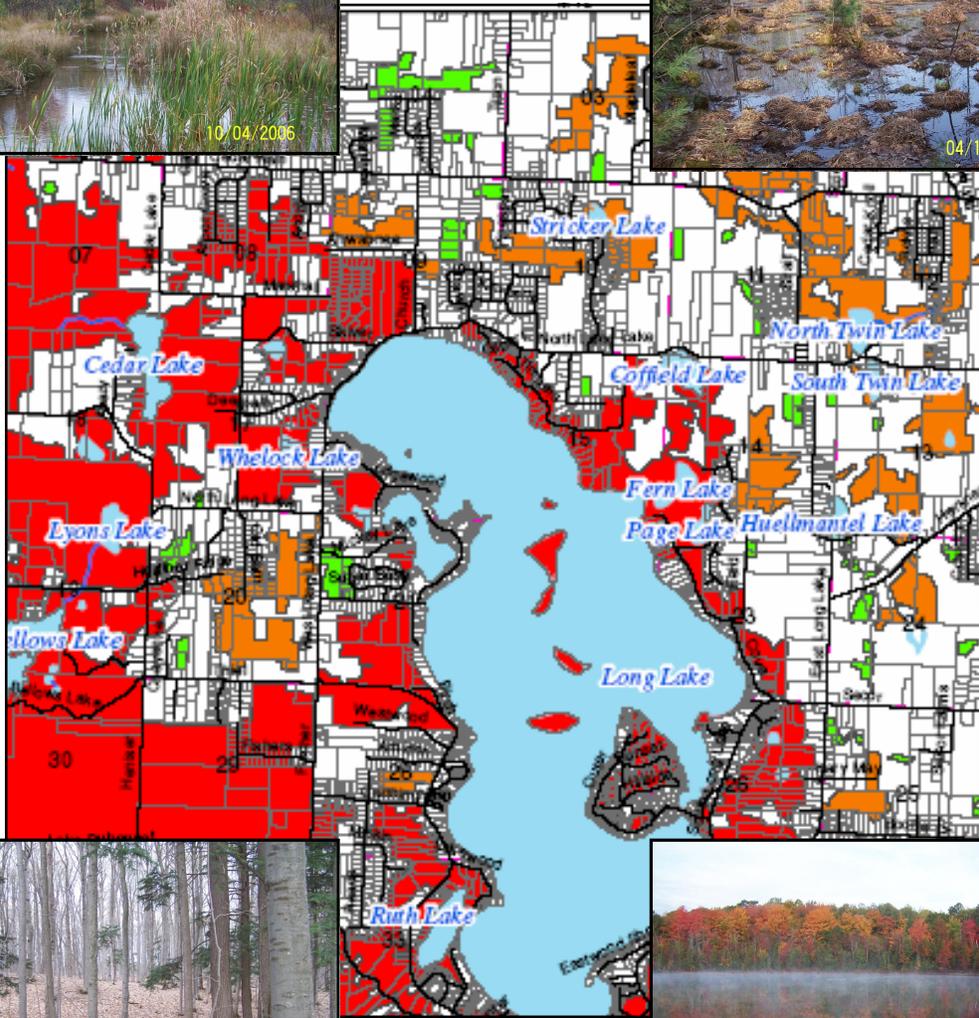


# Long Lake Township Natural Features Inventory

Long Lake Township



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<b>EXECUTIVE SUMMARY</b>	<b>iii</b>
<b>SECTION I. INTRODUCTION</b>	<b>1</b>
<b>SECTION II. COMMUNITY OVERVIEW</b>	<b>2</b>
EXISTING COMMUNITY PLANS	
EXISTING PHYSICAL AND BIOLOGICAL FACTORS	
<b>SECTION III. METHODS</b>	<b>12</b>
BASE MAP PREPARATION	
FIELD INVESTIGATIONS	
DATA ANALYSIS AND NFI COMPILATION	
<b>SECTION IV. RESULTS</b>	<b>16</b>
FLOODPLAINS	
STEEP SLOPES	
WETLANDS AND WATERCOURSES	
WOODLANDS	
THREATENED AND ENDANGERED SPECIES	
VIEWSHEDS	
NATURAL AREAS	
CORRIDORS ANALYSIS	
LAND USE TRENDS ANALYSIS	
<b>SECTION V. RECOMMENDATIONS</b>	<b>27</b>
FLOODPLAINS	
STEEP SLOPES	
WETLANDS AND WATERCOURSES	
WOODLANDS	
VIEWSHEDS	
LAND USE OF NATURAL AREAS AND CORRIDORS	
<b>REFERENCES</b>	<b>34</b>

**LIST OF TABLES**

Table 1. Lakes Located within Long Lake Township (acreage from 2006 NFI)
Table 2. Natural Areas Ranking Criteria
Table 3. Priority Areas Points Ranking
Table 4. Comparison of Findings of Forest Acres by Forest Type within Long Lake Township.
Table 5. Trends Analysis - Past and Present Land Use of Priority Natural Areas



**LIST OF FIGURES**

Figure 1. Floodplain Map

Figure 2 – Steep Slopes Map

Figure 3 – Wetlands and Watercourses Map

Figure 3a – Regulated Wetlands Map

Figure 4 – Woodlands Map

Figure 5 – Threatened and Endangered Species Map

Figure 6 – Scenic Views and Corridors Map

Figure 7 – Survey and Photograph Locations Map

Figure 8 – Natural Areas Map

Figure 9 – Large Parcels within Natural Areas Map

Figure 10 – Parcels Investigated within Priority One Natural Areas Map

Figure 11 – Wildlife Corridors Map

Figure 12 – Land Use of Natural Areas Map



This report is a supplement to the GIS data, and should only be used as a reference document. Any site plan review and natural features analysis should be completed utilizing the GIS data and its associated attributes. The Natural Features Inventory (report, maps, and GIS data) are for preliminary planning purposes only and do not replace the need for on-site assessment. The maps and report are intended to be used as a tool to assist in indicating the prioritization of natural features (*i.e.*, wetlands, woodlands, floodplains, Natural Areas, etc.) for possible protection by the Township. The presence of natural features as indicated on the maps and report is not intended to imply exact location or regulatory authority and should be evaluated on a site specific basis.

