage outreach programs designed to recruit new anglers and foster aquatic resource education.
- Market and Economic Analysis: Analyzing the recreational fishing market to determine and project angler participation, activity, preferences, satisfaction, values derived and economic impact under various fishery management policies.
- Fishing Information and Promotion: Promoting recreational fishing and informing the public of fishing opportunities and of the department's and Division's role in providing these opportunities.
- Public Access: Through appropriate technical, financial assistance and sponsored acquisition/maintenance, secure public access to accommodate fishing.

- Fishing Opportunities Inventory: Maintaining a current inventory of fishing opportunities, including their features.
- Fisheries Management: Determining the kinds of angling which should be provided by each inland lake, stream, and Great Lakes port and directing Division activities in each watershed management unit to maximize their contribution to fishery values.
- Recreational Fishing Regulation: Developing and effecting fishing regulations that best distribute angling benefits among anglers and balance fishing quality with fishing intensity.

Background

Fisheries Division's strategy is to manage the State's extensive aquatic resources to provide diverse fishing opportunities that meet various anglers' preferences.

The Division's main responsibility with respect to recreational fishing is to provide value to anglers. Angling market studies have shown that the values derived by anglers are most strongly affected by:

- size and composition of catch;
- availability of parking and access to the water;
- aesthetic features of the fishing experience such as natural beauty, companionship, solitude, and exercise of skill;
- cost of the fishing trip, especially as determined by travel distance; and
- availability of amenities nears the site.

Information about fishing opportunities is also important to many anglers. Anglers' preferences about fishing opportunities vary considerably. Both angler's preferences and the angling opportunities that are available must shape the services provided in this program. Therefore, the program includes angling market analysis and an inventory of fishing opportunities.

The Division's most important efforts to match anglers' preferences and fishing opportunities take place in the fisheries management units. Management unit staff manage waters to meet preferences of anglers consistent with scientific principles. Management unit priorities are focussed on activities that will contribute most to long-term angling value.

All fisheries have limited productivity. Angling demand is high enough to over-fish many of the State's fisheries and impair their value. Therefore, fishing is limited by regulations and access controls. The Recreational Fisheries Program responds to regulations recommended through the Fishery Resources Program. The Recreational Fisheries Program evaluates the acceptance and consistency of proposed regulations, facilitates their adoption, and communicates the regulations to anglers.

Unlike the Wildlife Conservation Act, the authority for changing fishing regulations rests with the Legislature, with limited powers granted to the Department. This system of decision making is confusing to the public and restricts the Department in carrying out fishery management decisions in a timely manner.

Although fish stocks and fishing regulations are extremely important factors in most fishing experiences, anglers are also concerned about various facilities and services. The Division pursues appropriate public access through sponsored acquisition and maintenance on behalf of anglers. Since these services are best provided by other agencies or by local interests, the Division encourages appropriate development through technical and financial assistance.

Fishing information and promotion by the Division help anglers find the fishing opportunities that best meet their preferences. Information provided by the Division can inform anglers about opportunities of which they were not aware. It can also increase angler certainty about fishing opportunities that they have not personally visited.

Personnel who are principally involved in this program are the staff program specialists and management unit staff. Major cooperators for this program include: Michigan State University Extension Service; DNR Parks and Recreation, Forest Management, Law Enforcement and Wildlife Divisions, License Control Section; U.S. Forest Service, Huron-Clinton Metropolitan Authority; Michigan Travel Bureau, Michigan United Conservation Clubs, and various local governments and organizations.

The State of Michigan is blessed with an abundance of aquatic resources. Through wise management, Fisheries Division provides anglers with a wide variety of excellent angling opportunities. However, participation in fishing has declined in recent years particularly when expressed as the percentage of the total population that purchases licenses. To reverse this decline the Division must support and implement programs designed to recruit new anglers, particularly in urban areas. The Division also needs to promote the general public's understanding of fish, fishing, and fisheries management principles and techniques. This will serve to foster public stewardship toward natural resources and increase acceptance and support for the Division's activities.

Angler Recruitment and Aquatic Resource Education

Conduct and encourage outreach programs designed to recruit new anglers and foster aquatic resource education.

PCA	KRA-Fund	Federal - Non-Federal
	GF	Non Federal

Recreational fishing has long been a favorite pastime of Michigan residents. However, the percentage of Michigan residents over the age of 16 who purchase fishing licenses has declined in recent years. In addition many people who have fished in the past have left the sport. This decline in the general fishing population threatens future funding of aquatic conservation and restoration efforts as well as the future of fishery management programs. Perhaps of greater importance, participation in fishing serves to promote a sense of advocacy and stewardship for clean water and healthy populations of fish and other aquatic animals. Renewed commitments to recruiting young anglers and providing aquatic resource education to the general public are needed.

Available research and education studies regarding angler recruitment suggest five major intervention strategies capable of maintaining interest and involvement in fishing:

1) introductory experiences (threshold events);
2) access to equipment;
3) access to aquatic resources that support fishing;
4) access to a guide or mentor; and
5) continued social support for fishing.

Performance of this key result area entails assisting various partners in conducting:

- Free Fishing Weekend events;

- fishing clinics and derbies;
- summer day camp and playground fishing; and
- aquatic education programs and other similar activities.

Developing and equipping tackle loaner outlets in cooperating state and local government parks and recreation areas provides access to equipment. Provision of access sites is covered under other key result areas of the Recreational Fisheries Program. The two key intervention strategies that are the most important (and unfortunately the most difficult) are providing a mentor and continuing social support for fledgling anglers. Research has shown that these factors are essential for the creation of lifelong, committed anglers. We can no longer depend on parents to provide this support particularly in single parent, urban households. An aquatic education outreach grant program would encourage the development of fishing clubs in schools and other organized youth groups. Such clubs will directly provide long-term mentoring and social support for young anglers.

Ideally, measurement of success of angler recruitment activities would include surveying participants of such programs to determine their future participation in fishing. Market analysis would be useful to estimate the effectiveness of these programs.

However, a simpler method of measuring performance is to tally the number of programs and participants, tackle loaner outlets developed, and number of grants awarded through an aquatic education outreach grant program.

1) Assist cooperators in developing and conducting fishing and aquatic resource education programs.
2) Develop tackle loaner outlets in state and local government parks and recreation areas.Develop and implement an aquatic education outreach program.
4) Establish a program to encourage existing anglers to act as mentors.

Market and Economic Analysis

Analyzing the recreational fishing market to determine and project angler participation, activity, preferences, satisfaction, values derived and economic impact under various fishery management policies.

PCA	KRA-Fund	Federal - Non-Federal
77310	RMK-G&F	Non-Federal

Market and economic analysis of recreational fisheries involves:

1) surveys of licensed anglers and the unlicensed population to obtain data on and perform analyses of angler preferences, fishing activity, satisfaction and expenditures;
2) formulation of computer-based projection models to support planning; and
3) preparation of reports summarizing historical data and identifying potential problems and opportunities for the future.

Performance measures for this analysis should address the numbers of anglers surveyed and their response rate; the statistical reliability of the estimates and the reports produced, and the timeliness of those reports.

Market analysis is relevant to all of the Division's fishery development priorities since it provides data to support planning and fishery evaluation.

It is also relevant to the:

- estimation of the value of fish stocking;
- continuing questions and concerns about the economic impacts of fishery management;
- analysis that helps to clarify the significance of non-angling water uses/angler conflicts;
- evaluation and improvement of sport fishing regulations;
- measurement of angler knowledge and understanding the risks of contaminants in fish; and
- valuation of resource impacts due to fish mortalities and habitat alterations.

The Division does not have a current market and economic analysis of recreational fisheries.

1. Conduct a statewide fishing market analysis to assess changes in use of fisheries and angler values over time (last done in 1980).
2. Re-establish angler survey operation to obtain annual estimates of recreational fishing activity.Reestablish a Surveys and Statistics Unit either within Division or through contract.
4. Review, analyze, and report on existing data.

Fishing Information and Promotion

Promote Michigan's recreational fishing and inform Michigan anglers of the fishing opportunities which best satisfy their preferences.

PCA	KRA-Fund	Federal - Non-Federal
77430	RIP-G&F	Non-Federal
77431	RIP-GFS	Non-Federal
77432	RIP-DOE	Federal

Performance in this area involves:

- publishing angler's guides and maps;
- providing information to the press and the public;
- operating a Master Angler program to maintain records on large fish and recognize anglers who catch them; and
- preparing and distributing current fishing reports.

The Fisheries Information Unit collects data weekly on current fishing conditions statewide, and reports this information to news wire services. Current fishing conditions information is taped on the Division's recorded 24-hour Fishing Hotline. Providing current fishing information through a variety of distribution points also serves to satisfy anglers' expectations for a quality fishing experience. The Division's Information Unit is inventorying and reviewing current "information products" (including publications, brochures, maps). This is particularly relevant to the Division's desire to increase fishing by southern Michigan residents as well as non-residents whose travel expenditures are a major economic factor. These anglers have indicated on surveys that their fishing is strongly affected by the availability of fishing information. Better information can also be expected to improve compliance with sport fishing regulations and has the potential to increase license sales.

