



*White Lake Shoreline  
Habitat Management Plan*

# Preface

The White Lake Habitat Management Plan was prepared by the White Lake Public Advisory Council in conjunction with the Muskegon Conservation District. This document looks to foster continued interest by the public while helping address environmental impairments within White Lake, and to help citizens and local municipalities to conserve, preserve, and restore shoreline habitat and wetlands. The White Lake Habitat Management Plan is a companion document to the 2002 White Lake Community Action Plan (RAP Update).



White River at Hillt's Landing

Throughout this document shoreline habitat and wetlands shall be considered synonymous unless otherwise designated. It should also be noted that within the White Lake ranking system non-wetland areas, upland habitats, and aquatic plant areas, were all used to determine importance of protection. Contiguity, and the value of ecological connectedness between these habitats are used to determine importance.

Certain information and portions of wording have been taken directly from documents and materials created by the Environmental Protection Agency, Michigan Department of Environmental Quality, Michigan Department of Natural Resources, Great Lakes Aquatic Network Fund, Tipp of the Mitt Watershed Council, and the Michigan Environmental Law Center. Information is intended for educational use only and the contents of this document do not necessarily reflect the views and policies of the above named agencies or organizations.



White Lake  
Public Advisory Council

## White Lake Public Advisory Council

The White Lake Public Advisory Council (WLPAC) is a formal council of members representing disciplines from throughout the White Lake area including industry, business, government, churches, and the general public. The WLPAC works to provide the public with information, services, and projects which will improve the environmental quality of White Lake and its affiliated watersheds. The WLPAC is focused on de-listing White Lake as an Area of Concern and restoring the eight Beneficial Use Impairments that impact what White Lake. Through these activities the Council works to advise agencies, express views and voice the concerns of the local community.



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# Executive Summary



This document is a companion document to the White Lake Community Action Plan (2002 RAP Update) as a means to facilitate the residents of White Lake in achieving specific fish and wildlife goals and restoring the lake as a whole. These goals are working toward an international effort to protect and manage the Great Lakes through the Great Lakes Water Quality Agreement, which identified White Lake as one of fourteen *Areas of Concern* (AOCs) in Michigan that are negatively impacting Lake Michigan and the Great Lakes. The original criteria in listing White Lake as an AOC designated eight Beneficial Use Impairments (BUIs) that were degraded and affecting water quality conditions and ecological health. Even though all eight BUIs are inextricably connected because of industrial pollution impacting the system, it is apparent that development and shoreline alterations have significantly impacted fish and wildlife populations. Historically White Lake had a diverse system of shoreline habitats including coastal wetlands, freshwater marshes, wetland bays, aquatic plant beds, and shoreline stands. This unique mixture of shoreline habitats is largely attributed to White Lake being a drowned-river mouth lake with a rich distribution of flora and fauna. Since White Lake was first settled in the mid 1800's the myriad of plants and animals has gradually changed with the most dramatic changes of habitat loss occurring in the past 60 years.

Development and inappropriate land uses are rapidly altering and eliminating critical habitat within White Lake with people continually moving to the shoreline, putting pressures on coastal habitats and wetlands. Yet, within the White Lake community, it is realized that when we lose these natural shoreline resources we lose components of our environment that are vital to our future. In short, we lose not only the resources but also all those components associated with local fisheries, wildlife, water quality, pollution mitigation, flood storage, locations for boating, hiking, bird watching, and areas that restore the spirit. As White Lake begins recovery from an industrial legacy our communities must ensure that shoreline development does not override the benefits achieved to date from sediment clean-ups and site restorations occurring around the lake.

This White Lake Shoreline Habitat Management Plan identifies remaining habitat to protect, and degraded habitats to revitalize and restore in the White Lake system. White Lake communities can use this plan as a blueprint to develop a common goal of to designate areas that need to be conserved, preserved, and restored. The Plan can be used by these entities to ensure overall Remedial Action Plan goals for White Lake are achieved and scientific data are used in decision-making. As community members and municipalities, we have the responsibility to protect our natural resources and implement planning and policies that accomplish these goals.

## **Associated Problems**

White Lake has experienced a variety of issues related to shoreline habitat loss resulting in decreased fish and wildlife populations and aesthetics, while at the same time increased fragmentation and alteration of shorelines. Original shoreline development around the lake had minimal impacts on the system as shorelines were left in a natural state. However, as residents moved toward more manicured landscapes, shorelines were claimed and "cleaned", and beaches were cleared and "groomed", especially during low water years. When water levels normalize, the loss of vegetation in these shoreline areas make erosion more likely. In an attempt to control this dynamic system the shoreline becomes armored and portions of the lake bottomlands are lost. In both scenarios the shoreline, which was once a transition zone from land to water, becomes drastically delineated with seawalls and manicured lawns. The loss of shoreline habitat surrounding White Lake and the subsequent fragmentation and elimination of habitat corridors has diminished fish and wildlife populations with the loss of nesting, rearing, feeding, and predatory safety zones.

## **Importance of Shoreline and Wetland Habitats**

The shoreline habitat surrounding White Lake provides many social, ecological, and economic benefits to the community, benefiting each persons quality of life. This myriad of habitats, largely defined as wetlands, is intertwined to form a complex ecosystem providing ecological functions that benefit everyday lives. These ecological functions are natural processes which occur and are valuable to our community, although society in general, does not attach a dollar value to these functions. These ecological functions are dependent on the integrity of the system and critically important to White Lake.

### **Economic**

Billions of dollars are spent each year in the Great Lakes Basin on hunting, fishing, bird watching, boating, canoeing / kayaking, nature photography, hiking, and camping activities that rely directly on the preservation of shoreline habitat. White Lake has an active sport fishing and charter boat industry due to a variety of sport fish including walleye, yellow perch, small and large mouth bass, northern pike, bluegill, black crappie, and white sucker as well as migratory salmon and trout from Lake Michigan to the White River. Over 90% of roughly 200 fish species in the Great Lakes are directly dependent on coastal and shoreline wetlands for some part of their life cycle. Nearly all amphibians in the Great Lakes basin are wetland dependent, especially for breeding. Loss of the sport fishing and recreational activities leads to a substantial economic loss in tourism for the community, and dramatically impacts the quality of life for residents.

### **Water Quality**

These shoreline habitats and wetlands are usually found in areas where the groundwater table is at or near the land surface. These habitats act as water storage, discharge, and recharge areas. It is the interplay of these hydrological functions that is the basis for the cleansing of water. Wetlands are the living filters that remove pollutants, nutrients, and sediments from surface water and ground water through a combination of incorporation (sedimentation, adsorption, precipitation) and degradation (biochemical interactions, volatilization).

### **Shoreline Protection and Erosion Control**

In their natural condition, wetlands associated with rivers and lakes function as a barrier to erosion along shorelines. The root systems of wetland plants stabilize soil at the water's edge and enhance soil accumulation at the shoreline. Leaves and stalks reduce erosion by dampening wave action and slowing the speed of water currents. Furthermore, as sediment-laden waters flow through a wetland from the surrounding watershed, sediments are deposited in the wetland reducing siltation into lakes, rivers, and streams.

### **Flood Protection**

Wetlands act as hydrologic sponges, temporarily storing flood waters and releasing them slowly. Wetlands reduce flood peaks and protect downstream property owners from flood damage. Wetlands and adjacent floodplains are natural floodways that convey flood waters from upland to downstream points. The water recharge potential varies according to a variety of factors, including wetland type, geographic location, subsurface geology, soil type, and amount of precipitation; however, it is the overall storage and slow release that maintains consistent stream flows and lake levels. These functions are increasingly important in urban areas where development has eliminated wetland areas and increased the rate and volume of stormwater runoff.

### **Contribute to Food and Fiber Production**

In addition to the revenue generated from wetlands by hunting, fishing, and trapping wildlife, wetlands provide a variety of natural products including blueberries, cranberries, and wild rice. Forested wetlands, such as cedar swamps, can provide sustainable yields of valuable timber if harvested with careful management and planning.

### **Education and Research**

Wetlands serve as wonderful outdoor classrooms, providing excellent opportunities for discovery and living examples of nearly all ecological principles. Boardwalks and observation platforms provide excellent opportunities to learn from wetlands while protecting it as a community resource.

### **Defining Wetlands**

Ecological zone between land and water with three interrelated characteristics, all of which serve as the scientific and regulatory basis for identifying and delineating wetlands. Wetlands exhibit:

1. The presence of water at or near the land surface occurring at a frequency and duration which determines the type of vegetation that can exist (hydrology).
2. The presence of hydrophytic (water loving) plants which are adapted to living in saturated soils (vegetation).
3. The presence of distinctive soil types which develop under saturated conditions (soil type).

### **Marsh**

When people hear the term wetland, they most commonly think of a marsh. Marsh is a term that represents a broad array of wetlands that are dominated by grass-like vegetation such as rushes, sedges, and cattails. They are wet areas that can be periodically covered by standing or slow-moving water and are usually associated with ponds, rivers, streams, inland lakes, and the Great Lakes.