Niswander Environmental has completed a comprehensive Natural Features Inventory (NFI) of Long Lake Township, Grand Traverse County, Michigan. This executive summary is intended to be taken in context with the complete report and GIS, and is not intended to be used as a separate document. The NFI report describes the methods and criteria used to establish the Natural Area boundaries and ranking. The following summarizes the findings of the NFI.

Niswander Environmental collected available GIS data from the Michigan Center for Geographic Information, Grand Traverse County, Long Lake Township, and the Michigan Natural Features Inventory. These data were incorporated into ArcGIS 9.1 where preliminary base maps for floodplains, topographic and steep slopes, threatened and endangered species, wetlands, woodlands, and potential natural areas, were generated. Field work was organized by prioritizing sites according to priority natural areas identified on the preliminary base maps. In April 2006, Niswander Environmental conducted a comprehensive field evaluation that identified the natural features of Long Lake Township, including wetlands, watercourses, woodlands, floodplains, steep slopes, and viewsheds. Natural features assessment data were collected at 345 survey points and photographs were taken at 433 locations during the field investigation portion of the NFI. In addition to assessing the publicly accessible sites, Niswander Environmental identified thirty-nine (39) Priority One properties within the Township greater than 20 acres in size. Upon contacting each property owner, a qualitative field evaluation of 10 properties thought to contain high quality natural areas was performed.

Upon the completion of the field investigations, Niswander Environmental analyzed the field data and developed an interactive GIS database that connects site specific data with points located on the map. GIS coverages were developed for each natural feature category (*i.e.*, floodplains, steep slopes, wetlands, watercourses, woodlands, and Natural Areas) based on the conditions assessed during the field investigations. Attribute data, including feature type, size, quality, restorability, and other pertinent information, were linked to each individual natural feature category.

The Natural Areas were then analyzed for significance to the Township by developing qualitative criteria for site ranking. Criteria used in the NFI analysis included total size of the Natural Area, size of core area, presence of stream corridors, connectivity to other Natural Areas (including existing open space), percentage and area of wetland and woodland, presence of



threatened, endangered, or special concern species, restorability, vegetative quality, and the number of parcels involved in protecting the Natural Area. By utilizing all GIS data collectively and in conjunction with on-site field investigations, the Township will be able to make land use decisions with regards to natural features more effectively.



A Natural Features Inventory (NFI) was recommended in the Long Lake Township *Township Comprehensive Plan* as a strategy for preserving the natural beauty and significant natural features of the community. The goal of the NFI is not only to identify the Township's existing natural features but also to provide a baseline data set to be used for land use planning. The NFI will allow for responsible, integrated land use and provide a tool for measuring how the Township's natural features change over time and what management strategies might be needed to protect them. For example, the NFI will be used to determine if and how effectively the natural resources of the Township are protected by any existing ordinances and if amendments to these ordinances or adoption of new ordinances would provide additional protection in the future. Another application of the NFI will be to evaluate the quality of the natural resources to provide guidance for the preservation, restoration, and management of the Township's open space and ecological corridors.

Long Lake Township retained Niswander Environmental to conduct the NFI in the fall of 2005 with completion slated for fall 2006. Niswander Environmental designed a GIS-based NFI as a tool to be used by the Township planning, engineering, and parks staff on a daily basis to evaluate projects and potential impacts to natural resources on a landscape level. The power of this NFI is that detailed information, including photographs, quality assessment, restoration potential, ownership, land use, aerial photographs, field assessment data, connectivity, and disturbance can all be assessed instantaneously with the click of a button. As part of the NFI, Niswander Environmental also conducted analysis of the collected data, including a corridor study and trends analysis, and recommends management strategies for conserving the identified significant natural areas as detailed in this report.



Long Lake Township is a rural, agriculture, and vacation based community in Grand Traverse County. The Township is approximately 22,745 acres in size with approximately 19,000 acres of land area. The Township is well known for its recreational opportunities and unique viewsheds. The Township has a history rich in agricultural practices and today, 2,418 acres of land are still used for agricultural production. Over half of the land in the Township is comprised of parcels that total 20 acres or more in size. Undeveloped forestland and wetlands make up almost half of the total land area in the Township. This undeveloped land includes the Pere Marquette State Forest, the largest section of public land in the Township.

Rapid urban growth from nearby Traverse City is directly impacting the Township economically and environmentally. Long Lake residents desire local economic growth that will strengthen the community while protecting the natural features as trends shift to a more suburban population. The number of year-round residents is increasing in areas that historically housed seasonal second homes and vacation rentals. This accelerated influx of new residents and new homes has created immediate pressure on existing natural resources. The ecological integrity of local resources is being threatened as land is cleared and new homes and businesses are built.

Long Lake Township strives to support and encourage the growing community while conserving the rural character of the Township and minimizing impacts to the natural resources. A community opinion survey recently conducted by the Long Lake Township Planning Commission shows that Township residents value the natural resources and are committed to preserving them through supporting the preservation of scenic views from roadways, maintaining woodlands, preserving wetlands, protecting lakes and streams by reducing soil erosion, and maintaining active farmland. The community also expressed their desire for the development of non-motorized paths and designated nature areas on existing and future recreation sites. The rural character of Long Lake Township presents many outdoor recreational opportunities to its residents and seasonal visitors. Increasing population growth within the community will create further demand for such recreational opportunities.

### **EXISTING COMMUNITY PLANS**

Long Lake Township has adopted a proactive approach to planning for the future needs of the community. A Comprehensive Master Plan, Community Forestry Plan, Forest Stewardship Plan, and Parks and Recreation Plan have all been completed for the Township and take into account the community's needs and desires. The Natural Features Inventory conducted by Niswander Environmental incorporates the goals stated in these plans and will provide another tool to strengthening the protection of the Township's valuable natural resources. The following is a summary of the existing plans for the Township.