The Fisheries Division is generally successful in satisfying public requests for information. However, much of this is accomplished through preparation by professionals of custom answers to individual requests. Thus, it is very expensive. Since the responses are reactive, the Division does little to broaden the opportunities of which anglers are aware. Little promotion is undertaken. The Division's publications are poorly targeted for their intended audience and there is no consistency of format or style.

Educational and promotional fisheries efforts like Michigan's Free Fishing Weekends, and participation in outdoor shows and State Fairs should be encouraged where appropriate and staff resources allow.

1) Establish measure of current activity and effectiveness of the Division in providing fishing information and a method of evaluation.
2) Develop a communication evaluation of Division educational and promotional efforts, including outdoor shows, Free Fishing Weekends, visitor centers, state fairs, etc.
3) Develop angler informational material for various kinds of fishing and management unit maps using standard formats.
4) Design and implement a system for routine distribution of fishing information of current interest.
5) Design and implement system for semi-custom responses to fishing inquiries.
6) Identify what messages or themes that should be conveyed to the public and determine the most cost effective means to communicate these messages.
7) Design and publish special situation publications with emphasis on quality.

Public Access and Local Services

Through appropriate technical and financial assistance, secure public access and local services to accommodate fishing on waters that can sustain public fisheries.

PCA	KRA-Fund	Federal - Non-Federal
77400	RPA-G&F	Non-Federal
77401	RPA-GFS	Non-Federal

The Fisheries Division is not a designated land management unit. Yet the Division does manage land in conjunction with its hatcheries, fisheries stations, administrative facilities and public access sites. This non-designation is a formidable barrier in the Division's land acquisition program. Department policy dictates that all land be assigned to a land-managing Division. Frequently parcels with public fishing access potential are not acquired due to the lack of a designated land management unit willing to assume ownership and maintenance responsibilities.

Public access is essential to the Division's programs and wise resource management. It is imperative for the Division's capability to service the angling public that this acquisition barrier be removed. Resolution of this problem has reached an impasse. Management Team should seek to have a Department Office/Division assigned responsibility for land management responsibilities for fishery access sites.

Current objectives for this area are:

1) prepare and maintain a statewide priority list for acquisition and development that considers all waters;

2) establish a fishing access acquisition and development program based on statewide priorities;
3) encourage the establishment of a land holding section within the Department for non-dedicated land or find alternatives outside of state government;
4) foster the adoption of local regulations on bodies of water where recreational conflicts, habitat damage or safety issues exist;
5) insure acquisitions, development and maintenance of fishing access with federal money specified under the Wallop-Breaux amendment of the Dingell-Johnson Act;
6) incorporate initial site cleanup, surveying and boundary identification, and control as part of the normal land acquisition process and budget;
7) enhance existing and new facilities to accommodate the handicapped according to the Americans with Disabilities Act; and
8) work with Parks and Recreation Division and federal and local units of government to develop appropriate access site rules to ensure that recreational angling interests are protected.

Fishing Opportunities Inventory

Maintain a current inventory of fishing opportunities, including their features.

PCA	KRA-Fund	Federal - Non-Federal
77310	RMK-G&F	Federal

A current inventory of fishing opportunities serves four primary uses.

1) It provides the foundation for planning work in each of the Division's fisheries management units.
2) The information can be provided to anglers to assist them in deciding where and when to fish.
3) Changes in fishing opportunities are an important measure of the Division's performance.
4) Current inventories of fishing activities can be used to provide a baseline of value important for estimating restitution in the event of man-induced calamities or sudden changes in natural conditions.

Performance of this key result entails maintaining a list of waters, fishing quality, and an inventory of access sites, camping opportunities, services, and other features of each water that may be important to anglers.

1. Develop a comprehensive database of water bodies and access sites using information of value to anglers and design a system to obtain and manage this information.

Management Unit Management

Determining the kinds of angling that should be provided by each inland lake, stream, and Great Lakes port, and directing the Division's activities in each watershed management unit to maximize their contribution to fishery values.

PCA	KRA-Fund	Federal - Non-Federal

77340	RMD-G&F	Non-Federal
77341	RDM-GFS	Non-Federal
77342	RDM-DOE	Federal

Performance of this analysis involves developing management unit fishing opportunity plans that designate the fishing opportunities to be managed for each variety of angling. These plans should also establish management priorities for each water body and assess needs and priorities for access acquisition and development. Work in this area is done primarily by management biologists. Considerable coordination with DNR Parks and Recreation Division, other DNR Divisions that administer lands, the U.S. Forest Service and local governments is also necessary.

Performance measurement for this area should include status reports of the current fisheries, management unit plans, and access acquisition and development activities.

Development of management unit fishing opportunity plans is an essential element of the Division's long range strategy for recreational fishery development. It also will contribute to increased public involvement in and Division accountability for some of the Division's more important decisions.

Management unit personnel have considerable knowledge of the waters in their units and field data is also extensive, but there is not at present a complete inventory of fishing opportunities.

1. Develop a format and guidelines for Management unit Fishing Opportunities Plans.
2. Prepare and adopt Management unit Fishing Opportunity Plans for all units.

Recreational Fishing Regulation

Developing and effecting fishing regulations that best distribute angling benefits among anglers and balance fishing quality with fishing intensity.

PCA	KRA-Fund	Federal - Non-Federal
77370	RMK-G&F	Non-Federal

Performance involves:

- evaluation of angler attitudes towards fishing regulations;
- drafting of proposed regulations in consultation with Law Enforcement Division, Natural Resource Commission, Legislature and constituent groups; and
- publication of legal notices and annual angler's guides.

Work is done primarily by management units and the program manager. Performance measurement for fishing regulations should include the changes in activity, catch, and value that result from regulation changes.

Regulations enhance predator populations, protect migratory fish in streams, recognize threatened and endangered species, encourage angling for under utilized species and promote ethical angling. This is accomplished through size limits, possession limits, seasons and equipment restrictions.

Over the past two decades competitive tournament fishing has increased dramatically. Tournament angling offers fisheries managers' opportunities for measuring fishery quality, stock assessment and value.

1. Draft, secure support for, and encourage the enactment of the Aquatic Species Conservation Act.
2. Develop guidelines and rationale for sport fishing regulations.
3. Develop an approach to encourage conservation in angling.
4. Investigate ways to use tournament catch data to measure fishery quality, stock health, and angler preferences.

Fisheries Resources Program

Goal

Through the Fisheries Resources Program, the Division seeks to protect and maintain healthy aquatic ecosystems and fish communities, and to rehabilitate those now degraded.

Key Result Areas

- Resource Inventory: For Michigan waters, maintain a current inventory of selected stocks of fish and other aquatic species and aquatic habitats. Keep a continuous record of numbers of fish stocked. Estimate fish extracted from selected waters. Identify fishery opportunities and problems and record results of management actions.
- Management Facilities: Develop and maintain facilities and equipment needed for fisheries management and research.
- Management Operations, Experiments and Evaluations: Implement and evaluate prescribed management actions. Develop, test, and improve decision models for the management of fish communities and habitats.
- Management Planning: Develop goals and management plans for protecting and rehabilitating fish communities and maximizing fishing values in Michigan's public waters.
- Resource Protection, Rehabilitation and Mitigation: In cooperation with other Divisions, agencies and organizations, work to protect and rehabilitate aquatic resources and habitats.

Background

The Great Lakes and inland waters are of substantial importance to quality of life and the economy of Michigan. About one third of Michigan's recreational fishing and all its commercial fishing take place on the Great Lakes and tributary systems. Michigan's inland waters support approximately two-thirds of the State's recreational fishing.

Management of fisheries resources requires collection and organization of information about the resources to be managed. Inventory of fish communities and habitats provides the basis for assessments of the status and trends of aquatic resources and identification of problems and opportunities in individual waters.

Management plans are based on inventory of the fish community, habitat, and history of the specific water body as well as on experience across the population of waters in the State. That experience is distilled in decision models and tested through management experiments. Both

model development and management experiments are based on comparisons across waters and over time. Inventory frequency and scope are determined by the data required for both management planning and research.

Fishery management follows a cycle of developing plans, implementing actions, and evaluating results. The management goals which anchor this cycle are developed in written fishery management plans. The Division seeks input from other agencies and the public in developing fishery goals and plans. For the Great Lakes, governmental structures have evolved to manage many aspects of Great Lakes ecosystems in two countries, nine states or provinces, and innumerable localities. Michigan's interests in the Great Lakes are best served by vigorous participation in these structures. On inland waters, watershed management requires coordination with many agencies and governmental units to plan and implement effective measures. To enable effective institutional learning, management plans include evaluation of management actions.

A variety of management actions may be used in fishery management but the most common in Michigan include fish stocking, special fishing regulations, facilities for managing fish migrations, and manipulation of fish species' balance through netting or application of piscicide. Fish stocking is implemented through the Division's Fish Production Program. Fishing regulations are implemented through the Division's Recreational Fisheries Program. Most other management operations are carried out within the Fisheries Resources Program.

Fisheries management requires operation of facilities such as weirs, barriers, fish ladders, vessels and buildings. Fisheries management also requires use of many types of equipment. These facilities and equipment require maintenance efforts, which are included in this program.