### **Swamp**

Swamps provide very important habitat for a wide array of wildlife throughout the year. Swamp is simply the technical term for a wooded wetland. The soils in swamps are usually rich in organic matter and nutrients. Soils are generally saturated periodically at some point during the growing season.

### **Bogs & Fens**

Although different in their water chemistry and source, bogs and fens are often grouped into a broad category called northern peatlands. Bogs are isolated from ground and surface water and contain acidic waters. Fens receive water that has passed through mineral soils rich in limestone and therefore contain somewhat alkaline waters. Both bogs and fens contain plants that are uniquely adapted to their water chemistry and occur as thick peat deposits in old lake basins or as blankets of peat across the landscape.

# White Lake's Shoreline History



The birth of White Lake took place approximately ten thousand years ago due to a unique combination of glacial sand deposition and the sands further movement. With this movement the sand eventually built many of the dunes seen along the shoreline and subsequently reduced the size of the mouth of the White River to Lake Michigan. These events slowly formed a drowned river-mouth lake at the end of the White River. The river, now White Lake, was originally known as “Waubish-sibi” by local Native Americans because of the large, white, clay deposits that colored the water at its mouth. Early French maps labeled the river as “La Rivier Blanche”; a name given by the early explorers as a translation from its native name. Other historical sources document the name of White Lake coming from a vision Father Marquette had while gazing at the birch lined shore. Regardless, the final English translation remains and the lake now thousands of years old covers 2,571 acres, is approximately five and a half miles long, averages a mile in width, has a mean depth of 23 ft., and maximum depth of 70 ft. The White River continues to be the major tributary to the lake contributing approximately 95% of the water.

Other significant historical events of White Lake and the White River Watershed include its importance throughout the region during the lumbering era. Twenty-eight sawmills once surrounded White Lake and, in conjunction with Muskegon Lake, supplied much of the lumber to rebuild Chicago after the *Great Fire*. Following the lumbering boom, the area developed into a region for agriculture and early industrial entrepreneurs of metal castings and leather production. Since this early development the communities of Montague and Whitehall began to congregate near the new mouth of the White River along the eastern end of White Lake. With community development the area became popular for tourists and families. At the beginning of the 20th Century visitors traveled from Chicago aboard steamships to enjoy the rustic and pleasant lifestyle of the White Lake Area. With the increase in permanent residents, and following the wind down of wartime industry during the 1940's, White Lake began to build its economic reputation with a future in chemical manufacturing.

In recent years, the cities and surrounding townships of White Lake have become a mix of light industrial, spreading commercial development, recreational marinas, seasonal cottages, and permanent residents. The community continues to use the lake for recreation, sporting, tourism, and industry. The lake is intertwined with culture and economy, each depending on the continued use and existence of this natural resource. White Lake's most defining asset is its natural resources; the lakes, dunes, beaches, rivers and forests. These natural features provide area residents with the quiet beauty and recreational opportunities that help to define its quality of life. In addition, they provide a significant source of revenue for the local economy drawing visitors from Grand Rapids, Lansing, Detroit, other areas of Michigan, Chicago, and neighboring states. Today, festivals, outdoor concerts, summer theater, a local farmer's market, craft shows, and community events support the small-town feel, truly demonstrating the communities love and appreciation of this great natural resource. The lake has also taken on a “spiritual” importance for many people which relates the beauty and serenity of the lake to a simpler, more enjoyable lifestyle.

White Lake's varied history and continued growth has degraded the ecological system, negatively impacting its natural resources. These changes have largely come about due to changes in how people associate with the lake and the associated environments. During the early 20th Century the lake was primarily a seasonal community where individuals lived or vacationed because of the abundant natural resources. And although the philosophy is still very prevalent throughout the White Lake area, there has been a dramatic shift in how those natural resources are used during the past 50 years. The once rustic cottages and homes have been replaced with year round residences and high speed water sports have become increasingly common. This shift from an emphasis of hunting and fishing activities, which were directly dependent on the quality of the lake's natural resources, has brought about a subtle change year after year. And although this shift in resource use is accepted, it has caused some accumulated impacts that need to be addressed so that all community members can enjoy the lake and preserve the quality of the natural resources for the future.

Overall, the greatest threat to White Lake has been a myriad of these impacts to the shoreline and aquatic habitat surrounding the lake. Habitat, on a very basic level, can be described as those elements both living and non-living that provide the essential living needs for an organism to exist in a given area. In the case of fish and wildlife habitat, and the associated changes that have occurred, this document focuses on those living elements. In particular, the loss of habitat due to decreases in native vegetation, and overpopulation of invasive exotic species.

### Reduced Native Vegetation

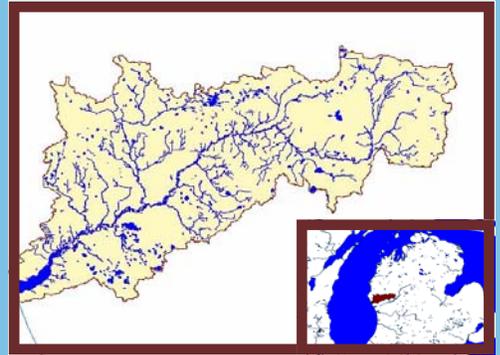
Many of the habitats in and around White Lake have been lost because of the decreases in native vegetation. Within the aquatic environment, the loss of rooted plants is dramatically affecting the sustainability of many aquatic insect, fish, bird, reptile, and mammal populations. Within certain populations, this type of disruption decreases food sources and eliminates certain species. Disruption of aquatic plants changes the structure of the biological food web and diminishes the ability of organisms to survive. White Lake has lost a majority of its aquatic habitat limiting certain fish because of reduced reproduction, growth, or overall survival rates. Aquatic habitat has been lost due to multiple causes, including removal during dredging, mechanical harvesting, chemical herbicides, manual pulling to maintain recreational use, increased competition with exotic species, seawall construction, and marina development.

Habitat loss within the riparian zone (area of land adjacent to the water) is significant, including the fragmentation and separation of the aquatic environment from upland areas. These shoreline areas, including wetlands, are unique in the benefits to the aquatic environment through water treatment processes, and the unique components they provide to wildlife. These areas are important to many rare and endangered species, as well as to common species (songbirds, turtles, salamanders, mink) for reproduction, growth, and survival.

### Increased Exotic Species Populations

The other major threat to habitat has come from invasive exotic species in both the terrestrial and aquatic systems. These species are considered to be one of the greatest dangers to ecosystems, and a serious biological pollution problem. Exotic species often dominate environments and decrease diversity. Eurasian watermilfoil, purple loosestrife, and zebra mussels are becoming well established. Other species like the round goby, curly leaf pondweed, and white swan have also increased in recent years. Exotic species often overwhelm a system as they compete with native species for territory and food, and have few predators adapted to their life strategies. The absence of competition from predators and habitat suitability allows uncontrolled population increases, destabilizing the native food web. Changes in the food web have eliminated many native species in White Lake, and reduced the ecological diversity. Remaining species tend to include only those that can resist exotics, and the exotics themselves.

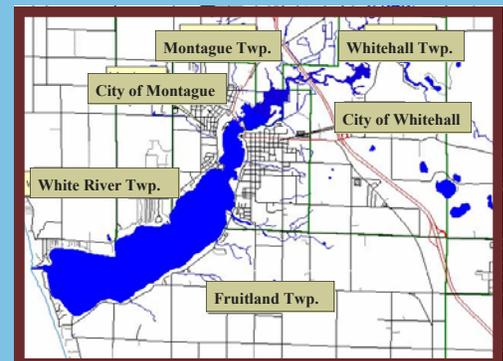
As exotic species have spread throughout White Lake, the habitat for native species is limited and further altered. This creates habitats suitable for other exotic species to invade and further weaken native species. White Lake continues to have dramatic changes in fish populations due to habitat alteration, where native species, established exotics, and new exotic arrivals are in competition with each other. Many of these species are spreading rapidly and will only be controlled through the use of integrated pest management. These impacts, combined with limited recreational use by boaters and swimmers due to the increased “weed” growth and decreased aesthetics, are seriously damaging the White Lake Community. The costs to manage this issue will increase with each succeeding year and each additional exotic species.



White Lake / White River Watershed, Michigan



Purple loosestrife



White Lake Area of Concern and Local Municipalities

# Regulating Wetland and Shoreline Habitat



There are many types of activities detrimental to wetlands that are exempted from regulation, either in a public code, are associated with a specific use, or are not mentioned in any law or regulation. At the other end of the spectrum, many activities are strictly illegal, and are not allowed under any circumstances. In between are a plethora of activities that are allowed by permit. These regulated activities allow a governing body to ensure that the activities done are done to minimize the impacts to wetlands.