#### *Comprehensive Plan*

The Long Lake Township Comprehensive Plan recognizes that time and community involvement is needed to reach the goals outlined in the plan. Goals related to the preservation, management, and enhancement of the existing natural resources are as follows (Comprehensive Plan 2005):



- Large and interconnected areas of healthy and viable woodlands will cover at least 8,600 acres in the Township.
- In addition to areas permanently preserved in State forest lands, conservancies and public ownership, privately-owned woodland areas will be conserved through careful forest management and innovative development techniques that enable an economic use of the land while preserving key features.
- With the exception of State highways and some key primary roads, most roadways in the Township will be rural in character with key views to water and woodlands and/or overlook preserved viewsheds.
- Farming and farmland will remain an important part of the Township's landscape with field crop, livestock and timber operations, niche-based crops, hobby and agri-tourism operations as well as equestrian developments that incorporate open lands and farming practices that are compatible with the expanding residential character of the Township.
- All lakes in Long Lake Township will be characterized by clean water and healthy habitat for native plants and animals while serving as sustainable resources for human recreation and use.
- Protect agricultural lands, wetlands, inland lakes, steep slopes, and groundwater recharge areas from development impacts.
- Encourage the establishment of a continuous open space system that interconnects public and private natural areas and recreational facilities as well as providing for wildlife habitat.
- Encourage the inclusion of open space areas in conjunction with new and established developments.

The Township has identified the current land use as falling under one of eleven categories: single-family residential, two-family residential, multiple-family residential, commercial, institutional, industrial, agriculture, township, county, non-developed, and other. Analysis of current growth trends and the goals within the Township resulted in the designation of eight future land categories: conservation-recreation, open space, residential/agriculture, lake residential, suburban residential, village residential, local commercial, general commercial, and light industrial.

### *Community Forestry Plan*

The Community Forestry Plan of Long Lake Township incorporates the community's goals and values outlined in the Comprehensive Plan into a manual to guide the Township in managing its valued forestlands. The Community Forestry plan has provided a solid base for developing scientific based management plans that incorporate the social values of Long Lake Township.



The following are the Township's goals for improving the forestlands within the community using the principles of ecosystem management (Community Forestry Plan, 2005):

- Use a collaborative approach to protecting and managing natural systems by forming partnerships with local and state agencies, adjacent units of governments, and resource organizations.
- Increase public awareness and encourage Township residents and businesses to participate in the implementation of the community-wide forestry program through educational programs, technical assistance programs and community events such as national Arbor Day.
- Encourage the use of native plants for reforestation, wildlife habitat, street and neighborhood trees, landscaping and roadside corridors.
- Encourage the retention of existing native trees and the establishment of street and shade trees in residential neighborhoods and commercial developments within the Township.
- Encourage the preservation, enhancement, and restoration of critical wildlife habitat and important ecological corridors.
- Support continued farming operations and encourage reforestation of lands no longer being farmed.
- Discourage fragmentation of wildlife habitats and resource lands while encouraging rural, low-density residential development.

The Community Forestry Plan identifies and uses four different forest resource types for making management recommendations: large tract forests, woodlands and riparian forest, farmland woodlots and open space, and suburban forest. Large tract forest includes state forest lands and private forest lands that are primarily designated as conservation and recreation areas. These lands are an important segment of an ecological corridor that stretches through the northwestern region of Michigan's Lower Peninsula. The Plan recommends that management of the woodlands and riparian forest resource type primarily focuses upon the preservation of natural forested areas located along streams and around lakes. The farmland woodlots and open space category is defined as predominately non-forested and include active and inactive farmland, developed areas, and smaller woodlots. Suburban forest includes subdivisions, small lot residential, commercial, and industrial areas within the Township.

### *Forest Stewardship Plan*

The Forest Stewardship Plan was developed for a 120-acre parcel of land on North Long Lake Road in Section 35 of Long Lake Township. The Township believes that this property is an opportunity to preserve a critical resource and can be used for educational purposes. As a "quiet wildlands recreation" park, nature observation, hiking, cross-country skiing, hunting, outdoor



education programs, and mushroom hunting is encouraged. The land may become a natural area to be used by the Grand Traverse Conservation District as a satellite of the Grand Traverse Natural Area Reserve, a 420-acre preserve along the Boardman River. A private consultant was retained to delineate the plant communities present on the property and rank the quality of each stand. Several stands of high quality woodlands are located on this property including oak, aspen, white and red pine, and forested wetlands. These stands provide quality wildlife habitat primarily due to high mast production, cover, and breeding habitat. Three wetland cover types occur within the park: forested wetlands, open bogs, and emergent wetlands. These areas will be considered preservation areas and are protected from all management activities. A 100-foot buffer along the edge of all areas classified as a wetland will protect the ecological integrity of these vital systems. Wetland areas are utilized by all forms of wildlife - amphibians, reptiles, mammals, birds, macroinvertebrates, and insects. More of these rich habitats exist in Long Lake Township and, while national trends show that these areas are on the decline, the community desires to preserve and enhance these resources. This Stewardship Plan is an example of how common management principles will enrich and preserve the quality of life that is expected and desired by residents of Long Lake Township. The Natural Features Inventory provides the preliminary information necessary to identify other priority natural areas that would benefit from development of such management plans.

### *Parks and Recreation Plan*

Long Lake Township currently houses a variety of resources that are on public or semi-public lands. The Parks and Recreation Plan developed by the Township strives to protect the environment while providing safe and accessible recreation for community members, residents of nearby townships, and seasonal visitors. Other goals stated in the plan, relating to the preservation and conservation of the Township's natural resources, are as follows:

- Promote a variety of activities evenly dispersed throughout the Township.
- Protect water quality to maintain ecological integrity as well as economic viability.
- Acquire parcels of land adjacent to recreational lands in order to conserve larger sections of land and to provide a wider range of recreation opportunities to the public.

The Parks and Recreation Plan describes several existing outdoor recreation areas. Bullhead Lake Natural Area is a 26-acre parcel with 1,100 feet of lake frontage. Nature trails wind through the property and provide access to the preserved lakefront habitat. The 120-acre parcel owned by the Township and described in the Forest Stewardship Plan has a network of trails that wind through seven different natural plant communities representative of Northern Michigan's land cover and offer a variety of opportunities for wildlife observation. A 20-acre parcel within the Township was transformed from an old dump site into a park with trails, benches, picnic tables, a native plant garden, and interpretive signage. This park was designed and developed by community volunteers and is monitored annually for the presence of contamination from its previous use as a dump. The Grand Traverse Regional Land Conservancy allows public access to South Island in Long Lake and the Carter-Strong Bird Sanctuary on Ruth Lake. The Gerald Oleson Foundation allows public access to its island in Long Lake. The Timbers Girl Scout



Camp, Mickey Lake Girl Scout property, and Gilbert Pines Boy Scout Camp encompass 396 acres of land in Long Lake Township (Community Forestry Plan, 2005) and are opened to the public for a variety of programs and uses.