Protection and rehabilitation efforts led by Fisheries Division are largely responsible for the magnitude and value of current fisheries. Accumulated effects of overfishing, invasion by sea lamprey and other non-indigenous fishes, pollution and habitat destruction collapsed most Great Lakes fish stocks by the 1950s. Inland fish populations have suffered from construction of dams, degraded water quality, and loss of habitat. Rehabilitation has advanced toward re-establishing many major fish stocks and has provided fish to support large, valuable fisheries. However, Great Lakes fisheries will not be fully rehabilitated until well into the next century. It is estimated that without management of problems and opportunities which arise in inland waters, they would support only 40 percent of present fishing.

Fisheries Division works with other agencies and the public to protect or rehabilitate aquatic habitats so that fishery goals can be met. The Fisheries Resources Program provides technical and financial assistance to citizens' groups and local governments who wish to contribute to management of fishery habitats. These activities may be initiated by citizens but must be consistent with the Division's management plans.

The Fisheries Resources Program is carried out by staff program specialists; field biologists and technicians in the thirteen districts state-wide; and research and evaluation personnel at the Marquette, Alpena, Charlevoix, Mt. Clemens, Hunt Creek, and Ann Arbor fisheries stations. Program direction on each of the Great Lakes is developed and coordinated through an internal committee and a citizen advisory committee for each of the Great Lakes. Major collaborators for the Fisheries Resources Program include anglers and other citizens involved in various projects; the Great Lakes Fishery Commission, the U.S. Fish and Wildlife Service, the fishery agencies of the other Great Lakes jurisdictions through the Great Lakes Fishery Commission's lake committees; the U.S. Forest Service and Natural Resource Conservation Service; DEQ Land and Water Management and Surface Water Quality Divisions and Office of the Great Lakes, and faculty and graduate students of Michigan universities.

Resource Inventory

For Michigan waters, maintain a current inventory of selected stocks of fish and other aquatic species and aquatic habitats. Keep a continuous record of numbers of fish stocked. Estimate fish extracted from selected waters. Identify fishery opportunities and problems and record results of management actions.

PCA	KRA-Fund	Federal - Non-Federal
77530	MRI-G&F	Non-Federal
77531	MRI-GFS	Non-Federal
77532	MRI-PRI	Non-Federal
77533	MRI-NOA	Federal
77534	MRI-SFR	Federal
77535	MRI-MIX	Non-Federal/Federal

An inventory and associated analysis of fishery and other aquatic resources are the initial requirements for effective determination of management practices. An inventory allows the development of standards for assessing effects of management actions, including stocking hatchery fish, habitat improvements, changes in fishing regulations, fish community manipulations, and environmental effects.

Performance involves regular planning of surveys, field sampling of populations and habitats, analysis of data, identification and evaluation of problems and opportunities, and preparation of technical reports. Work is done primarily by management and research biologists and technicians, in cooperation with staff specialists. Some work is done cooperatively with other departments (e.g., Department of Environmental Quality) and agencies (e.g., U.S. Forest Service).

1. Inventory and develop a database of fish stocks in Michigan waters of the Great Lakes and inland lakes and streams.
    - Plan inventory process.
    - Develop and maintain software and database for statewide inventory.
    - Survey waters under resources inventory process and management evaluations (or SWQD Procedure 51). Incorporate observations of other aquatic species during scheduled fish surveys.
    - Define movement patterns and survival rates for major fish stocks.
    - Define discrete fish stocks, geographically and biologically.
    - Determine age and growth for major fish stocks.
    - Determine natural reproduction rates for major fish stocks.
    - Obtain annual forage biomass estimates of the Great Lakes in cooperation with other agencies.
    - Prepare report following each major survey.
    - Determine diet of major fish stocks.
2. Develop a directory of fish stocked in Michigan waters including tribal, federal, and other cooperative agencies.
    - Continue development and maintenance of software and databases for a continuous record of fish stocked in Michigan waters.

- Develop a directory of fish stocked in Michigan waters including tribal, federal, and other cooperative agencies.
- Continue development and maintenance of the Fish Stocking Information System (FSIS).

3. Estimate fish extraction by species.
   - Develop and maintain software and database of fish removed from Michigan waters.
   - Maintain a reliable continuous record of total extraction by species including sport, charter, commercial (State and Tribal), weir, water intakes, subsistence, survey catches, and commercial by-catch from the Great Lakes and anadromous fisheries annually.
   - Maintain a reliable record of total extraction by species for selected inland waters.
4. Inventory and develop a database of fisheries habitat in Michigan waters.
   - Plan habitat inventory process.
   - Conduct habitat inventories.
   - Develop and maintain software and database for statewide habitat inventory.

Management of Facilities

Develop and maintain facilities and equipment needed for fisheries management and research.

Management of certain fisheries requires facilities such as weirs, barriers, and fish ladders. These facilities, plus buildings, vessels, and equipment, require maintenance.

Performance involves maintaining weirs, ladders, barriers, dams, district and research buildings, vessels, and equipment. This work is done or overseen by district, management, and research biologists, and technicians.

Management Operations, Experiments and Evaluations

Implement and evaluate prescribed management actions. Develop, test, and improve decision models for the management of fish communities and habitats.

PCA	KRA-Fund	Federal - Non-Federal
77630	MMO-G&F	Non-Federal
77631	MMO-GFS	Non-Federal
77632	MMO-PRI	Non-Federal
77633	MMO-NOA	Federal
77634	MMO-SFR	Federal
77635	MMOMIX	Non-Federal/Federal

Sound management planning and actions require an understanding of fish population and community dynamics, and effects of alternative management actions. Such understanding and predictive capabilities are developed through applied research and evaluation of management actions.

Performance involves operating weirs, ladders, barriers, and dams; conducting field and laboratory projects; developing computer models; reviewing published literature; and communicating results in Federal Aid reports, Division research and technical reports, scientific

journals, and popular articles. This work is done by research and management biologists and technicians.

1. Implement prescribed management actions.
   - Operate and maintain weirs.
   - Operate and maintain Division-owned dams.
2. Evaluate stocking.
   - Evaluate stocking success to determine if stocking is to be continued.
   - Improve stocking success by determining stocking density, size, time, and techniques that provide best results for stocking locations, considering rearing costs and return.
   - Determine stocking trade-off in the Great Lakes using forage base projections and considering fish community goals.
   - Evaluate strain performance and attempt to match genetics of stocked fish to receiving waters.
   - Determine methods to evaluate stocking success.
   - Review and revise fish stocking guidelines.
3. Evaluate sport fishing regulations.
   - Maintain Director's Orders to reflect fishing regulations.
   - Evaluate effectiveness of various regulations in accomplishing desired fish management goals.
   - Calculate target allowable catches for sport fisheries and coordinate with commercial fisheries for development of TACs.
4. Evaluate fish community manipulations.
   - Determine community effects of manual removals.
   - Determine advantages and disadvantages of chemical treatments.
   - Determine community effects of predator enhancement.
   - Determine community effects of fish ladders, lamprey weirs, fish barriers, and dams.
5. Evaluate habitat alterations.
   - Test and quantify effects of potential habitat improvements on aquatic ecosystems.
   - Test and quantify effects of habitat manipulations as a result of human development and activities on aquatic ecosystems.
6. Develop decision-support tools. Develop, test, and improve models to predict likely outcomes from management choices that reflect current understandings and uncertainties about the history, dynamics, structure and management of fish communities and fisheries.
   - Develop and test model to predict effects of regulation changes.
   - Develop and test models to predict the influence of aquatic exotic species on fish communities.
   - Develop and test models to predict predator-prey relationships and competitive interactions resulting from management actions.
   - Develop, test, and improve models to assist in re-negotiating the 1985 Consent Decree.
   - Develop and test models to predict temporal and spatial distributions of major fish species in the Great Lakes.
   - Develop and test fish community and habitat models to aid in the classification and management of inland lakes and streams.

Management Planning

Develop goals and management plans for protecting and rehabilitating fish communities and maximizing fishing values in Michigan's public waters.

PCA	KRA-Fund	Federal - Non-Federal
77730	MMP-G&F	Non-Federal
77731	MMP-GFS	Non-Federal
77732	MMP-PRI	Non-Federal
77733	MMP-NOA	Federal
77734	MMP-SFR	Federal
77735	MMP-MIX	Non-Federal/Federal

The planning process begins with an assessment of the condition and potential of specific fish communities and fisheries, with suggestions for protection, rehabilitation, enhancement, and public involvement. Then goals are established and plans for action and evaluation are developed. Assessments and management plans provide important vehicles for public involvement in the management process and collaboration with other fishery jurisdictions.

Performance involves timely development of appropriate plans for major waters. Major inland waters have assessments or status reports, management plans, and prescriptions prepared and reviewed by fisheries biologists and Division specialists. Great Lakes plans are developed by internal lake committees, which are composed of district, management, and research biologists.