## **Federal Regulation**

In 1984, Michigan received authorization from the federal government to administer Section 404 of the federal Clean Water Act in most areas of the state. A state administered 404 program must be consistent with the requirements of the federal Clean Water Act and associated regulations set forth in the Section 404(b)(1) guidelines. In other states, applicants must apply to the U.S. Corps of Engineers and a state agency for wetland permits. Applicants in Michigan generally submit only one wetland permit application to the Michigan Department of Environmental Quality (DEQ). State and federal authorities overlap in coastal and certain other waters according to Section 10 of the federal Rivers and Harbors Act. Activities in these waters require a joint permit application which minimizes time and effort for applicants. In accordance with the Clean Water Act, Section 404(g), the U.S. Army Corps of Engineers retains federal jurisdiction over traditionally navigable waters including the Great Lakes, connecting channels, other waters connected to the Great Lakes where navigational conditions are maintained, and wetlands directly adjacent to these waters.

## **State Regulation**

In 1979, the Michigan legislature passed the Geomare-Anderson Wetlands Protection Act, 1979 PA 203, which is now Part 303, Wetlands Protection, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended. The Department of Environmental Quality has adopted administrative rules which provide clarification and guidance on interpreting Part 303. Some wetlands in coastal areas are given further protection under Part 323, Shorelands Protection and Management, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended.

In accordance with Part 303, wetlands are regulated if they are any of the following:

- Connected to one of the Great Lakes or Lake St. Clair.
- Located within 1,000 feet of one of the Great Lakes or Lake St. Clair.
- Connected to an inland lake, pond, river, or stream.
- Located within 500 feet of an inland lake, pond, river or stream.
- Not connected to one of the Great Lakes or Lake St. Clair, or an inland lake, pond, stream, or river, but are more than 5 acres in size and located in counties with a population of more than 100,000.
- Not connected to one of the Great Lakes or Lake St. Clair, or an inland lake, pond, stream, or river, and less than 5 acres in size, but the DEQ has determined that these wetlands are essential to the preservation of the state's natural resources and has notified the property owner.

The law requires that persons planning to conduct certain activities in regulated wetlands apply for and receive a permit from the state before beginning the activity. A permit is required from the state for the following:

- Deposit or permit the placing of fill material in a wetland.
- Dredge, remove, or permit the removal of soil or minerals from a wetland.
- Construct, operate, or maintain any use or development in a wetland.
- Drain surface water from a wetland.

The DEQ must determine the following before a permit can be issued:

- The permit would be in the public interest.
- The permit would be otherwise lawful.
- The permit is necessary to realize the benefits from the activity.
- No unacceptable disruption to aquatic resources would occur.
- The proposed activity is wetland dependent **or** no feasible and prudent alternatives exist.

### Local Regulation

In accordance with Part 303, a local unit of government can regulate wetlands by ordinance, in addition to state regulation, if certain criteria are met. These criteria include:

- A wetland ordinance cannot require a permit for activities exempted from regulation under Part 303.
- A wetland ordinance must use the same wetland definition as in Part 303.
- Local units of government must publish a wetland inventory before adopting a wetland ordinance.
- Local units of government that adopt wetland ordinances must notify the DEQ.

Wetlands less than 5 acres can also be regulated by local governments, even through they do not have state or federal regulation. If a local government wishes to regulate a wetland less than 2 acres in size, the local government must grant a permit unless it is determined that the wetland is essential to the preservation of the community's natural resources. In areas where a local wetland permit is required, a permit must also be received from the State of Michigan before beginning the activity. For more information on the requirements for local wetland regulations, please refer to Sections 30307, 30308, 30309, 30310, and 30317 of Part 303.

Regardless of whether a community chooses to adopt a local ordinance all DEQ permits should be reviewed by local planning commissions. Permits for each municipality are presently sent to the municipality's Clerk.

### Sample Local Wetland Ordinance

<http://www.deq.state.mi.us/documents/deq-ess-cm-fig-AppendixE-SampleDEQWetlandOrdinance.pdf>

### Sample Shoreline Protection Overlay Zone

<http://www.deq.state.mi.us/documents/deq-ess-cm-fig-appendixs-shorelineprotection.pdf>

### The Permitting Concept

Throughout all levels of regulation is a concept called sequencing. The sequencing involves review of each project so that first impacts to wetlands are avoided, then minimize those impacts that are deemed unavoidable, and then mitigating those that are eventually allowed. Application of the "avoid, minimize, and mitigate" sequence is predicated on the assumption that unless a project is water or wetland dependent, then less damaging alternatives exist. Regulations require that a permit shall not be issued if a less damaging "practicable" alternative exists. Other considerations include determination of whether the project is in the public interest and whether the project will have unacceptable impacts to aquatic resources. As part of this process it is imperative to involve and receive input from the public concerning the proposed project.

## What is a Taking?

Land Use planning and zoning are intended to help address the concern of a community and private property owners about future development in a manner that creates predictability, consistency, and fairness. It's widely recognized that zoning actions can create significant economic benefits and burdens for specific parcels. Sometimes private property owners feel that governmental action has unjustly interfered with their property, and they claim that a "taking" has occurred.

A taking dispute often occurs when there is the notion held by some that the individual's right to do whatever he or she chooses on their property supersedes any concern for how that activity might impact the health, safety, and general welfare of others.

### Seven Points of Analysis for Regulatory Takings:

1. Do established principles of Michigan property law prohibit the proposed land use?
2. Does the government regulation further a valid public interest?
3. Does this taking affect the parcel as a whole?
4. Does the regulation allow property owners a reasonable economic return on their land?
5. Is the takings claim ready for the court to review?
6. Has a temporary taking occurred?
7. Can communities insist that development pay for its costs?

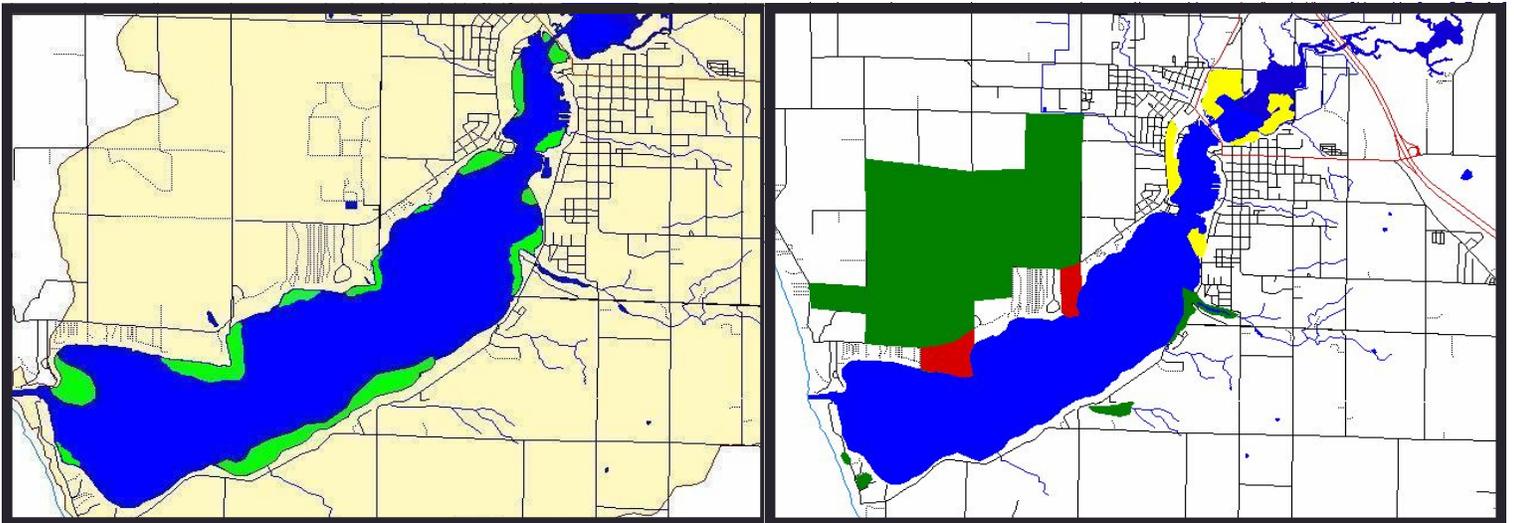
\*information and wording from "What is a Taking?: Exploring the Boundary Between Public Interest and Private Property", published by the Michigan Environmental Law Center and the Tipp of the Mitt Watershed Council. Information is intended for educational purposes only. It is not intended for legal advice.

# Management Plan Strategy



The proceeding pages are a compilation of several years of work by public and private agencies, organizations, and individuals. Throughout the process of reviewing data sets and looking at reports it was determined that all materials must be readily available in a format that is accurate, easy to use, and provides a scientific basis for decision making. As such, this plan is a tool to assist individuals and municipalities to develop a common goal of conservation, preservation, and restoration. In order to reach this goal, this plan built upon three previous studies and integrated national research to build a useful set of ranking criteria. A Geographic Information System (GIS) was constructed to create layers to query, analyze, and provide a visual overview.