Currently, a 5-year Action Plan has been developed by the Township as part of the Parks and Recreation Plan. The proposed acquisition of land adjacent to the Township-owned 120-acre conservation area and the Township property between Bass Lake and South Long Lake for the development of natural areas and trails accessible by the public, are positive steps toward developing outdoor recreation opportunities desired by the community.

### **PHYSICAL AND BIOLOGICAL FACTORS**

In preparation for the development of the Community Forestry Plan, the Township conducted a resource inventory using aerial photo interpretation and field investigations to assess the existing natural resources. Data produced by this resource inventory, the Comprehensive Plan (2005), and the preliminary investigations conducted for this NFI provided insight to the existing conditions of the natural features of Long Lake Township.

#### *Topography and Soils*

Long Lake Township offers unique scenery and viewsheds throughout gently rolling hills formed by glacial deposits from over 10,000 years ago. As a result of these deposits, the Township experiences a significant change in elevation – low and flat in the east and south then rising 360 feet into hills characterized by their steep slopes. The Long Lake Township Comprehensive Plan (2005) used the U.S. Department of Agriculture Soil Survey to categorize the three main soil types that define the Township: Emmet-Leelanau, Rubicon-Grayling, and Kalkaska-Mancelona. The Emmet-Leelanau association is found in the northeast and eastern sections of the Township. These well-drained, sandy loam soils encompass a majority of the steep slope areas in the northeast and eastern regions of the Township. The Rubicon-Grayling association extends southwest from the southern half of Long Lake. The majority of land area within the Township that is comprised of these sandy, dry soils is located in the forested, public lands of the Pere Marquette State Forest. The Kalkaska-Mancelona association encompasses over half of the Township. This soil association is characterized by well drained sands and loamy sands that occur throughout the level valleys and sloping uplands of the Township. The Kalkaska soil series is Michigan's official State Soil. It was first described in 1927 in the western northern lower and was one of the first soil series to be named and used in Michigan (NRCS).

#### *Lakes, Streams, and Watersheds*

The lake systems in Long Lake Township are critical resources for seasonal recreation, tourism, and residential development. Valuable wildlife habitat and plant communities are associated with these lakes. The Township prides itself on the diverse recreational opportunities that the open water and natural areas provide for the community. There are 20 named inland lakes covering approximately 3,920 acres within the Township, or approximately 16% of the Township's surface area as listed in Table 1 (Comprehensive Plan, 2005). Long Lake is the primary feature of the Township and covers approximately 2,954 acres within the Township borders. According to the Comprehensive Plan for Long Lake Township (2005), over 75% of



the Township’s total water surface is comprised of Long Lake. Other larger lakes within the Township are Bass Lake and Lake Dubonnet. Natural lakefront property is experiencing the most rapid decline in land area in the Township in part due to conversion of lakefront seasonal homes to primary residential neighborhoods. Preservation and enhancement of the remaining natural areas adjacent to the lakes are a priority in the Township.

Table 1. Lakes located within Long Lake Township (acreage from 2006 NFI)

NAME	ACRES	NAME	ACRES	NAME	ACRES
Bass Lake	251.6	Huellmantel Lake	18.0	Page Lake	10.5
Bellows Lake	85.2	Lake Dubonnet	170.6	Ruth Lake	43.8
Bullhead Lake	3.7	Long Lake	2953.7	South Twin Lake	11.5
Cedar Lake	51.1	Lost Lake	7.8	Skiver Lake	7.0
Coffield Lake	29.4	Lyons Lake	18.7	Stricker Lake	13.4
Dyer Lake	36.5	Mickey Lake	60.1	Whelock Lake	8.4
Fern Lake	20.1	North Twin Lake	18.5		

Water quality of the lakes is feared to be in jeopardy with the rise of development. Township residents raised the issue of water quality when they noticed a rapid increase in the amount of algae and vegetation in local lakes. A lake that is producing an excess of vegetation is called eutrophic; this happens when nutrients entering the lake encourage the plant and animal life to become more productive. Increased biotic productivity decreases water clarity and the amount of oxygen in the water. Phosphorus is a common chemical nutrient that contributes to plant and algae growth in lakes. Phosphorous and other nutrients such as nitrogen, along with sediments enter the lake via lawns that are mowed up to the lake’s edge, development activities, and banks that are not protected from erosion. A water quality study of Long Lake conducted in 1999 confirmed that as residential building increased, water quality decreased (Comprehensive Plan, 2005). The study showed that phosphorus levels measured in the bottom sediments of Long Lake were elevated. A long term water quality study conducted from 1993-2001 confirmed that phosphorus levels are increasing in the bottom sediments. However, the study determined that the waters of Long Lake were actually of high quality, receiving scores ranging from 93 to 100 on a Water Quality Index scale of 1 to 100 (Comprehensive Plan, 2005). As a result of these studies, the Township has worked with landowners to reduce runoff to the lakes through promotion of lakefront buffering with natural vegetation. Regulatory measures have also been taken in the Bellows and Cedar Lake areas to increase the setback requirements for lakefront developments.

Long Lake Township contains few streams. The largest, and perhaps most significant, stream in the Township is Cedar Run Creek, which is located in the northwest corner of the Township. Cedar Run Creek is a cold water stream and is designated by the Michigan Department of Natural Resources as a trout stream. The creek and its riparian corridor is richly diverse, offering several distinct habitat types including sedge meadows, emergent and scrub-shrub wetlands, and a cedar/hemlock swamp. The other streams in the Township primarily serve as connections between lakes or through wetlands and are likely important wildlife corridors.

The Township contains five primary watersheds. The Platte River watershed is the primary watershed for the Township consisting of 90% of its land area (Comprehensive Plan, 2005).