1. Plan management in accordance with Division goals and policies.
   - Review and revise existing policies.
   - Develop new policies as needed.
2. Develop fisheries management plans for waters requiring management actions.
   - Develop management plans and prescriptions for inland waters.
   - Prepare assessment reports for rivers.
   - Develop management plans for Michigan waters of the Great Lakes.
3. Participate in the development of fisheries management plans for inter-jurisdictional waters.
   - Develop and review fisheries management plans for inland waters.
   - Develop basin-wide fisheries management plans for each of the Great Lakes in cooperation with other agencies.
   - Participate in the development and review of other basin-wide plans affecting fisheries management.

Resource Protection, Rehabilitation, and Mitigation

In cooperation with other Divisions, agencies and organizations, work to protect and rehabilitate aquatic resources and habitats.

PCA	KRA-Fund	Federal - Non-Federal
77830	MRP-G&F	Non-Federal

77831	MRP-GFS	Non-Federal
77832	MRP-PRI	Non-Federal
77833	MRP-NOA	Federal
77834	MRP-SFR	Federal
77835	MRP-MIX	Non-Federal/Federal

Maintenance and rehabilitation of desirable aquatic resources and habitats are essential to continued management of healthy fish communities and productive fisheries. Responsibility for protection of aquatic resources is shared with other departments, agencies, and the public.

Performance involves participating in Federal Energy Regulatory Commission (FERC) license review of hydropower facilities. Fisheries Division plays the lead role in carrying out the Department's responsibilities to define data needed to evaluate effects of hydroelectric facilities, recommend needed mitigation, recommend license conditions for each project, and ensure that the Department's role in permit review provides adequate protection of natural resources.

Performance also involves providing leadership in development of rehabilitation projects, assisting in programs to protect threatened and endangered species, assisting in monitoring exotic species and contaminant levels in fish, and participating in partnerships with local governments, agencies, and citizen groups. This work is done by all Division personnel.

1. Determine the effects of, and seek mitigation for hydrologic manipulations.
   - Participate in FERC license review.
   - Provide leadership and participate in review of (non-FERC) projects involving water intake, discharge, or impoundment.
   - Require best available technology to prevent fish mortality and mitigation of residual mortalities for major intake use facilities.
2. Protect and rehabilitate aquatic ecosystems.
   - Provide leadership in the development of Division and Department goals, objectives and guidelines for aquatic habitat protection and rehabilitation.
   - Maintain a surveillance of adverse use practices on streams and develop and implement strategies for minimizing and, if possible, eliminating derogatory use practices.
   - Participate in the review of permit applications for projects affecting habitat in cooperation with other Divisions and Departments.
   - Improve habitat including participation in partnerships with other agencies and citizens groups.
   - Implement ecosystem rehabilitation projects.
3. Provide leadership in the development of programs to protect or rehabilitate endangered and threatened species.
   - Develop and implement rehabilitation programs for selected species.
4. Monitor and evaluate effects of exotic species on aquatic communities.
   - Maintain surveillance of undesirable exotic species introductions and develop strategies to mitigate or minimize the negative effects of exotic species.
   - Identify and prioritize potential problem areas in Michigan waters and initiate actions to prevent future entry and spread of undesirable species.
5. Minimize contaminant loads in fish and the potential risk to public health.
   - Assist DEQ's SWQD in maintaining a fish contamination sampling program.

- Provide information to the public regarding contaminants in fish.
- Estimate value lost as a result of fish contamination and seek mitigation for the damage from the parties responsible.
- Support research necessary to reduce the uncertainty in health effects from eating Michigan fish.

6. Develop and participate in coordinated multi-agency fisheries investigations to monitor fish health and determine causes of fish mortality. Minimize loss of fish to disease and other factors.
   - Participate in fish mortality investigations.
7. Provide support for citizens' groups and local governments for fisheries enhancement projects.
   - Help secure project funding.
   - Provide technical information in design and implementation of projects.

Commercial and Native American Fisheries Program

Goal

The Commercial and Native American Fisheries program seeks to permit and encourage efficient and stable commercial fisheries which accommodate Native American fishing rights and do not conflict with recreational fisheries.

Key Result Areas

- Commercial Harvest Allocation: Execute monitoring programs, maintain data bases, and perform analyses necessary to manage and evaluate the partitioning of allowable fishing between Native American tribes and the State. Manage the transfer, sale, and status of State-sanctioned fishing operations.
- Commercial Fishery Administration: Through regulations, licenses, fish catch and purchase reports, and inspections, assure that State-allocated commercial fishing is not exceeded and that the user-pay principle is satisfied.
- Commercial Fishery Development: Promote adoption and development of more effective enterprise management, processing, and fishing practices in the commercial and tribal fisheries.

Background

Commercial and Native American Fisheries program decisions are based on principles of fisheries economics, statutory and administrative law, and court decisions about Native American fishing.

Overfishing of commercial fish stocks is a problem throughout the world. This phenomenon has been labeled a "tragedy of the commons" because it results from common use of fish stocks by multiple, competing fishers.

Michigan began to limit the number of commercial fishing enterprises and their fishing effort or harvest in 1968. These limits initially removed many commercial fishers from the fishery. Commercial fishing regulations were also changed to eliminate large mesh gill nets and thereby reduce commercial harvest of fish preferred by recreational anglers. Although conversion from

gill nets to impoundment nets did not decrease fishing profits, it increased necessary capital investment. A number of Native Americans were among those forced out of the fishery by limited entry or gear conversion. Subsequent adjudication established that at least some Michigan Native American tribes have fishing rights that must be accommodated within the fishery.

Fisheries Division and commercial fishers have often been in conflict with regard to present fishery regulations and administrative decisions about individual operations. To correct this situation, Michigan needs to view commercial fishing as an economic activity using State property, similar to timber harvest on State lands. Economic efficiency is realized most readily when rights to use the fishery are fully marketable. However, the State is owner and manager of the fishery, and as such must retain the right to dissolve these rights through first purchase.

The public's interests must be ensured by limiting fishing and enforcing compliance through a comprehensive system that includes reports on fishing activity and harvest, catch inspections, biological monitoring, and data analysis. Costs of managing commercial fishing should be paid by the commercial fishing industry.

Commercial fisheries benefit the people of Michigan only if they generate additional employment and profit beyond that which would accrue without the fisheries. Commercial fishing beyond optimal rates drains Michigan's economy and reduces the value of fishing enterprises. Besides the health of commercial fish stocks, the success of a commercial fishing operation is largely dependent on owner skill. The considerable variation in productivity among Michigan's fishing enterprises implies that there is a need to improve fishing and business skills in the industry.

The Commercial and Native American Fisheries Program is carried out largely by the staff program specialist with advice from Great Lakes basin management and assessment personnel. Major cooperators for this program are Michigan Native American tribes, the DNR Law Enforcement Division, Michigan State University Sea Grant Extension agents, and researchers from state academic institutions.

Commercial Harvest Allocation

Execute monitoring programs, maintain data bases, and perform analyses necessary to manage and evaluate the partitioning of allowable fishing between Native American tribes and the State. Manage the transfer, sale, and status of State-sanctioned fishing operations.

PCA	KRA-Fund	Federal – Non-Federal
76280	CHA-GEN	Non-Federal
76281	CHA-G&F	Non-Federal

1. Establish stock-assessment monitoring standards and pursue long-term partitioning of commercial fishing opportunities among tribal and State-licensed fisheries in treaty areas and resolve the legal issues involved.
2. Compensate State-licensed fishers displaced to accommodate tribal fishing rights.
3. Investigate possible sources of funding to purchase State-licensed fishing effort, as needed, to accommodate recreational fishing.
4. Obtain amendment and/or recodification of current laws and rules to achieve program objectives.

Commercial Fishery Administration

Assure through regulations, licenses, fish catch and purchase reports, and inspections, that State commercial fishing allocations are not excessive and that the user-pay principle is satisfied.

PCA	KRA-Fund	Federal – Non-Federal
76310	CFA-GEN	Non-Federal
76311	CFA-G&F	Non-Federal

1. Develop a commercial fishery administration system that automatically integrates license issuance, catch reports, purchase reports, commercial fishing fees, salmon harvest, research fishing contracts, bait fishing, charter fishing, and fish breeders.
2. Develop policies and procedures to insure consistent handling of commonly recurring commercial and tribal fishing issues and to implement Great Lakes management plans.

Commercial Fishery Development

Promote the adoption and development of more effective enterprise management, processing, fishing practices and market development in the State-licensed commercial and tribal fisheries.

PCA	KRA-Fund	Federal – Non-Federal
76360	CFD-GEN	Non-Federal
76361	CFD-G&F	Non-Federal

1. Assist the tribes in conversion from gill nets to impoundment gear in areas where lake trout and other non-target species mortalities exceed target values.
2. Encourage State-licensed and tribal commercial fishers to adopt fishing and processing practices that maximize the value of their fish harvest. Establish priorities for fishery development and create a framework for cooperative work between the commercial fishing industry and people from other agencies.
3. Clearly document and promote the scientific basis for commercial fisheries management. Target audiences include recreational anglers, the fish consuming public, and commercial fishers.

Fish Production Program

Goal

The Fish Production program goal is to hatch, rear, and transport fish required for management of both Great Lakes and inland fisheries.