In 2002 the White Lake Public Advisory Council designated several areas of habitat for protection within the White Lake Community Action Plan. These areas included both terrestrial and aquatic sites; with the designations based on current natural resource conditions. These designations did not link upland areas with aquatic areas, nor look at the ecological integrity of the system as a whole. This plan utilized those designations, previous data, and 2005 survey work to field-verify previously identified areas and clarify quality attributes.



*Aquatic habitat areas above left depicts areas of special concern for habitat loss, including shallow areas in the narrows. The right-hand map depicts the areas recommended for protection in the 2002. Locations shaded as red are priority for habitat protection, followed by yellow and green shaded areas, respectively.*

There is substantial gaps in shoreline habitat protection throughout the municipalities surrounding White Lake, and in some cases, no planning has been focused directly on shoreline habitats. Approaches to shoreline protection varies according to specific local needs, including loss of historical habitat and associated values, and current governmental priorities and goals. Participation and coordination in habitat management among municipalities will provide the greatest benefit, especially combined with a diversity of public and private groups with a high degree of hands-on community involvement. This process would utilize the best possible data and resources available for comparison of present and past shoreline habitat conditions. This will not only ensure proper restoration, but instill community ownership, and evaluate progress and long-term success. Lastly, community involvement is needed to continue monitoring and evaluate of the health of shoreline habitat through stewardship activities.

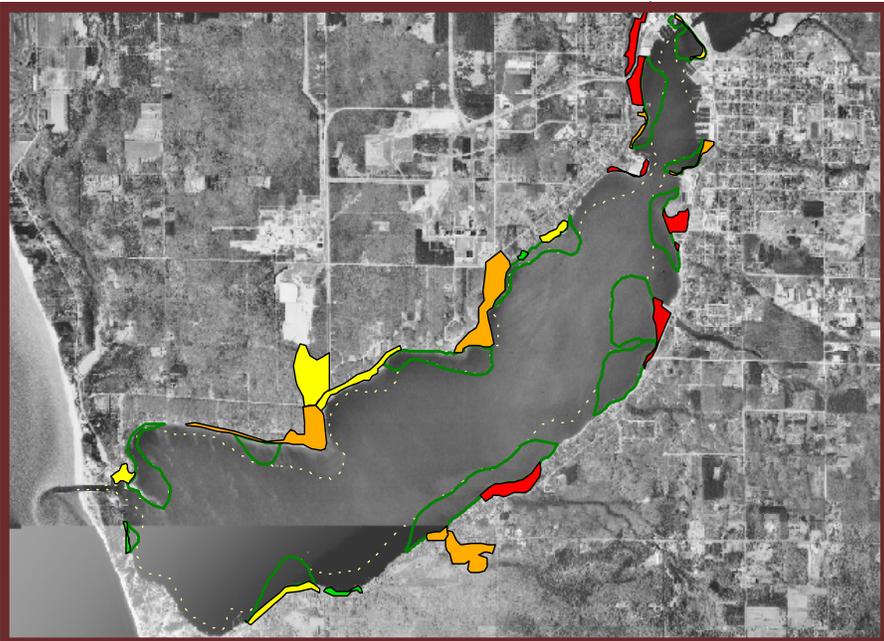
## Management Overview

The White Lake Public Advisory Council strives to protect the existing habitat for fish and wildlife species, while protecting ecosystem functions that benefit the community's social, economic, and environmental components. However, to simply preserve what is left is not enough for a sustainable future. The White Lake community also needs to restore areas that increase the integrity of fish and wildlife habitat.

A general goal for the White Lake community is to avoid fragmentation of natural habitat throughout the landscape and protect existing areas that are critical to reproduction, growth, and survival of fish and wildlife. The plan also looks to restore aquatic habitats and altered shorelines, especially those that are connected to large intact areas, through public purchase, conservation easements, state designations, and zoning. Those areas designated within this plan must be set aside now before future development and economic pressures increase. White Lake municipalities must take the initiative to preserve these properties to help on a large scale, while individual property owners should work to preserve or restore their own piece of property. Working on both large and small scales will minimize the number of isolated habitats within the watershed. If individuals work on small patches throughout the area the habitat integrity of the system will increase, while slowly instilling a greater sense of stewardship on a larger scale.

The White Lake Habitat Shoreline Management Plan designates specific areas for protection and the following lakewide management goals need to be implemented to ensure protection of the fish and wildlife populations and the associated habitats.

1. Place permanent conservation easements on all public and private lands designated as high, medium, and low priority in next 2, 3, and 5 years, respectively.
2. Implement a restoration plan to connect these priority areas. Connect areas through conservation easements, public stewardship activities, education, exotic species control, and grant funding.
3. Establish habitat corridors between critical areas where preservation is not feasible, and establish 130 ft. riparian buffers around all water bodies (lakes, rivers, streams) to connect the aquatic and terrestrial environments.



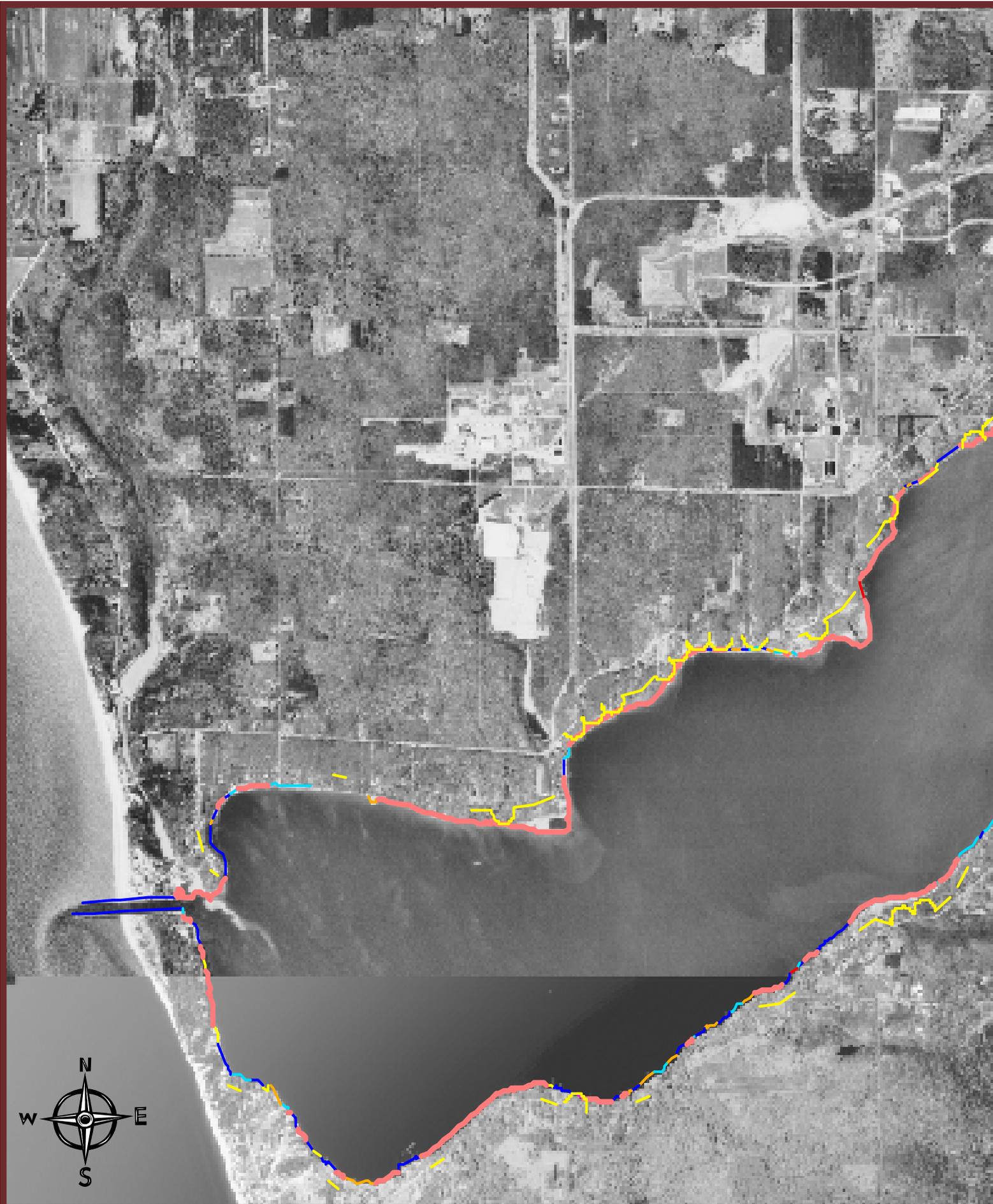
Priority areas for aquatic habitat protection (outlined in green). Locations shaded as red are priority for terrestrial habitat protection, followed by orange, yellow, and green shaded areas, respectively.