The Platte River watershed boundary winds through Long Lake Township and Benzie County and then drains into Lake Michigan (Comprehensive Plan, 2005). The Lake Leelanau, Duck Lake, Green Lake, and Boardman River watersheds drain the remaining area in the Township. The Township also has a Long Lake Watershed Management Plan that evaluates the water quality of the watershed and identifies several ongoing activities to evaluate and monitor the health of the watershed.

### *Wetlands*

According to Part 303, Wetlands Protection, of the Natural Resources and Environmental Protection Act, 1994 PA 451, the State of Michigan defines a wetland as, "...land characterized by the presence of water at a frequency and duration sufficient to support, and that under normal circumstances does support, wetland vegetation or aquatic life". In Michigan, wetlands are determined using three factors: soils, vegetation, and hydrology. If two of these factors are present, the area is usually classified as a wetland. If vegetation is used as a determining factor, the dominant vegetation must be classified as a wet tolerant species using the Federal Army Corps of Engineers wetland indicator ranking. This classification system ranks plant species according to what level of soil moisture regime they most often occur. Wetland soils are either mineral or organic soils (Mitsch and Gosselink, 1993). Mineral soils contain little organic (undecomposed plants) material and typically occur in freshwater marshes and lowland hardwood associations (Mitsch and Gosselink, 1993). Organic soils, such as peat, are capable of storing much more water than mineral soils (Mitsch and Gosselink, 1993). A good example of this characteristic is the thick layers of sphagnum moss that comprise the bog ecosystems in Long Lake Township. The peat soaks up large quantities of water to create a floating mat that supports a variety of unique plant species.

Soil types found in wetland ecosystems are classified as hydric. According to the Comprehensive Plan (2005), Grand Traverse County Soil Survey indicates that there are 1,588 acres of hydric soils in the Township. Hydric soils are defined as, "A soil that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part" (MDEQ). Anaerobic soil conditions mean that there is limited to no available oxygen located in-between the soil particles available for uptake by the plants' root systems. Wetland plant species are better adapted to surviving these conditions than plants found in an upland grassland or forest.

Wetland ecosystems are known for their biological diversity and their value to humans. Wetlands create habitat for fish and wildlife and often are home to threatened and endangered species. Wetlands improve water quality by filtering pollutants out of water before it flows into an aquatic or groundwater system. Wetlands are also efficient at removing sediments from water. As sediment-laden water flows through wetland vegetation, sediments are pulled out of the water and deposited in the wetland. This function reduces the amount of sediments that enter our lakes and streams, impacting the natural aquatic environment. Wetlands that occur along the edges of lakes and other watercourses reduce erosion caused by waves or heavy rains. Wetlands also act as a storage system for floodwaters, protecting homes from water damage and ecologically sensitive areas from sedimentation. Wetlands are also valued by humans for the hunting and wildlife observation opportunities these habitats offer.



Approximately 15% of Grand Traverse County's land cover is wetlands (Grand Traverse County Master Plan, 2002). Over 1,200 acres of wetlands are located in Long Lake Township, an estimated 6.5% of the Township's land area (Community Forestry Plan, 2005). The Township's wetlands tend to typically occur in association with one of its many lakes. The Bellows, Lyons, and Cedar Lake complexes are primarily characterized by wetland. Many undeveloped portions surrounding Long Lake are wetland.

Wetlands within the Township generally fall under the following categories: forested, scrub-shrub, wet meadow, open bog, and freshwater marsh/emergent. Forested wetlands are usually wet only a small portion of the year and are classified as having primarily woody vegetation greater than 30 meters in height. Forested wetlands are either coniferous or deciduous in nature and typically contain species such as tamarack, white cedar, balsam fir, white spruce, black spruce, elm, red maple, silver maple, black ash, green ash, and quacking aspen. Scrub-shrub wetlands have varying wetness, from seemingly wet a large portion of the year to dry most of the year, and are classified as having woody vegetation less than 30 meters in height. Common species found in scrub-shrub wetlands of northern Michigan include tag alder, willows, and dogwoods. Buckthorn, a non-native invasive species, can also be common in this wetland cover type. Wet meadow wetlands are classified as occurring in saturated soils with grasslike plants dominating the vegetation. Common species found in wet meadows include bluejoint, path-rush, brown fox-sedge, and a variety of asters. Open bogs are generally classified as a thick mat of floating vegetation, typically sphagnum moss, that is acidic in nature. Common species in an open bog include cranberry, leatherleaf, bog-laurel, sedges, pitcher plants, and sundews. Freshwater marsh/emergent wetlands are wet a large portion of the year and are primarily dominated by grasses or grass-like species and may contain some portions of open water. Common species found in emergent wetlands include cattails, sedges, rushes, pickerelweed, arrowhead, smartweeds, and floating aquatic species. Emergent marshes provide prime habitat for many waterfowl and wading birds.

A special feature of Long Lake Township is the conifer bogs that are found primarily in the southwest corner of the Township. The Michigan Natural Features Inventory classifies these bogs as a special natural plant community (Community Forestry Plan, 2005). More commonly found in Michigan's Upper Peninsula, northern conifer bogs are scattered throughout the northern lower and are uncommon in the southern region of the State. Tree species create a border around the bog with scattered individuals taking root in the thick peat layer. Common shrub and wildflower species found in northern conifer bogs include large and small cranberry, leatherleaf, pitcher plant, sundew, and orchids. The bog habitat is protected from most development due to wetland laws and the low economic value of the timber.

### *Woodlands*

Long Lake Township is not only characterized by its many lakes, but also by its abundance of woodlands throughout the community. Many large remnants of original and second growth forests still exist in much of the Township. These areas are very important assets to the Township as both a natural feature and an economic resource. The Township wishes to protect the remaining woodland areas from development pressures as well as promote new forestation as part of new development.



A resource inventory conducted as part of the Community Forestry Plan classified the woodlands of Long Lake Township into four categories: upland hardwoods, upland conifers, lowland hardwoods, and lowland conifers. The upland hardwoods category is the largest forest category encompassing 5,134 acres of the Township's land area (Community Forestry Plan, 2005).