Key Result Areas

- Hatchery Facilities: Develop and maintain hatchery facilities which are environmentally neutral and can reliably produce at low cost the fish needed for fishery management;

- Stock Acquisition: Maintain genetically diverse wild or captive broodstock for the species and strains of fish needed for fishery management;
- Fish Rearing: Efficiently rear fish in the varieties, sizes, and numbers which best meet fishery management needs within hatchery and rearing pond capacities;
- Fish Health and Quality Assurance: Assure that fish produced and stocked are free of debilitating and lethal diseases, in good condition, and do not show symptoms of chronic stress;
- Fish Performance Evaluation: Tag or mark a portion of fish produced to permit evaluation of fish performance and contribution towards meeting fishery management objectives;
- Fish Distribution: Stock and transfer fish according to fishery management plans and priorities in the manner and times which will produce optimal results at the lowest possible cost.

Background

Fish stocking is one of the principal tools used in fisheries management. Although stocking does not substantially increase the productivity of a water body, it can channel more of that productivity into desirable forms than would otherwise occur. Stocking is also used to substitute for natural reproduction where habitat loss or other causes have caused reproduction to fail. Such mitigation stocking is a temporary solution and should not be considered a replacement for rehabilitation of wild stocks and their critical habitats. Approximately one-third of all recreational fishing in Michigan depends on stocked fish, including most of the Great Lakes trout and salmon fishery.

The Fisheries Division operates six fish hatcheries with production capacity of nearly 750,000 pounds. These are: Wolf Lake, Harrietta, Platte River, Oden, Thompson, and Marquette. Thompson, Harrietta, Marquette and Wolf Lake have been rebuilt within the last 20 years. Oden and Platte are scheduled for renovation in 1999-2001 and improvements to effluent treatment and information centers are being designed for other stations. These facilities are designed for high density (intensive) rearing and are heavily dependent on reliable facility operation. The Division also operates a large system of extensive rearing ponds for the culture of coolwater and warmwater fish, including walleyes, pike, muskies, sunfish, and bass. These species are sustained on natural foods. Pond design strongly affects productivity and costs. Lake sturgeon are cultured at Wolf Lake Hatchery in indoor tanks.

Selection of appropriate spawning stock is the essential beginning of fish production. The Division endeavors to match species and strains of fish to the waters in which the fish will be stocked. Parent (broodstock) management and breeding must be shaped to avoid loss of valuable genetic diversity through unintended selection.

Efficient fish rearing may be achieved by careful control of fish inventories, feeding, and water supplies within the capacities of the rearing facilities.

Healthy fish perform substantially better after release than fish which are diseased or stressed. When fish are concentrated into small volumes of water, special efforts are required to prevent debilitating stress or epidemic disease. Preventive measures, monitoring, diagnosis, and treatment are all-important elements of health and quality assurance.

The achievements of Fish Production are ultimately measured in terms of whether anticipated benefits to ecosystem health and/or quality and quantity of fish harvested are realized. One example of an ecosystem benefit from fish stocking was the control of overabundant alewives by stocking of salmon in the Great Lakes. The salmon-stocking program also produced

fisheries valued at upwards of one billion dollars in tourist revenue to Michigan annually. Thus, means of measuring and evaluating the contributions of hatchery production are needed. Fish marking is an important tool for distinguishing stocked fish from wild fish and for distinguishing among groups of stocked fish. Hence, marking of stocked fish should be a routine part of the Fish Production Program.

Most fish produced in Michigan's hatcheries and rearing ponds are stocked in waters remote from the rearing unit. Stocking must be accomplished within tight time constraints. Stocking can be very stressful to fish. Thus, fish distribution to the stocking sites is a critical element of the Fish Production Program.

Hatchery and management personnel, the fish health and quality laboratory, and the fish marking and transport unit are responsible for this program. Hatchery personnel are principally responsible for fish production in the hatcheries while management personnel are primarily responsible for fish production in rearing ponds. Assistance from management personnel to hatcheries and from hatchery personnel to management units is required during high workload seasons. Major cooperators for the fish production program are the Great Lakes Fish Disease Control Committee, the U. S. Fish and Wildlife Service fish culture laboratories and hatcheries, Michigan State University Partnership for Ecosystem Research and Management (MSU PERM), the Michigan State University School of Veterinary Science, and the agencies of other states with which the Division exchanges fish and eggs.

Hatchery Facilities

Develop and maintain fish production facilities which can reliably produce at low cost the fish needed for fishery management.

PCA	KRA-Fund	Federal – Non-Federal
76780	FHM-SFR	Federal
76781	FHM-G&F	Non-Federal
76783	FHM-MIX	Non-Federal/Federal

Performance of this key result involves the upgrading and maintenance of Michigan's six production facilities, which are valued at $60 million (in Year 2000 dollars). Most of these facilities have become highly technical and mechanical. They must be maintained in top working order and be protected against failure of water and oxygen supplies through reliable backup systems. They also must be environmentally responsible and comply with increasingly restrictive environmental standards.

1. Operate and maintain existing facilities according to manufacturer's specifications and/or recommendations and safety requirements.
    - Each facility manager will complete an Annual Work Plan outlining the maintenance schedule for the coming year.
    - Each year as first priority after fixed costs are met, allocate 1% of the six facilitys' total replacement cost for scheduled maintenance. Estimated cost: Using Year 2000 dollar value of $60 million = $600,000 in FY2001.
    - Provide 7 days per week, 24 hour emergency coverage of facilities by hatchery personnel.
    - Staff maintenance positions according to current staffing plan for all facilities.

2. By 2001, complete the reconstruction of Oden Hatchery as a production and broodstock facility.
3. By 2003, reconstruct Platte Hatchery's water supply and outdoor raceways to improve efficiency, rearing environment, and effluent management.
4. Complete capital improvements at Thompson Hatchery.(WL and HA are competed as of 12-27-99).
5. Build coolwater production facilities at Wolf Lake and Thompson.
   - By FY2001, begin construction of coolwater hatchery building, including facilities for intensive culture of lake sturgeon.
   - For FY2002, build rearing ponds at Wolf Lake and rearing ponds at Thompson.
6. Complete information centers for each hatchery by end of FY2002.
7. Hatchery managers will develop Amortization Plans for new/rebuilt facilities.
8. Continue evaluation of evolving technology related to recirculation for possible adoption at Oden, Platte and Thompson.
9. By FY08, renovate Thompson Hatchery to include the latest technology in water conservation and effluent management.
10 Improve effluent quality of combined facility discharges by 50% by year 2015.
11 Reduce energy use of all facilities by 20% by 2010.

Stock acquisition and broodstock management

Maintain genetically diverse wild or captive broodstocks for the species and strains of fish needed for fishery management.

PCA	KRA-Fund	Federal – Non-Federal
76810	FSM-SFR	Federal
76811	FSM-G&F	Non-Federal
76813	FSM-MIX	Non-Federal/Federal

Eggs from all anadromous, warmwater, and coolwater fish are obtained from wild naturally spawning fish stocks. Eggs from non-migratory salmonids are obtained from captive broodstocks.

In 1983, Fisheries Division discontinued maintaining captive broodstock for rainbow and brown trout. Specific pathogen-free eggs of these species were instead obtained from state and federal hatcheries on a cooperative basis. This wide variety of sources provided eggs of less than desired quality. Some of these strains have resulted in less than satisfactory performance in the fishery. Acting on recommendations from the Broodstock Committee, three strains of brown trout are again being held at Oden Hatchery. There are plans to add at least one strain of rainbow trout after reconstruction. Brook and lake trout broodstocks are maintained at Marquette. There is a need to periodically infuse these captive broodstocks with genes from the wild. Salmon and rainbow trout eggs are taken from feral stocks at egg-taking stations located on several of Michigan's Great Lakes tributaries. Spawn collections from these egg-taking stations must be designed such that genetic diversity of the broodstocks is preserved.

1. Acquire and maintain broodstock strains and species of fish as requested by management.
2. Assist Management in obtaining strains and species (such as sturgeon, muskies, coaster brook trout) for future broodstock development.
3. With assistance from the Michigan State University PERM Unit, design and implement genetic management plans for broodstock egg collections.
4. In FY2000, review char broodstock needs and plan char broodstock facilities accordingly.
5. In conjunction with the Oden Capitol Outlay Project, by fall of 2001, build an isolation facility and implement a wild stock isolation and disease certification process for regular replacement of captive broodstock and additions of new stocks from the wild.
6. With advice of the MSU PERM geneticist , the Broodstock Committee and Hatchery Operations Manager will produce a captive broodstock genetics management plan that will encompass methods of obtaining and replacing strains and species from the wild. The plan will identify disease certification and quarantine/isolation processes and facilities to be used.

Fish Rearing

Efficiently rear healthy, high quality fish in the varieties, sizes, and numbers called for in fish stocking targets within hatchery and rearing pond capacities.

PCA	KRA-Fund	Federal – Non-Federal
76840	FHR-SFR	Federal
76841	FHR-G&F	Non-Federal
76843	FHR-MIX	Non-Federal/Federal

All salmonid species and hybrid musky are reared intensively in fish hatcheries on formulated diets. These fish are reared by hatchery personnel using standard fish cultural guidelines.

Most walleye, pike, musky, sunfish, and bass are reared in ponds where they feed on natural foods. Lake sturgeon are reared in hatchery tanks on live and frozen food.