## Agency Responsibility

The White Lake Public Advisory Council (PAC) continues to function as the responsible non-governmental organization for the delisting of Beneficial Use Impairments for White Lake, with help and support by the Michigan Department of Environmental Quality, Michigan Department of Natural Resources, the US Environmental Protection Agency as well as local and state governmental bodies. The White Lake PAC provides documentation and delisting status in products and research. The PAC works in conjunction with the White River Watershed Partnership and White Lake Association to ensure an ecosystem approach is utilized for all restoration activities

The 1987 White Lake Remedial Action Plan was driven by state agencies integrating general public ideas with a Technical Team approach. In 1995 it was suggested that a closer link and interaction needs to be made between the PAC and this technical team. This recommendation came to fruition with the Public Advisory Council now driving the RAP process, having a stronger ownership, yet having continued coordination with technical advisors.

It is well recognized that many studies, articles, surveys, and other materials are unknown by the White Lake Public Advisory Council and are not distributed between governmental agencies. Yet, the PAC strives to act as the coordinating agency for materials from cities, townships, community organizations, and state or federal agencies. Participation and openness to sharing documentation by all governmental units is necessary for the continued success of the PAC and the remediation efforts of White Lake.





# SHORELINE SURVEY

In the summer of 2005 the Muskegon Conservation District staff surveyed the shoreline of White Lake in order to update previous field studies, collect data to build GIS layers, and assess current shoreline conditions. As part of the survey the structural composition of each shoreline was determined as fitting within one of eight categories:

1. **Natural** - pink
2. **wood pile** - orange
3. **sheet pile** - dark blue
4. **cement slab** - red
5. **concrete block** - green
6. **poured concrete** - yellow
7. **fieldstone riprap** - purple
8. **limestone riprap** - light blue

This process included Global Positioning System (GPS) readings for all changes in shoreline structural composition (determined parcel-by-parcel along the lakeshore). The survey also included evaluation and classification of adjacent riparian areas to determine if these areas were in a natural state. Natural included both native areas as well as some landscaped areas and were designated as "natural slope / riparian area." Extent (distance from shoreline) was only determined if area was important to the larger ecological picture (i.e., presence of wetlands). All areas designated as natural needed greater than 75% of area from shoreline to lakeward side of main structure on property (house, restaurant, club house) as having a natural state. Areas with extensive landscaping, lawns, or other maintained areas were considered impacted and were designated as maintained.

1. **Natural slope / riparian area** - yellow wavy lines in upland areas
2. **Maintained riparian area** - all other unmarked areas



# WETLANDS & IMPORTANT SHORELINE HABITATS

Habitat areas of importance were designated as wetland areas (green / shaded areas) or shoreline habitats (blue outline). In some cases, habitats met both criteria and were given greater importance in final habitat analysis. It should be noted that the habitat areas designated are only representative of those along the immediate shoreline (or contiguous with the shoreline) and should not be used for any regulatory purposes. Failure to designate a specific area does not necessarily mean it holds no habitat benefits.

To help define specific areas of protection, the Muskegon Conservation District included wetland boundaries regulated by federal and/or state agencies. Yet, in many cases regulatory boundaries do not include smaller wetland and important shoreline habitats areas. In other cases wetlands present on regulatory maps do not exist any longer due to changes in land use and development. The District used the National Wetlands Inventory (NWI) and Michigan Resource Inventory System (MIRIS) inventory maps to designate wetland areas critical for protection (*map shown in lower right-hand corner*). The inventories represent existing information that suggests the probability that a wetland may or may not exist in a given area. Green areas represent wetlands as identified on NWI and MIRIS maps. Tan areas represent hydric soil areas which include wetland soils, depending on historic manipulation and prior drainage.





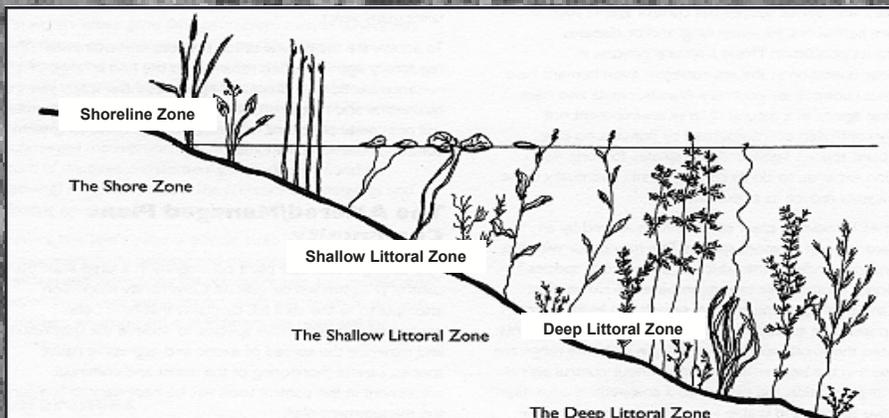
# AQUATIC PLANT TRANSECTS (1995)

In 1995 Dr. Mark Luttenton of Grand Valley State University completed the White Lake Aquatic Plant Assessment. The study provided detailed information on the macrophyte (rooted plants) beds in White Lake. The project established basic information about the state of macrophyte communities, including extent of plant growth, species composition, and biomass. The 1995 transects were evaluated for this study according to the following criteria:

1. # species
2. dominance value (biomass)
3. water column distribution (plant height providing habitat)
4. presence / absence of exotics

Sites were ranked from 1 to 20 according to the above criteria, with 1 having the most importance and 20 the least. Only the rankings 1 - 14 are shown as other sites (15 - 20) were nearly identical in characteristics.

Overall, the aquatic habitat within White Lake encompasses many areas including macrophyte beds, open water, bottom (benthos), shallow water areas, artificial structures (docks, seawalls, pilings), and natural structures (logs, rocks, and even rooted plants). Of these, the most important is the aquatic plant community which supports the diversity and richness of other aquatic organisms. Aquatic plants are the forests for the underwater world, providing significant structure for critical life stages of insects and fish. Three major zones comprise the aquatic plant habitat including shoreline, shallow littoral, and deep littoral. Within each of these zones it is also important that different plant species occupy different depths within the water column (diversity!).





# AQUATIC PLANT TRANSECTS (2000)

In 2000 Tom Hamilton of Hamilton Reef Fishery Services, and retired USFWS fisheries biologist, resurveyed the White Lake aquatic plant community. This follow-up survey revisited many of the sites originally evaluated by Dr. Mark Luttenton and added an additional 18 transects throughout the lake. The study was slightly more comprehensive in scope including plant community composition, comments on popular sportfishing areas, relative importance of areas to the lake's fisheries as a whole, and evaluated the dominance of exotic species. Utilizing this data, transects were evaluated for the purposes of this study according to the following criteria:

- 1. # species / families**
- 2. water column distribution  
(plant height providing habitat)**
- 3. Presence / absence of exotics**
- 4. # of exotic species present**
- 5. importance of area to fisheries**

Sites were ranked from 1 to 38 according to the above criteria, with 1 having the most importance and 38 the least. Only the rankings 1 – 16 are shown as other sites (17 - 36) were nearly identical in characteristics.

The greatest change between the 2000 and 1995 study was the extensive spread of exotic species (*Eurasian watermilfoil* and *curly leaf pondweed*). The presence of both species were present in 1995, but merely noted within a few transect locations. In 2000, the presence of exotics was widespread throughout the system occurring in all transect locations except two, which were located near the Business 31 bridge between Montague and Whitehall.