The upland hardwoods category was divided into three sub-categories: northern hardwoods, aspen-birch, and oak. The northern hardwoods associations are comprised of sugar maple, red maple, American beech, basswood, and yellow birch. Soil types range from mostly acid loamy sands to loams. This forest community stretches over 5.9 million acres of northern Michigan, including the Upper Peninsula. The aspen-birch association is comprised of big-tooth aspen, quaking aspen, white birch, and red maple. Aspen-birch forest communities are commonly found in areas that have experienced major disturbances, such as logging or clear-cutting. Aspen-birch associations occur in a wide range of soil and moisture regimes. White pine, red pine, balsam fir, and other hardwoods may be found growing within this association. The oak associations are comprised of red and white oak. The oak communities of Long Lake Township are classified as northern dry-mesic oak forests for they are usually found in acidic, well-drained or loamy sands. Historically, these forests were primarily dominated by white and red pine forests with oak species occurring in the understory. As the pines were harvested for their valued timber, the land became more susceptible to wildfires. These wildfires created an environment where the fire-loving oak species could outcompete pine seedlings for nutrients and sunlight. Red pine, black cherry, and aspen will commonly occur in the canopy of oak stands and white pine will often occur in the understory. Development pressure, absence of management, and the negative impacts of deer browse on oak seedlings is contributing to the decline of these communities.

The upland conifers category is the second largest forest category covering 2,044 acres of the Township (Community Forestry Plan, 2005). This forest community is comprised of jack pine, red pine, white pine, white spruce, balsam fir, blue spruce, and scots pine. Blue spruce and scots pine are not native species to Michigan. Northern pine forests are generally associated with very acidic, excessively drained soils. Jack pine and red pine are commercial timber species and, with proper management, can be sustained as a valuable economic and ecological resource.

The lowland hardwoods category is the third forest category found in the Township. This forest community is primarily found adjacent to creeks and lakes and is classified by the Township as a forested wetland. Lowland hardwoods cover 275 acres of Township land (Community Forestry Plan, 2005). This is a significant change in land cover from the large areas comprised of upland hardwoods and conifers. Lowland hardwoods are comprised of elm, red maple, ash, and quaking aspen and are typically found in slightly acid to neutral sandy, sandy loam, or muck soils that are poorly drained and/or seasonally inundated.

The lowland conifers category is the fourth forest category identified by the Township. Northern conifer swamps cover 237 acres of the Township and are comprised of northern white cedar, black spruce, white spruce, eastern tamarack, and balsam fir (Community Forestry Plan, 2005). This forest category also includes the rare spruce-fir bogs that occur in the Township.



The resource inventory conducted for the Community Forestry Plan found that the Township's forests are in good health; however, gypsy moth outbreaks and the rising threat of oak wilt are issues of concern. The Forestry Plan encourages community participation in the Grand Traverse County Gypsy Moth Program and the development of Township-wide programs focusing on the education and management of oak wilt.

### *Flora and Fauna*

According to the Michigan Natural Features Inventory, Long Lake Township is home to plant and animal species that are state-listed as Threatened, Endangered, or Species of Special Concern. The common loon, red-shoulder hawk, and massasauga rattlesnake are three species whose occurrence has been recorded in specific sections of the Township.

The common loon is a large bird that dives for fish (Sibley, 2003) and, in Michigan, only breeds in some areas of the northern lower peninsula and throughout the upper peninsula (MDNR). According to the Michigan Department of Natural Resources (MDNR), the common loon population in Michigan began its decline prior to 1912. Only 200 pairs remained in the early 1980's (MDNR). It was listed as a state threatened species in 1987 and active management to improve habitat and increase the breeding population is currently in place (MDNR). Common loons are highly sensitive to human disturbance and will usually abandon their nest if a human approaches them.

The red-shoulder hawk may be globally secure, but it is a state-threatened bird of prey that utilizes mature forested floodplains and mature deciduous or mixed forest habitats (MNFI). These raptors prey on small rodents, birds, frogs, snakes, and insects (MNFI). Historically, red-shoulder hawks bred in the southern lower peninsula, but have since changed their preferred breeding grounds to the northern lower (MNFI). Hawks breeding in areas of Manistee County currently have the highest brood success (MNFI); however, the MNFI has recorded occurrences of this species in Long Lake Township. Areas of Long Lake Township may be suitable breeding grounds for this species if it continues to expand its range to the north.

The massasauga rattlesnake is a reptile of special concern in Michigan and is threatened on the global level (MNFI). This species is currently a candidate for federal listing (MNFI). This docile, medium sized snake is usually found in lowland river habitats, hence its Chippewa name *massasauga* that means "great river mouth" (Harding, 1997). Habitat conservation at the landscape level is important for this species on account of the snakes use of upland areas adjacent to its lowland habitat in the summer for food and basking (Harding, 1997). Research indicates that Michigan's massasauga population is persisting at a better rate than any in the United States, yet it is still declining. Education and habitat conservation are the two best management techniques to preserve this species.



This Natural Features Inventory (NFI) is a collaborative effort between Long Lake Township, the community, and Niswander Environmental. The Comprehensive Plan for Long Lake Township, Community Forestry Plan, Forest Stewardship Plan, Parks and Recreation Plan, and Master Plan for Grand Traverse County were the primary documents used in developing the goals and objectives of the NFI. Oakland County NFI methodology and Niswander Environmental NFI experience was used to draft a work plan for conducting the NFI.

### **BASE MAP PREPARATION**

Niswander Environmental collected available GIS data from the Michigan Center for Geographic Information, Grand Traverse County, Long Lake Township, and the Michigan Natural Features Inventory. Additionally, black/white aerial photographs (2003) were provided to Niswander Environmental by Grand Traverse County, and 1998 infrared aerials were obtained from the Michigan Geospatial Digital Library (MiGDL). This data was incorporated into ArcGIS 9.1 where preliminary base maps for floodplains, topographic and steep slopes, threatened and endangered species, wetlands, woodlands, and potential natural areas, were generated. A public meeting was held in April of 2006 to provide Township residents with an opportunity to become familiar with the NFI project, provide feedback and address questions or concerns, and interact with Niswander Environmental staff.