For most non-salmonid species, this key result requires efficient operation of a statewide network of outlying rearing ponds. Management unit personnel using established guidelines operate most of these ponds.

1. Rear healthy, high quality fish in the varieties, sizes, and numbers called for in fish stocking targets within hatchery and rearing pond capacities.
   - Continue experimentation with lake sturgeon fed formulated diets.
   - Staff cultural positions according to current staffing plan at all facilities.
2. Each December, review annual and 6-year fish stocking targets.
   - Assign to Basin Teams and advisory committees review of inland and Great Lakes stocking plans and finalization of 6-year targets and annual updates.
   - The statewide walleye evaluation committee will annually review research and development programs, in-service training opportunities and guidelines, walleye culture methods, and statewide rearing guidelines for extensive culture.
3. Make rearing assignments every year that balance stocking targets with hatchery capacity and provide fish of the type, size, quality, and number requested.

- Continue to evaluate low-cost options for manipulating rearing environment (temperature, recycle, diet) especially for early life stages, to increase productivity and meet target sizes and stocking windows.

4. Maintain broodstock and conduct egg collections.
5. Conduct fish culture research and experiments to improve post release performance and rearing efficiency.
6. Evaluate centralized walleye rearing using lined ponds at Wolf Lake and Thompson hatcheries.
7. Continue evaluation of new low phosphorus diets.

Fish Health and Quality Control

Produce and stock fish that are free of debilitating and lethal diseases, of good quality, and do not show symptoms of chronic stress.

PCA	KRA-Fund	Federal – Non-Federal
76870	FHQ-SFR	Federal
76871	FHQ-G&F	Non-Federal
76873	FHQ-MIX	Non-Federal/Federal

The Fish Health Laboratory provides health services through: 1) diagnostic services to all state hatcheries as needed; 2) annual fish health inspections on all salmonid production lots and all broodstocks, including the anadromous salmonid species during spawning; 3) investigating fish mortalities in natural bodies of water; 4) some diagnostic service to private aquaculturists when it could impact on public trust waters; 5) training in fish health for hatchery personnel and other interested persons; and 6) studies of problems with fish health and survival concerning hatcheries and/or natural waters.

The Fish Health Laboratory maintains the Fish Quality Control Program. Fish quality data collected under this program at the hatcheries should be followed up with field evaluations of the same criteria where problems of post-stocking survival are suspected. This information is used to evaluate the effects of hatchery operations and/or strain selections, diets, etc. on performance in the hatchery and after release.

1. Maintain diagnostic capabilities to detect and control pathogens at all state production and egg taking stations.
   - Continue to provide field ELISA supplies needed for bacterial kidney disease control strategy.
   - Continue to fulfill obligations to Great Lakes Fish Disease Control Committee Model Program, maintaining inspections of state facilities, training selected personnel in disease diagnosis, and screening the transfer of fish to protect state facilities and waters from introduction of reportable and emergency pathogens.
   - For the near future, continue to use federal laboratories and staff for virus detection in tissue samples collected by the Fish Health Laboratory.
   - Explore other options for disease diagnosis and virus detection laboratory work; in particular, investigate the possibility of a cooperative arrangement with the MSU School of Veterinary Medicine.

- Require fish health certification of private sector hatcheries when fish are to be stocked in public waters. Work with Department of Agriculture, MSU PERM Unit, and MSU School of Veterinary Medicine to establish protocols for private hatchery certification and health inspection that would be consistent with the Great Lakes Fishery Commission Model Disease Program.
- Continue investigations on the distribution of diseases in wild fish populations.

2. Maintain a statewide quality control and monitoring program for Fishery Division production.
3. Continue the Utah Fish Health/Condition Assessment Procedure at all stations for all lots of intensively cultured fish, including those in pens and other cooperating facilities.
   - Continue training of selected field and production personnel in the procedure.
4. The Fish Quality Laboratory and with collaboration with Division research personnel, PERM units, and others, conduct research into fish health and product quality, both in production fish and in field.
   - Continue to meet demands for Early Mortality syndrome research and Bacterial Kidney Disease monitoring in production and feral stocks at the Fish Quality Laboratory.
   - Fish Quality Laboratory will work with basin teams, management units, and Research Section to define standards of "quality" stockings for chinook salmon, steelhead trout, brown trout, and coho salmon for Great Lakes waters.
   - Fish Quality Laboratory will work with the Trout Committee and research section to define ingredients of quality stockings of brown trout, rainbow trout, brook trout, and splake in inland waters.
   - Replace vacant Quality Control Specialist with a research biologist position that would coordinate and conduct research, both on station and in field trials.
5. Support the reregistration of therapeutics needed to control diseases in the hatchery system.
   - Continue joint state-federal efforts to secure registration of needed therapeutic chemicals.

Performance Evaluations of Stocked Fish

Tag or mark a portion of fish produced to permit evaluation of fish performance and their contribution to fisheries of the Great Lakes region.

PCA	KRA-Fund	Federal – Non-Federal
76900	FMK-SFR	Federal
76901	FMK-G&F	Non-Federal
76903	FMK-MIX	Non-Federal/Federal

Ultimately, the performance of the Fish Production Section must be measured in terms of whether stocked fish meet ecosystem and harvest objectives set by Resource Management Program. The marking and tagging of hatchery fish allows the evaluation of their effectiveness. Marking also permits estimation of the relative contribution of hatchery and wild fish to the State's fisheries. It is imperative that the Fisheries Division evaluates existing stocking and husbandry practices. Innovations should be tested (adaptive management). Evaluations are impossible, however, without effective and reliable marking.

This key result area requires that a continuing commitment be made to the evaluation of the effects and desirability of hatchery fish in natural waters.

1. Provide the capability to mark and tag fish at production stations.
    - Continue to purchase and maintain equipment that can be used at any station, sufficient to microwire tag at least 1.5 million fish per year.
    - Continue to hire temporary tagging crews.
    - Continue to assist in handling the fish during fish tagging (quality control will be provided by management/research).
    - Continue to mark all production lots as requested.
    - Continue to maintain oxytetracycline-marking capability and to administer oxytetracycline as requested.
    - Design and build better facilities for mass-marking walleye fry with oxytetracycline and other emerging technologies at production facilities.
    - By Year 2010, be capable of marking all hatchery fish stocked in the wild.
2. Conduct on-station fish culture research and experiments to improve post-release performance and rearing efficiency.
3. With basin teams develop standards for making field, post-stocking performance the principal measure of the Fish Production Section.
4. Evaluate post-release contributions of stocked fish in terms of ecosystem objectives, fish community objectives, and harvest goals.
    - Work with basin teams, lake technical Committees, and management units to design and coordinate post-release research priorities and workforce needs. Encourage involvement of production personnel in field tests when workloads permit.
    - In coordination with the Great Lakes stations and basin teams investigate the effects of rearing density and stocking size on post-stocking survival for chinook salmon stocked in the Great Lakes

Fish Distribution

Stock or transfer fish according to fishery management plans and priorities in the manner and times which will produce optimal results at the lowest possible cost.

PCA	KRA-Fund	Federal – Non-Federal
76930	FDS-SFR	Federal
76931	FDS-G&F	Non-Federal
76933	FDS-MIX	Non-Federal/Federal

Transporting fish to the stocking sites is a substantial logistical effort. This key result requires that it be planned, coordinated, and executed in a cost efficient manner that will deliver fish at the appropriate time.

The resource basis of this result area is a fleet of 18 specialized vehicles and staff at the fish production facilities as well as vehicles available at other facilities, and personnel to maintain and drive them. The annual lease cost for these vehicles is currently $127,000. Cost of maintenance and fuel is in addition to the lease cost.

1. Maintain the fish transport fleet in good condition and place it on a routine replacement schedule.
    - Continue to use established vehicle lease and replacement schedules through Vehicle Transport Services (VTS).
    - Provide for central oversight of fleet warranties, scheduled maintenance, maintenance records, standard equipment specifications, annual inspections, life support system maintenance, and new vehicle tank fabrication.
    - Hire fleet mechanic by the end of FY2000.
    - Investigate the utility of Automated Vehicle Location Devices for the fish transport fleet by end of FY2000.
2. Move the Fish Stocking Information System from the mainframe computer to a client-server system, while making it readily available to all Fisheries Division facilities.
    - Fund programming costs to upgrade and transfer the system.
    - Integrate Fish Stocking Information System with other elements of Fish Production Information System so that fish production history and quality data can be readily queried for each group of stocked fish.
    - Digitize all stocking sites to latitude and longitude so their locations can be electronically mapped and are consistent with the formats used for other fishery databases.
3. Provide for GIS capability (upgraded desktop computers, software, wide carriage color printers, training) at each station so that truck routes and stocking sites can be plotted and maps printed out for every route and truck driver.
4. Review the transport and stocking methodology to improve post-stocking survival.
    - Basin teams need to identify research needs, including, but not limited to: site-specific stocking windows, offshore stocking, and nighttime stocking, strains.
    - Review rationale for and effectiveness of existing stocking windows for Great Lakes fish by end of FY2000.