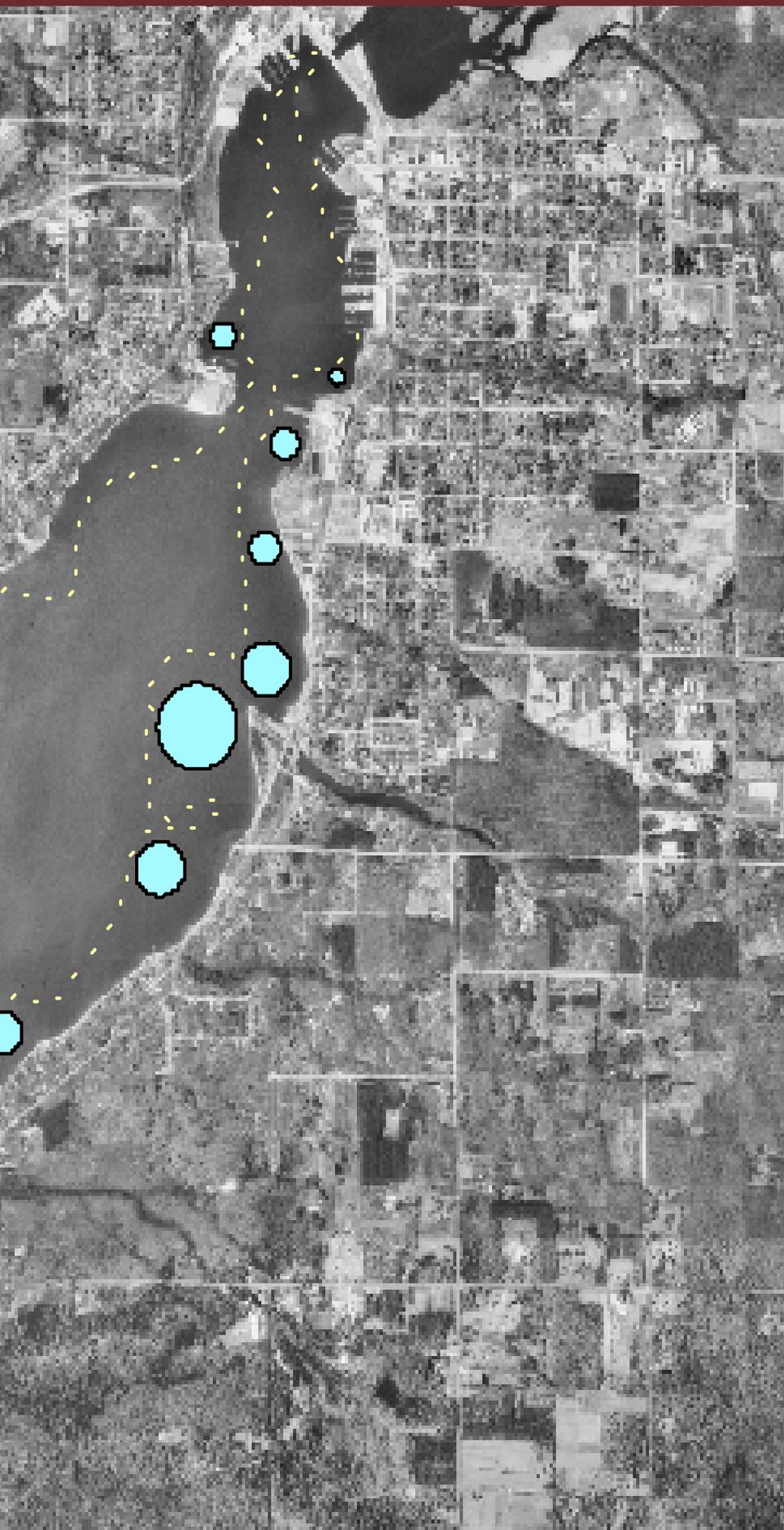


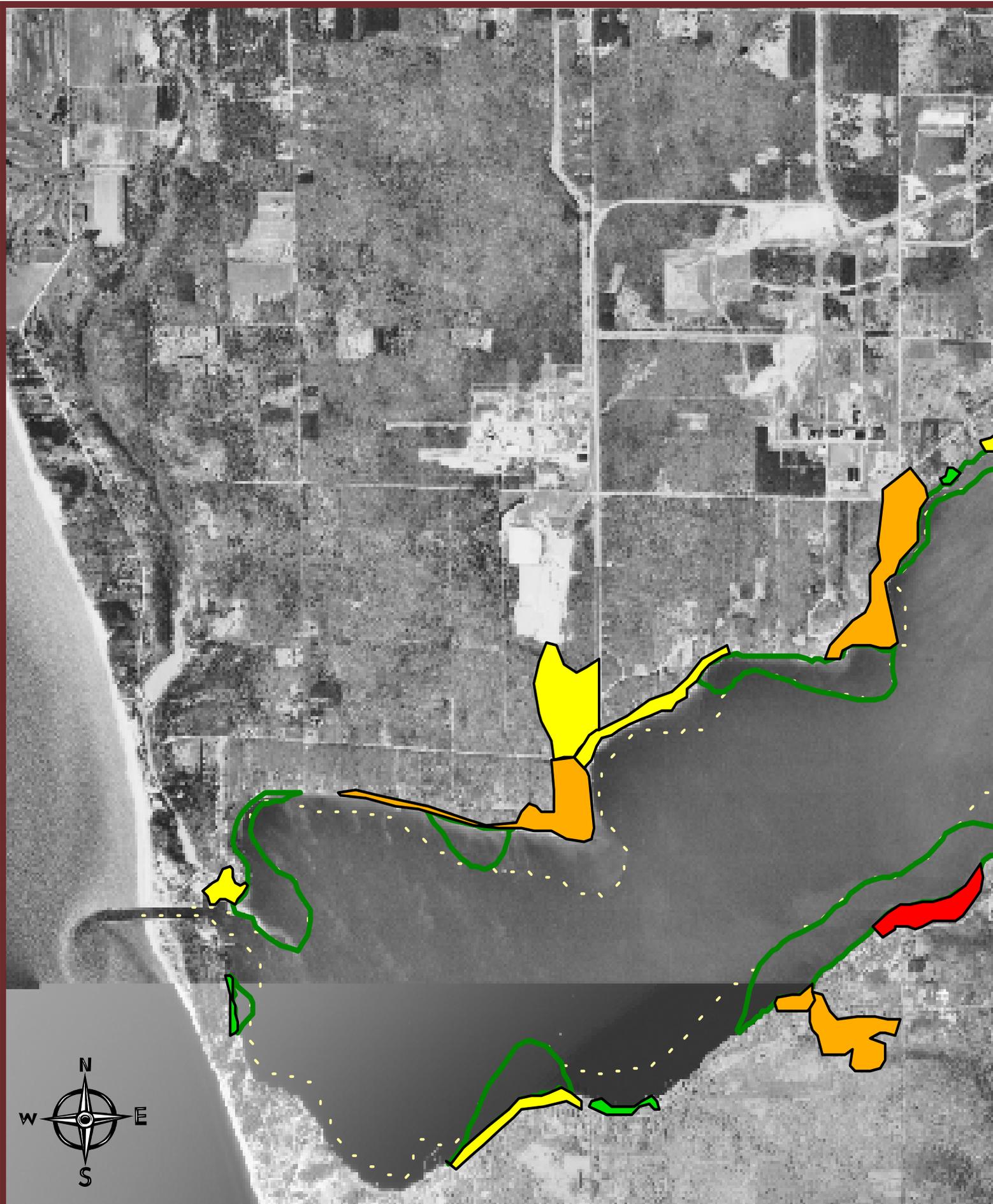


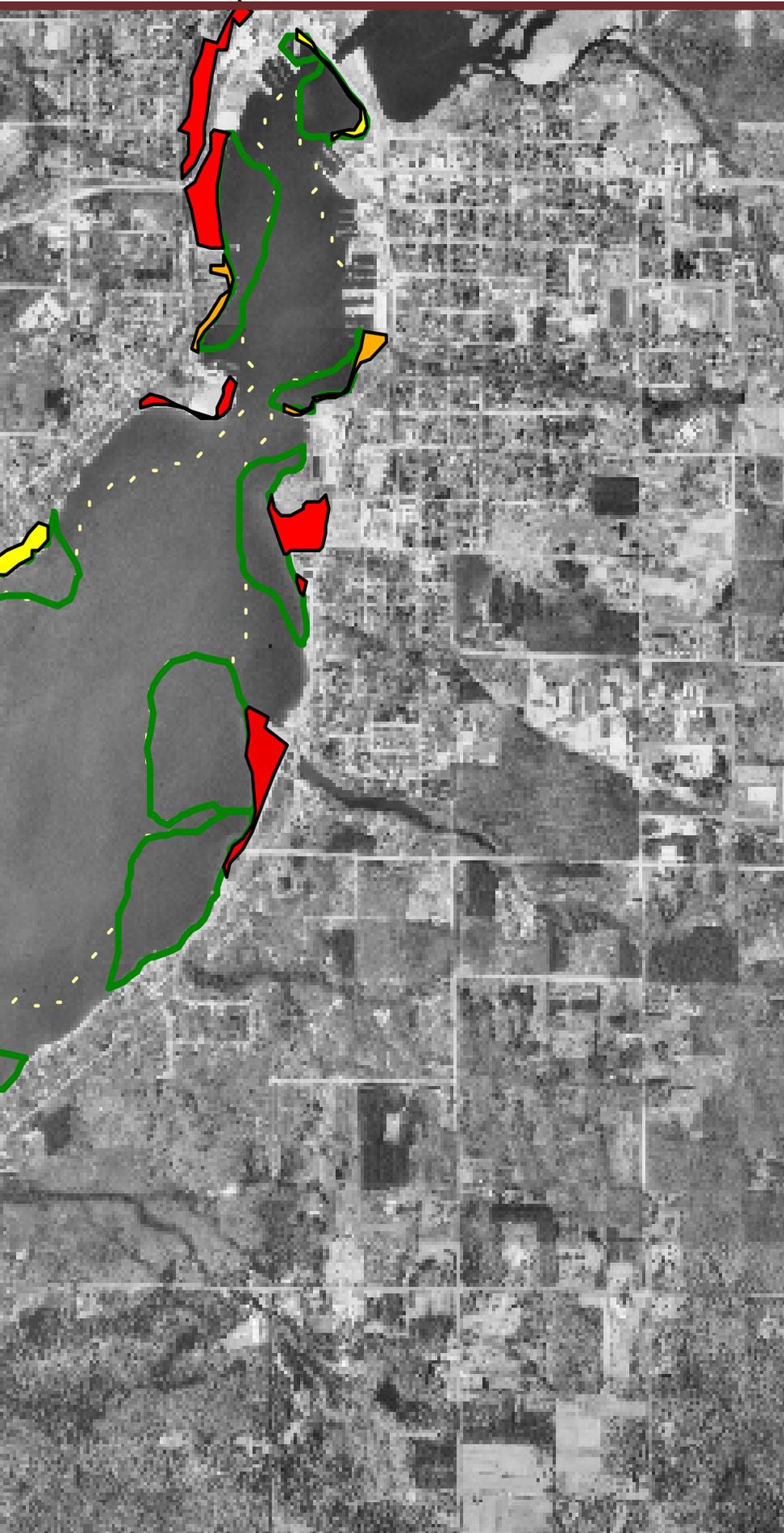
## EXTENT OF MACROPHYTE BEDS

In the White Lake Community Action Plan (2002 Remedial Action Plan Update), the White Lake Public Advisory Council states that an overall goal for White Lake's aquatic habitat would be to "maintain a healthy, vegetated habitat equal to 50% of the lake surface. In designing criteria for this study the District utilized bathymetric (water depth) maps and aquatic plant growing characteristics (maximum depth that a plant can grow) to determine the macrophytic shelf for White Lake. The extent of the macrophytic shelf is designated as a dashed yellow line on the map. Analysis of these data show that if plants were present throughout the entire available area plants would be restricted to covering approximately 27% of the lake. Although valid in its original intent and based on data for healthy lake characteristics for systems in Michigan, the original goal appears to be limited in its application to White Lake. The large variation is likely due to White Lake being a drowned river mouth lake and having a greater percentage of deep water caused by the internal river dynamics within the lake.

The District was able to utilize the macrophytic shelf data, and the presence of waterfowl found within multiple documents and personal accounts, to generate preference areas for migratory waterfowl. In all cases commentary was only utilized when waterfowl were present in large numbers, known as rafting. The avian behavior of rafting is well known to occur during migration as a protection measure, especially in areas of preferred food sources, which allows some members to feed and rest while other members scout for predators. Rafting areas are designated as blue circles on the map. Waterfowl rafting was also stated to occur within the deeper open water sections of the lake,







## SHORELINE RANKING

Utilizing all criteria, data, and information described within the previous pages (including maps and text), the Muskegon Conservation District compiled a Geographic Information System map for White Lake. This map and associated databases were analyzed to determine priority shoreline and aquatic habitat areas. In evaluating each of these habitat areas, priority was first determined according to a ranking as either shoreline or aquatic habitat by itself. Second, ranked based on contiguity between these two habitats. If quality shoreline habitat was adjacent to quality aquatic habitat it increased the shoreline habitat ranking. Increasing the shoreline habitat ranking and not the aquatic habitat facilitates land preservation around the lake while also preserving the aquatic habitat. The opposite does not necessarily occur, in that shoreline habitat is continually lost regardless of the aquatic habitat immediately connected to a given parcel. This is largely due to the practicality in preservation. It is easier to conceptualize and actually preserve “land” versus preserving “underwater land.”

Lastly, in generating the final criteria data map, all aquatic habitats identified by the analysis are determined to be of high priority. Aquatic habitats do not encompass the entire macrophytic shelf and because of the dramatic changes seen within the aquatic plant community are largely due to exotic species. Areas of importance for the aquatic habitat are outlined with green on the map; whereas, areas of importance for shoreline habitat are ranked by color:

- red—immediate preservation**
- orange—high preservation priority**
- yellow—intermediate priority**
- green—low preservation priority**

# Management Plan Recommendations



To protect fish and wildlife populations, shoreline habitats and wetlands for future generations the White Lake Public Advisory Council and Muskegon Conservation District will implement this document and recommends that the White Lake community work together to implement the following steps:

## **Municipalities:**

1. Utilize the White Lake Shoreline Habitat Plan locate areas within your jurisdiction that need immediate protection. Protect designated shoreline areas (pages 19 & 20) that need preservation in the next 3, 5, 7, and 10 years, respectively.
  - a. if publicly owned - place a conservation easement on the parcel (shoreline and aquatic habitat)
  - b. if privately owned - work with landowner to protect parcel
2. Work with other municipalities to develop and implement a strategy to adopt a White Lake Shoreline Habitat Plan by 2008, which evaluates impacts to the White Lake system as a whole and includes:
  - a. a 10-year action plan to connect protected habitats through restoration activities
  - b. tax incentives for wetland, shoreline, and aquatic habitat protection and conservation activities
  - c. natural resource impact assessments for all development activities within 500 ft. of the shoreline
  - d. supporting ordinance language within each municipality that
    - i. reduces dredging and aquatic plant harvesting in areas designated for protection
    - ii. establishes a 130 ft. native buffer and 100 yr. floodplain setbacks along the shoreline
  - e. all natural areas, publicly and privately owned that would benefit from habitat corridor connections
3. Work with the White Lake Association, local conservation organizations, and sport fishing groups to develop and implement an Integrated Pest Management Plan for exotic species. Association should act as lead, with strong financial support from municipalities, and ensure plan is implemented by 2008 with measurable results by 2010.

## **Community Organizations / Groups:**

1. Combine efforts to implement an exotic species outreach program that will eliminate or reduce introduction pathways. Acquire funding through grant writing and fundraising to provide signs, brochures, and other outreach materials at all locations where individuals access the lake. Ensure all areas "posted" within 2 years and outreach saturates community within 5 years.
2. Work to implement a voluntary (non-regulatory) fishing species take (length, number of individuals) to enhance future fishery populations (i.e., catch and release for perch under 8 1/2 inches, which allows for 2 to 3 more spawning times). Support the Michigan Dept. of Natural Resources stocking native fish of importance to White Lake (including White bass, Great Lakes Spotted Muskellunge, Sturgeon, and Walleye). Establish limits by 2007 and work with charter boat captains / sport fishing suppliers to facilitate support of program.

## **Individuals:**

1. Stop introducing new exotic species by being conscious of transporting exotic species on your boat, on the trailer, in the bait bucket, or in your vehicle. Do not purchase exotic live-bait to use in White Lake, White River, or immediate Lake Michigan area. If you use exotics do not dump bait buckets overboard at the end of the day.
2. Help re-establish native plants in your yard, while eliminating invasive exotic species. Riparian landowners, provide a soft shoreline (do not utilize breakwalls / seawalls) to maintain contiguity between the aquatic and terrestrial habitats, acting as wildlife corridors. Interested individuals can help control and slow the spread of exotics in public areas throughout the community (participate in purple loosestrife control days, or serve as an exotics survey volunteer).
3. Participate in education programs including workshops, public meetings, and demonstration projects.
4. Place a conservation easement on your shoreline property and / or your bottomlands (underwater) property.
5. Voice / lobby local governmental leaders to take action to preserve, protect, and restore White Lake's habitat.

### **Additional Resources**

*A Citizen's Guide for the Identification, Mapping and Management of the Common Rooted Aquatic Plants of Michigan* - MSU Extension

*An Introduction and User's Guide to Wetland Restoration, Creation, and Enhancement* - Interagency Workgroup on Wetland Restoration

*Great Lakes Coastal Wetlands* - Environment Canada

*How Much Habitat is Enough?* - Environment Canada

*Living with Michigan's Wetlands: A Landowner's Guide* - Tip of the Mitt Watershed Council

*The Urban Outback ~ Wetlands for Wildlife: A Guide to Wetland Restoration and Frog Friendly Backyards* - Adopt-A-Pond, Metro Toronto Zoo

*Wetlands and Water Quality: A Citizen's Handbook for Protecting Wetlands*—Lake Michigan Federation

*Habitat Management Guidelines for Amphibians and Reptiles of the Midwest*—Partners in Amphibian and Reptile Conservation

*Management of Aquatic Plants*—Michigan Dept. Environmental Quality

### **Web Resources**

U.S. Environmental Protection Agency  
<http://www.epa.gov/owow/wetlands/>

U.S. Fish and Wildlife Service  
<http://www.fws.gov/>

USDA-Natural Resources Conservation Service  
<http://www.nrcs.usda.gov/technical/biology.html>

Michigan Department of Environmental Quality  
<http://michigan.gov/deq>

Michigan Department of Natural Resources  
<http://michigan.gov/dnr>

Muskegon Conservation District  
<http://www.muskegoncd.org>



Your public comment is essential at all public meetings to express your agreement or disagreement with specific emerging issues. Other avenues to have your voice heard.