### **FIELD INVESTIGATIONS**

The extensive field work was organized by prioritizing sites according to priority natural areas identified on the base maps, thereby making the project more time and material efficient. Natural features assessment data were collected at 345 survey points and photographs were taken at 433 locations during the field investigation portion of the NFI. In April 2006, Niswander Environmental conducted a comprehensive field evaluation that identified the natural features of Long Lake Township, including wetlands, watercourses, woodlands, floodplains, steep slopes, and viewsheds. In addition to assessing the publicly accessible sites, Niswander Environmental identified thirty-nine (39) Priority One properties within the Township greater than 20 acres in size. Letters were sent to each of the 39 property owners in September 2006 requesting permission to access their parcels to conduct a more comprehensive field assessment of the property. Twenty of the property owners responded to the mailings, and Niswander Environmental conducted a qualitative evaluation of ten properties thought to contain high quality natural features.

### **DATA ANALYSIS AND FINAL NFI COMPILATION**

Upon the completion of the spring field investigations, Niswander Environmental analyzed the field data and developed an interactive GIS database that connects site specific data with points located on the map. The final GIS-based NFI was generated by integrating the field data with the preliminary base map data. Each survey and photo location was identified on the NFI map and the assessment data and digital photographs were then linked to each location. GIS coverages were developed for each natural feature category (*i.e.*, floodplains, steep slopes, wetlands, watercourses, woodlands, and Natural Areas) based on the conditions assessed during the field investigations. Attribute data, including feature type, size, quality, restorability, and other pertinent information, were linked to each individual natural feature category.



Natural Areas were determined from an analysis of the existing GIS data and the field investigation. Natural Areas are public and private lands that are primarily undeveloped and include lands devoted to active or passive recreational use or lands retained for visual or natural resource protection purposes. Natural Areas typically contain wetlands, woodlands, watercourses, floodplains, or active recreation areas. A Natural Area was also defined as a section of land greater than 20 acres in size comprised of natural plant communities that have not been significantly disturbed or modified by modern development activities.

The Natural Areas were then analyzed for significance to the Township by developing qualitative criteria for site ranking. Determining significance to the Township was based on evaluation of not only the quality of the natural resource, but also the site’s need for protection, threat of destruction, and relationship to surrounding land use. Each Natural Area was ranked using a set of criteria to assign a number for each attribute that significantly contributes to the ecological integrity of an area (Table 2). Criteria for ranking was based on the natural features inventory analysis done by the MNFI for Oakland County (2004 *Oakland County Potential Conservation/Natural Areas Report*) and previous natural features inventories conducted by Niswander Environmental. Criteria used in this NFI analysis included total size of the Natural Area, size of core area, presence of stream corridors, connectivity to other Natural Areas (including existing open space), percentage and area of wetland and woodland, presence of threatened, endangered, or special concern species, restorability, vegetative quality, and the number of parcels involved in protecting the Natural Area (Table 2).

**Table 2. Natural Areas Ranking Criteria\***

Criteria	Description	Detail	Points	
<b>Total Size</b> Size is recognized as an important factor for viability of species and ecosystems.	Total size of Natural Area in acres.	<40 acres	0	
		>40-80	1	
		>80-240	2	
		>240	4	
<b>Size of Core Area</b> Greater core area limits negative impacts on “edge sensitive” animal species.	Acres of core area.  Core area is defined as the total area minus 300 ft. buffer from edge of polygon.	0-60 acres	0	
		>60-120	2	
		>120-230	4	
		>230	8	
<b>Stream Corridor</b> Stream corridors provide wildlife connections between patches of habitat.	Presence/absence of a stream or river within the Natural Area.	None	0	
		Present	2	
<b>Landscape Connectivity</b> Connectivity between habitat patches is considered a critical factor for wildlife health.	Percentage Proximity	Percentage of Natural Areas within ¼ mile.  Number of potential Natural Areas within 100 feet.	0-11 %	0
			>11-22	2
			>22-33	3
			>33	4
			0	0
			1	1
			2	2
			3	3
			>4	4



**Table 2. Natural Areas Ranking Criteria\***

<p><b>Wetlands</b> Wetlands are considered important ecosystems as they provide wildlife habitat as well as environmental benefits including flood retention, groundwater recharge, and sediment and pollutant filtering.</p> <p style="text-align: right;">Percentage</p>	<p>Measures the percentage of wetland within the Natural Area.</p>	<p>0-10% &gt;10-30 &gt;30-65 &gt;65-100</p>	<p>0 1 2 4</p>
<p style="text-align: right;">Area</p>	<p>Measures the actual area in acres of wetland within the Natural Area.</p>	<p>0-26 acres &gt;26-129 &gt;129-281 &gt;281</p>	<p>0 1 2 4</p>
<p><b>Criteria</b></p>	<p><b>Description</b></p>	<p><b>Detail</b></p>	<p><b>Points</b></p>
<p><b>Wetlands continued</b></p> <p style="text-align: right;">Quality</p>	<p>Area-weighted measure of wetland quality based on field assessment.</p>	<p>Low Med-Low Medium Med-High High</p>	<p>1 2 3 4 5</p>
<p><b>Woodlands</b> Woodlands are considered important ecosystems as they provide wildlife habitat, critical habitat linkages, visual buffers, and improved air quality.</p> <p style="text-align: right;">Percentage</p>	<p>Measures the percentage of woodland within the Natural Area.</p>	<p>0-25% &gt;25-68 &gt;68-90 &gt;90-100</p>	<p>0 1 2 4</p>
<p style="text-align: right;">Area</p>	<p>Measures the actual area in acres of woodland within the Natural Area.</p>	<p>0-34 acres &gt;34-108 &gt;108-442 &gt;442-1,261 &gt;1,261</p>	<p>0 1 2 3 4</p>
<p style="text-align: right;">Quality</p>	<p>Area-weighted measure of woodland quality based on field assessment.</p>	<p>Low Med-Low Medium Med-High High</p>	<p>1 2 3 4 5</p>
<p><b>Parcel Fragmentation</b></p>	<p>Measures the feasibility of conservation for a site by analyzing parcel numbers and size. Multiplies the percent area of the largest parcel in the site by the mean size of the parcels within the site.</p>	<p>0.00-0.46 0.47-1.20 1.21-2.41 2.42-5.97 5.98-17.99</p>	<p>0 1 2 3 4</p>
<p><b>Threatened, Endangered, Special Concern Species</b></p>	<p>Presence/absence of known occurrence within Natural Area</p>	<p>None Present</p>	<p>0 2</p>
<p><b>Total Points - 54</b></p>			

\* Modified from the 2004 Oakland County Potential Conservation/Natural Areas Report criteria ranking system.