Division Support Program

Goal

The Division Support Program seeks to integrate and support the Fisheries Division's strategic programs. This program provides the strategic direction, Division-wide planning and quality resources to ensure efficient Division operations and accountability to our publics.

Key Result Areas

- Strategic Planning: Define, evaluate, and communicate the Division’s goals and objectives.
- Work Planning and Reporting: Plan, implement, and report on the Division's accomplishments and activities, and their associated costs.
- Financial Management: Plan, manage, and report the Division’s revenues, and expenditures. Provide Division-wide oversight to the planning, acquisition, maintenance, and reporting of the Division’s assets.

- Human Resource Management: Hire qualified personnel who are representative of the work force. Provide safe working conditions and appropriate training to facilitate employee productivity. Ensure each employee understands their role in achieving the Division's strategic program's goals and objectives.
- Information Services and Technology: Develop and mainteain information services and systems that provide the Division ready use of all available information needed for fishery management decisions and services.
- Public and Professional Affairs Management: Assure the Division responds to public needs and concerns andcapitalizes on valuable public input to Division initiatives. Amplify effectiveness of the Division's programs by developing and maintaining professional relationships.

Background

This strategic management program functions in a service and support role. Key result areas identified in this program define broad, overall responsibilities and requirements that, in many areas, overlap with specific objectives of other strategic programs.

In 1998, the Division implemented a new approach to the management of the aquatic resources of the State (the WART Plan: Watershed Approach to Fishery Management in Michigan). This shift to watershed management resulted in the use of new techniques for planning, implementation, and reporting of the Division's work, and integrated all Sections of the Division in the process. The WART Plan also defines the mechanism by which the Strategic Plan directs the Division's activities. The processes described in the WART Plan are incorporated into many of the key result areas of this program.

The Division Support Program includes strategic planning, work planning and reporting, and financial management. The Division ensures accomplishment of its mission by undertaking long-term strategic planning for each program area. The goals and objectives identified in the strategic plan are implemented and reported across the Division through annual work plans and accomplishment reports. Financial oversight and reporting by program area allows us to evaluate our success in fulfilling goals identified in our budget request. This process also provides accountability to our publics.

An active, knowledgeable, well-trained work force operating in a safe environment is key to efficient accomplishment of the goals and objectives identified in the strategic plan. In addition, support for and provision of technology infrastructure and ready access to information are tools vital to the employee's success in accomplishing the work plans.

Ultimately, the success of the Division in carrying out its mission is measured by the support for our programs from our publics. A responsive, collaborative, and respectful relationship with the public and other agencies is critical to our success in promoting stewardship of aquatic resources.

Strategic Planning

Define, evaluate, and communicate the Division's goals and objectives, key result areas, and management systems.

PCA	KRA-Fund	Federal- Non Federal	Program
74780	DSP-G&F	Non-Federal	Division

74810	CSP-G&F	Non-Federal	Commercial
74900	RSP-G&F	Federal	Recreation
74901	FSP-SFR	Non-Federal	Fish Production
74903	FSP-G&F	Non-Federal	
74950	FSP-MIX	Non-Federal/Federal	
	MSP-G&F	Non-Federal	Resource Mgt.

This key result addresses the processes of defining, directing, and holding the Division accountable for program strategy.

Effective Division-level strategic planning sets long-term, broad-scale strategic direction on a statewide basis for all Division programs. The Fisheries Division Strategic Plan provides focus and overall direction for Division efforts to program managers. The strategic planning process is dynamic, incorporating course corrections when needed.

Long term fishery and ecosystem management strategic planning is conducted for the four Great Lakes basins. Basin Management Teams define goals and objectives for each Great Lakes basin, focusing on effective holistic management of ecosystems.

1) Accomplish strategic planning for the Division in conformance with the WART Plan: Watershed Approach to Fishery Management in Michigan.
   - Understand and implement the Division's Strategic Plan and the WART Plan.
   - Develop and maintain long-term basin management plans for the four Great Lakes basins.
   - Annually review and update the Fisheries Division's Strategic Plan and the WART Plan.
   - Make the Fisheries Division's Strategic Plan available for outside review and comment.
2) Work with other Divisions and offices of the Department of Natural Resources and other state agencies to integrate their program strategies with the Fisheries Division's program strategy.
   - Continue to include personnel from other Divisions and agencies on a regular basis at Division staff meetings (Division and basin management teams, Department liaison meetings).
   - Encourage the DNR Director and DNR Management Team to maintain open communications with Department of Environmental Quality (DEQ) and to facilitate working with DEQ Divisions on issues relating to fisheries and aquatic resource protection.
3) Revise the Fisheries Division Policy and Procedures Manual and maintain it on a regular basis.
   - Initiate a review of existing policies, update existing policies and develop new policies, as needed. All policies should reflect the WART Plan, Division Strategic Plan, and Department policies.
   - Redesign the manual's organization to conform to Fisheries Division's administrative and operational structure to help employees pursue the Division strategy effectively and efficiently.
   - Make the manual available to all Division employees in electronic and paper form.

Work Planning and Reporting

Plan, implement, and report on the Division's accomplishments, activities, and costs.

PCA	KRA-Fund	Federal- Non Federal	Program
75030	DAD-G&F	Non-Federal	Division
75060	CAD-G&F	Non-Federal	Commercial
75120	RAD-G&F	Non-Federal	Recreation
75150	FAD-SFR	Federal	Fish Production
75151	FAD-G&F	Non-Federal	
75153	FAD-MIX	Non-Federal/Federal	
75200	MAD-G&F	Non-Federal	Resource Mgt.
75201	MAD-GFS	Non-Federal	

This key result addresses the processes of identifying the work required to implement the Division's strategy, organizing the resources needed to perform that work, implementing these work plans, and accounting for the work accomplished and resources used in the process.

Work plans establish a work unit's anticipatedactivities and expected costs for the planning period. Staff resoources, special equipment and unique needs are also identified to allow for cross-unit staffing and equipment coordination.

Based on high priority management program objectives identified ini the strategic planning key result areas, work plans are established, approved, funded, and monitored. Completed work plan activities, including resources and costs used, are documented.

1) Accomplish work planning at all levels (Unit, Basin, Section, and Division) that conforms to the WART Plan and reflects Strategic Plan priorities.
2) Develop and implement procedures for scheduling Division tasks and events to better coordinate deadlines and activity timelines for Division personnel, facilities, and equipment.
    - Utilize electronic Division calendar to schedule, record and communicate major tasks, meetings, events and deadlines, including financial.
    - Conduct annual workforce and equipment scheduling meetings to coordinate work across unit and section boundaries according to the WART Plan.
3) Provide the needed accommodations, goods and services to execute the annual work plan as approved by the Division Management Team.
    - Acquire goods (including general office supplies) and services necessary to carry out the strategic program activities.
    - Acquire and maintain facilities (including office space) and equipment to support the strategic programs as identified in the work plan.
    - Replace or salvage equipment and facilities as needed, following appropriate procedures.
4) Use proper accounting codes (Index, PCA, project numbers, etc.) for time and attendance reporting.
    - Revise Baker's Field Guide on an ongoing basis to reflect changes in accounting codes and provide clarification where needed.

- Expand Baker's Field Guide to assist all units and sections in the identification of proper accounting codes.
- Implement use of time and attendance reporting guides across all Division sections and units.

5) Publish an annual report of the Division's accomplishments, structured according to the Division's strategic plan and make available to our publics.

Financial Management

Plan, manage, and report the Division's assets, revenues, and expenditures.

PCA	KRA-Fund	Federal- Non Federal	Program
76030	DFM-G&F	Non-Federal	Division
76060	CFM-G&F	Non-Federal	Commercial
76120	RFM-G&F	Non-Federal	Recreation
76150	FFM-SFR	Federal	Fish Production
76151	FFM-G&F	Non-Federal	
76153	FFM-MIX	Non-Federal/Federal	
76200	MFM-G&F	Non-Federal	Resource Mgt.
76201	MFM-GFS	Non-Federal	

This key result area encompasses the management of program expenditures, revenues, and equipment.

Since we spend public monies, efficiency and accountability are essential. Once investments have been made in land, facilities, and equipment, priority must be given to maintaining and controlling these assets.

The Division develops an annual budget request for monies to carry out the goals and objectives of the Strategic Plan. Monies are allocated to Basin Management Teams and Section Managers based on approved work plans and high priority special projects. Opportunities to expand our effectiveness by partnering with others and utilizing outside funding sources are pursued.

Organizational units report time and expenditures using account codes assigned by key result area and line appropriation. Ongoing budget analysis and projections occur to ensure we remain within our annual allocation. A final year-end financial report is generated to account for each fiscal year's expenditures by line appropriation.

1) Oversee the acquisition and maintenance of facilities and equipment, including computer hardware, software, and infrastructure, necessary to carry out the strategic program activities.
   - Develop and maintain an ongoing inventory system.
   - Annually inventory and inspect all lands, facilities and equipment.
   - Develop and implement standardized policies and procedures for acquisition to ensure continuity and compatibility (e.g. standardize software, survey gear).