### **CONTACT INFORMATION**

#### **Local Groups / Organizations**

**White Lake Public Advisory Council**  
Norm Ullman, Chair  
940 N. Van Eyck St.  
Muskegon, MI 49442

#### **Muskegon Conservation District**

940 N. Van Eyck St.  
Muskegon, MI 49442  
(231)773-0008

#### **White Lake Association**

PO Box 151  
Montague, MI 49437

#### **White Lake Area**

**Sportfishing Association**  
PO Box 157  
Montague, MI 49437

#### **Local Municipalities / Agencies**

##### **City of Montague**

(231)893-1155  
Zoning Official (231)893-1155

##### **City of Whitehall**

(231)894-4048  
Zoning Official (231)893-1155

##### **Whitehall Township**

(231)893-2095  
Zoning Official (231)894-6877

##### **Montague Township**

(231)894-4414

##### **Fruitland Township**

(231)766-3208

##### **Blue Lake Township**

(231)894-6335

##### **White River Township**

(231)894-9216

##### **White Lake Area Building Authority**

8778 Ferry St.  
Montague, MI 49437  
(231)893-1155

Research Studies,  
&  
Summaries  
(2005-1992)



White Lake Area of Concern Contaminated Sediment Update. 2002. Rick Rediske - R.B. Annis Water Resources Institute, Grand Valley State University. Prepared for the White Lake Public Advisory Council and the Muskegon Conservation District.

White River Streambank Erosion Inventory. 2002. Prepared by Timberland Resource, Conservation, & Development Area Council, INC. for the White Lake Public Advisory Council and the Muskegon Conservation District.

DEQ to Remove Underground Storage Tanks. 2001. DEQ Press Release Dec. 5, 2001(State Listerv)

White Lake Fish and Waterfowl Aquatic Habitat Assessment. 2001. Prepared by Tom Hamilton for the White Lake Public Advisory Council, Muskegon Conservation District, and Michigan Department of Environmental Quality. - *Updating and expansion of earlier (1995) assessment of aquatic plants, including identifying critical habitat.*

Expedited Reconnaissance Study: White Lake Muskegon County, Michigan. Section 905(b) (WRDA 96 Analysis. August 2000. *Define water resource problems related to sediment contamination and identify potentially viable solutions.*

Draft Data Summary Report White Lake 905(b) Analysis. March 2000. Prepared for U.S. Army Corps of Engineers - *Historical and current natural resource data for 905(b) analysis - federal interest in sediment dredging within White Lake.*

White Lake Habitat Assessment. Sept. 1995/May 1996. Prepared for White Lake PAC, Lake Michigan Federation, and Muskegon Conservation District by Tom Nederveld and Theresa Lauber - *Inventory of vegetation and wildlife within a quarter-mile zone around White Lake. Includes historical analysis and recommendations.*

White Lake and Muskegon Lake Watershed Study. Sept. 1995. Richard R.Rediske, Water Resources Institute of GVSU. *Results of water and sediment/heavy metal samples for each lake including discharge areas of adjoining tributaries.*

White Lake Aquatic Plant Assessment. Sept. 1995. Prepared for White Lake PAC and Muskegon Conservation District by Mark Luttenton – *State of macrophyte communities in White Lake: extent of plant growth, species composition, and biomass.*

Work Plan for a Hydrogeological Investigation of the Whitehall Leather Company. Sept. 1995. Prepared by Horizon Environmental for Warner, Norcross, & Judd - *Characterization of surface soils, potential source areas in unsaturated, subsurface soils, and ground water quality at the interface with White Lake.*

White Lake Area of Concern Sediment Assessment Summary of Results. 1994. Prepared by USEPA conjunction with the Michigan DNR, U.S. Army Corps of Engineers, and Thermo Analytical, Inc. - *Determine contaminant concentrations and vertical profiles in the vicinity of the Whitehall Leather Company and determine the need for remedial actions.*

White Lake Public Advisory Council - Concerning the Whitehall Municipal Wells. November 18, 1993. Prepared by Gerald Homminga, City Manager –*Information about the wells, including locations, existence of volatile organic chemicals.*

White River Effluent. 1993. *Data on contaminant levels from January 1992 to October 1993.*

Occidental Chemical Corporation RCRR Facility Investigation. June 1993. *Location, ownership, operation history (production waste spills, environmental permits, surrounding land uses, ecological setting, hydrogeological conditions).*

White Lake Area of Concern Progress Report. January 1993. *An overview of the reasons for identifying White Lake as an Area of Concern, and the progress made since the Remedial Action Plan submitted in 1987.*

White Lake Watershed Discharge Violations. November, 1993. *Listing of discharge violations from 1989 to 1992.*

A Biological Survey of the North Branch of the White River, Oceana County. July 1992. Prepared as a staff report for the Michigan DNR - *Effects of sedimentation on fish & macroinvertebrate including habitat evaluation and water chemistry.*

Chronic Toxicity Assessment of Occidental Chemical Corporation Outfall 001 Effluent. April 24 - May 1, 1992. Prepared by Deborah Quinn of the Great Lakes and Environmental Assessment Section for the Michigan DNR - *The methods and results of a ceriodaphnia dubia survival and reproduction test to assess the chronic toxicity of the effluent.*

Chronic Toxicity Assessment of Muskegon County, Whitehall WWTP Outfall 002 Effluent. April 24 - May 1, 1992. Prepared by Deborah Quinn of the Great Lakes and Environmental Assessment Section for the Michigan DNR - *The methods and results of a fathead minnow larval survival and growth test. Ceriodaphnia dubia survival and reproduction test on the effluent.*



## Research Studies, & Summaries (1991-1967)

Annual Wastewater Report for 1991, White River Basin. Michigan Department of Natural Resources.

Acute Toxicity Assessment of Muskegon County, Whitehall WWTP Outfall 002 Final Effluent, Whitehall, Michigan. May 8 - 10, 1991. Prepared by Christopher Bradlee and Megan McMahon of the Great Lakes and Environmental Assessment Section for the Michigan DNR - *A summary of effluent toxicity on Daphnia magna.*

White River Status of the Fishery Report with Management Plan. Feb. 1991. Richard O'Neal. *Section information (upper, middle, and lower) specifically related to fish, habitat, management history, current status, and analysis.*

Fish Contaminant Monitoring Program White Lake 1987 and 1991 Analytical Results. Prepared by Michigan DNR - *Data on contaminants found in fish of White Lake without analysis or conclusions.*

Phase I Groundwater Investigation for White Lake Landfill. March 1990. Prepared by Fishbeck, Thompson, Carr & Huber, Inc., *Groundwater investigation required by Michigan DNR including soil borings, screened-auger borings, monitor well installation, groundwater sampling and other tests. Conclusions and recommendations included.*

Fish Collection, White Lake. June 1990. Prepared by Richard O'Neal of the Michigan DNR - *Electrofishing surveys comparing game fish numbers associated with disturbed areas and natural areas. Includes analysis, map, remarks, and fishing reports.*

White Lake Analytical Results for MDNR Collected Sediment Samples. September 13, 1990. *Data only.*

White Lake Sediment Sampling Stations. *Data only for 1972, 1980, 1986, and 1990.*

Whitehall Municipal Wells Investigation Completed. August, 1989. *Field investigation of Whitehall Municipal Wells Superfund Site to identify the nature and possible contamination.*

White Lake Total Phosphorus Spring Turnover. 1989. *Data only.*

Michigamme Project, White Lake, Muskegon County. Aug. 1989. Michigan DNR - *Sediment contamination data.*

Benthic Macroinvertebrate Survey of the White River at White Cloud in the Vicinity of an Old (Abandoned) WWTP, Newaygo County. September 16, 1983. Prepared by David Kenaga of the Michigan DNR - *Benthic macroinvertebrate study conducted to document the condition of the river since the city stopped use of the primary wastewater treatment facility.*

Biological Assessment of an Unnamed Tributary Receiving the Whitehall-Montague Wastewater Treatment 5 Day Irrigation Facility Discharge. August 16, 1983. (Complete Report) - *A macroinvertebrate study to determine the impacts of the discharge originating from under drainage within the spray irrigation area.*

The Impacts of the White Cloud Wastewater Treatment Plant on the White River at White Cloud. June 24, 1981. Prepared by David Kenaga of the Michigan DNR - *A macroinvertebrate survey conducted to determine the impact of the White Cloud Wastewater Treatment Plant on the White River.*

White Lake Press Release. July 2, 1980. Michigan Department of Public Health, Office of Communication - *Confirms that it is safe to swim and fish in White Lake since levels of PCB and PCE were trace.*

Memorandum: Meeting on White Lake. October 2, 1979. Prepared by John L. Isbister, Disease Control Officer - *Addresses concern about whether or not it is safe to swim and fish in White Lake, due to possible presence of PCB.*

Water Chemistry of White Lake. March 1, 1978. Prepared by Elwin Evans, PhD of the Michigan DNR - *Water and sediment testing to assess synthetic organic contamination in White Lake.*

White Lake Nutrient Survey. 1967. Prepared by State of Michigan Water Resources Commission Dept. of Conservation *Compilation of several surveys dealing with nutrient inputs (nitrogen and phosphorus) to White Lake and the effects of these inputs on the chemistry and productivity of the lake.*



# *White Lake Shoreline Habitat Management Plan*

Photos for this document supplied by:  
Jerry Grady  
Tom Hamilton  
Jeff Auch  
Greg Mund  
SeaGrant  
MSU-Extension