2) Oversee the acquisition of goods and services necessary to carry out the strategic program activities.
   - Provide employees information and training regarding purchasing procedures, policies, and guidelines.
   - Monitor Division's compliance with purchasing procedures and resolve violations.
   - Assure use of correct accounting codes (Index, PCA, project numbers, etc.).
   - Monitor and revise purchasing procedures for maximum efficiency.
3) Manage the Division's annual budget.
   - Develop the annual budget proposal, and present to the Department (which in turn is presented to the Department of Management and Budget, to the Legislature, with final approval by the Governor).
   - Develop the Division's annual budget based on appropriation and approved work plans in conformance with the WART Plan.
   - Allocate budget to the four Great Lake Basin Management Teams, and the Fish Production, Research, and Program Services sections.
   - Monitor the annual budget to ensure expenditures don't exceed allocations.
   - Analyze and report expenditures for each fiscal year by appropriation, KRA, project number, index and work unit. Generate additional reports as required.
4) Assure the Division earns all federal aid monies.
   - Monitor expenditures of federal aid monies and comply with report and audit requirements.
   - Review the practices used to earn the federal aid monies and make recommendations on alteration of strategy.
5) Identify sources or alternative methods of funding the Division's operations (e.g. collaborative efforts, partnerships, gifts, mitigative settlements).
   - Establish a standing financial committee with the responsibility to direct and oversee the development of funding sources.
   - Develop capital outlay initiatives to fund special projects (e.g. facilities refurbishment, vessels).
   - Work with the identified funding source (partner, collaborator, or mitigation fund) to accomplish the associated projects (e.g. habitat rehabilitation, exotic species control).
6) Annually update the Division's long term financial plan for both program operations and capital outlay.
   - Analyze historical financial information of those variables that affect the financial status of the Division (e.g. license sales).
   - Make five-year forecasts of expenditures against anticipated funding (e.g. Game and Fish Fund) and implement steps to resolve shortfalls.

Human Resource Development

Secure capable staff for the Division who are representative of Michigan's population and provide good working conditions, foster commitment, and focus efforts so that each employee may take responsibility for achievement of the Division's goals and his/her own goals.

PCA	KRA-Fund	Federal- Non Federal	Program
75780	DHD-G&F	Non-Federal	Division
75810	CHD-G&F	Non-Federal	Commercial
75870	RHD-G&F	Non-Federal	Recreation
75900	FHD-SFR	Federal	Fish Production
75901	FHD-G&F	Non-Federal	
75903	FHD-MIX	Non-Federal/Federal	
75950	MHD-G&F	Non-Federal	Resource Mgt.
75951	MHD-GFS	Non-Federal	

Knowledgeable and skilled workers are the Division's most important program resource. Recruiting and retaining a qualified work force is essential in carrying out the Division's mission. Each employee must be able and willing to take responsibility for the achievement of the Division's goals.

Optimal staffing plans, based on management program objectives, are used to determine hiring priorities. Training and educational programs provide development opportunities to ensure each employee has the adequate knowledge, skills and abilities to perform their assigned tasks.

Fisheries Division is charged with the responsibility to provide a safe and accessible working environment for each worker.

1) Assure adequate staffing levels to accomplish each strategic program.
   - Revise Division staffing plan by organization structure cross-referenced with strategic program priorities.
   - Maintain the Division staffing plan, including current position descriptions, in response to continuing needs.
   - Hire qualified employees based on Division staffing priorities.
   - Improve hiring processes across the Division for filling positions in an efficient and timely manner. Encourage the Department to enhance practices and procedures to improve the methods used for filling vacancies.
2) Develop a comprehensive training and employee development plan to achieve the objectives in the Division's strategic plan.
   - On an ongoing basis, identify and implement general (e.g. computer software, supervisory, civil service classes) and program specific (e.g. fish transportation, fish survey techniques) employee training.
   - Provide opportunities for employees to understand their role in their assigned program area and all Division programs.
   - Review and evaluate employee's performance in compliance with Department and Civil Service procedures.
3) Provide safe and accessible working conditions for all employees.
   - On an ongoing basis, develop and implement employee safety training programs.
   - Provide a safe working environment for all employees including safety equipment where required.

- On an ongoing basis, monitor work environment and employee work practices for safety compliance.
- Assure the Division's facilities and services are in compliance with the Americans with Disabilities Act.

Information Services and Technology

Develop and maintain information services and systems that provide ready use of all available information needed for fishery management decisions and services.

PCA	KRA-Fund	Federal- Non Federal	Program
75530	DIM-G&F	Non-Federal	Division
75560	CIM-G&F	Non-Federal	Commercial
75620	RIM-G&F	Non-Federal	Recreation
75651	FIM-G&F	Non-Federal	Fish Production
75653	FIM-MIX	Non-Federal/Federal	
75680	FIM-SFR	Federal	
75700	MIM-G&F	Non-Federal	Resource Mgt.
75701	MIM-GFS	Non-Federal	

This key result area addresses the collection, organization, management and dissemination of program specific information, regardless of recipient, distribution method or format.

Effective planning, development and deployment of information technology products and services is necessary to assure the Division keeps pace with emerging technology while at the same time meeting strategic program needs.

Organization and coordination of library services for fishery management reference tools and technical reports make scientific-based material easily assessable to natural resource managers.

Promotional and educational brochures, pamphlets and exhibits must be organized, coordinated and distributed in such a manner that they are easily available to the public.

1) Assure the Strategic Plan for information technology is in alignment with the Division's Strategic Plan and that it incorporates each strategic program area's information technology needs.
    - Maintain the Information Strategic Plan to reflect completed strategic program-specific tabular and spatial data management projects, technology and infrastructure improvement projects, and document management projects.
    - Identify, review and prioritize new strategic program-specific proposed information technology initiatives (tabular and spatial data management, technology, infrastructure, and document management projects).
2) Maintain information systems, technology infrastructure and documents (printed and electronic) to support Fisheries Division activities as identified in strategic program areas.
    - Develop, implement and support information technology systems (FSIS, Fish Collection system, Master Angler, Prescriptions, Fish Production, Fish Catch and

Sales, Wholesale Purchase Reporting, etc.) using system development life cycle methodologies, system development practices and data administration principles.

- Develop, coordinate and maintain the Fisheries Division library of printed and electronic documents, resources, and electronic resource tools. Provide bibliographic instruction, literature searches, bibliographies, and document delivery services.
- Maintain the Fisheries Division collection of materials for public information and distribution. This includes printed and electronic brochures, pamphlets and other fishery informational materials (e.g. fish bobbers, Outdoor Explorer Club items) for all strategic program areas. Provide distribution services of the materials for general public inquiry (e.g., internet), special events, DNR offices and tourism offices.
- Encourage the continued development and use of electronic formats for informational and reference materials and communications, both internal and external.

3) Maintain universal participation by Division personnel in the Department and Division standard end-user computing hardware and software products (e.g., GroupWise, DCDS, MS-Office Product Suite, etc.).
   - Develop and maintain Division end-user computing policies, procedures and standards.
   - Monitor use of Division hardware and software against end-user computing policies and procedures.

Public and Professional Affairs Management

Manage relationships with the Division's publics and assure that the Division responds to public needs and concerns and secures informed consent for the Division's programs.

PCA	KRA-Fund	Federal- Non Federal	Program
75280	DPM-G&F	Non-Federal	Division
75310	CPM-G&F	Non-Federal	Commercial
75370	RPM-G&F	Non-Federal	Recreation
75400	FPM-SFR	Federal	Fish Production
75401	FPM-G&F	Non-Federal	
75403	FPM-MIX	Non-Federal/Federal	
75450	MPM-G&F	Non-Federal	Resource Mgt.
75451	MPM-GFS	Non-Federal	

As a public agency, the Fisheries Division is obligated to serve the public. As trustee of the public's fishery resources, we are further obligated to define the public interest and seek their involvement in fishery management.

Efforts to inform, consult, and involve our publics (including those not directly serviced by the Division's programs) are done by building and maintaining strong and positive relationships with them. These relationships ensure these publics have an opportunity to provide input into the decision-making process and understand the implications of the decisions.

Relationships with other professionals in fisheries science and related fields allow for the exchange of knowledge, services, and research that may not be available through other mechanisms.

1) Identify the needs and concerns of the Division's public.
    - Identify and implement methods that will obtain the information required in determining if the Division is fulfilling the needs of its publics.
2) Solicit public support for the stewardship of aquatic resources.
    - Provide informational materials in both a written and electronic format that describe the Division's aquatic resource stewardship, services, plans, and activities.
    - Participate in public discussions, meetings, events and conferences to promote responsible aquatic resource stewardship.
    - Develop and maintain interpretive displays to provide information about aquatic systems and promote stewardship of aquatic resources.
3) Inform the public about Division programs and new initiatives. Request public input and support.
    - Maintain established citizen advisory committees.
    - Continue to involve the public in fish production and fishery management decisions to ensure their understanding and support of these programs.
    - Continue to inform and consult with angling clubs, conservation organizations, environmental groups, and other interested publics regarding Division programs and new initiatives.
4) Develop and maintain relationships with other professionals in fisheries science and related fields.
    - Obtain and retain corporate memberships in professional organizations.
    - Develop and maintain collaborative relationships with universities and other agencies involved in the study, management, and protection of aquatic resources.