To analyze and classify the Natural Areas, the natural break classification, known as the Jenk's Optimization Method, was used. This Method finds groupings and patterns inherent in the data by minimizing the sum of the variance within each of the classes. A total of 54 points could be assigned to each Natural Area based on the criteria and points system outlined in Table 2. The Natural Areas were placed within one of three Priority Areas based on the points obtained in its criteria ranking (Table 3). Priority One Natural Areas are properties or groups of properties that have the potential to contain high quality natural features (*i.e.*, undisturbed wetlands, watercourses, old-growth or mature forests, ideal habitat for threatened or endangered species, etc.), Priority Three Natural Areas contain less significant features.

**Table 3. Priority Areas Points Ranking**

<b>Priority Area</b>	<b>Points Range</b>	<b>Number of Natural Areas</b>
One	27-45	9
Two	13-26	20
Three	4-12	45
Total Number of Natural Areas - 74		



Individual maps were generated that depict each natural feature type identified in Long Lake Township (Fig. 1. Floodplain Map; Fig. 2. Steep Slope Map; Fig. 3 Wetlands and Watercourses Map; Fig. 3a. Regulated Wetlands Map; Fig. 4. Woodlands Map; Fig. 5. Threatened and Endangered Species Map; Fig. 6. Scenic Views and Corridors Map; and Fig. 7. Survey and Photograph Locations Map). A Long Lake Township Natural Areas Map was also generated that shows the Natural Areas and their priority ranking (Fig. 8). In addition, analysis of the collected natural features data resulted in identification of Large Parcels in Natural Areas, Private Parcels of Interest, Existing and Potential Wildlife Corridors, and Land Use of Natural Areas; maps were generated highlighting each of these categories (Figs. 9 through 12). Final maps and the GIS Natural Features Inventory (NFI) were submitted to the Township in October of 2006.

A public meeting to present the final results and to the community was held on October 24, 2006. Niswander Environmental demonstrated how the NFI will aid the Township in planning for their future land use goals. The Township will make the final report and all NFI maps available for public download on its website, [www.longlaketownship.com](http://www.longlaketownship.com). The following is a discussion of the natural features inventoried and their existing conditions within the Township.

### **FLOODPLAINS**

Niswander Environmental generated a Floodplain Map that shows areas of 100 year floodplain within the Township (Fig. 1). Floodplains within the Township are concentrated around Long Lake, Ruth Lake, Coffield Lake, North and South Twin Lake, Huellmantel Lake, Dyer Lake, and Bass Lake. These floodplains coincide with high density residential areas of the Township.

### **STEEP SLOPES**

Glacial deposits have created significant steep slopes within the Township. These slopes are often in highly erodible sandy soils. Niswander Environmental generated a Steep Slope Map for the Township that shows slopes between 18% and 25% and greater than 25% (Fig. 2). The majority of the steep slopes are primarily located in the northeast portion of the Township. Fortunately, a large portion of this area is currently forested, which aids in the stabilization of these steep slopes.

### **WETLANDS AND WATERCOURSES**

Niswander Environmental generated a Wetlands and Watercourses Map that shows wetlands located within the Township (Fig. 3). Based on the findings of the NFI field investigation, wetlands were classified into seven categories: bog complex, emergent, emergent/scrub-shrub, scrub-shrub, scrub-shrub/forested, forested, and unconsolidated bottom (open water/ponds). Lakes and streams are also identified on the map. Several unique wetland areas were identified during this NFI, including sensitive bogs and lowland conifer swamps that are abundant throughout the Township. These areas often contain threatened and endangered species.

The NFI identified 1,466 acres of wetland within the Township, which constitutes 6.5% of the Township's total land use. There are several large wetland areas within the Township, especially in the southwest portion of the Township. Several unique bog areas were identified throughout



the Township. Thus, there are large tracts of wetland that has the potential to be protected within the Township and possibly incorporated into the Township's protected open space.

Seventeen named lakes, totaling 3,708 acres, were identified during the NFI, which constitutes 16% of the Township's total land use.

The Natural Resources and Environmental Protection Act, 1994 PA 451 (NREPA) defines regulatory authority over water bodies and wetlands. The NREPA includes two parts concerning such jurisdictional authority. The first, MCL 324, Part 301, Inland Lakes and Streams, states that any watercourse, which has definable banks, a bed and visible evidence of a continued flow or continued occurrence of water, is regulated. Additionally, any body of water with a surface area greater than one (1) acre is regulated. The second, MCL 324, Part 303, Wetlands Protection, states that if a wetland is five (5) acres or larger and located within a county with a population of 100,000 or more without a completed wetland inventory, and/or connected to or within 500 feet of any regulated body of water and/or regulated watercourse it is regulated. Both the above parts prohibit the fill, dredge, removal of soils, construction, placement or removal of structures, redirection of water and artificial drainage of any regulated wetland, body of water or watercourse without a Michigan Department of Environmental Quality (MDEQ) issued permit.

In addition to generating a Wetlands and Watercourses Map, Niswander Environmental created a Regulated Wetlands Map that identifies potentially regulated wetlands, bodies of water, and/or watercourses within the Township (Fig. 3a). Regulatory status was determined with a GIS analysis of identified wetlands and watercourses utilizing the NREPA rules as described above. Grand Traverse County does not have a population of 100,000 or more (according to the 2000 census); however, the MDEQ has completed the required county wetland inventory rendering the population stipulation no longer applicable. Therefore, all non-contiguous wetlands greater than 5 acres will now be regulated. Of the 1,466 total acres of wetland located within the Township, approximately 1,394 acres (~95%) are likely regulated by MDEQ due to size, connectivity, and/or proximity to a body of water.

#### **WOODLANDS**

Niswander Environmental generated a Woodlands Map that shows woodlands located within the Township (Fig. 4). Based on the findings of the NFI field investigation, woodlands were classified into five categories: developed forest land, upland conifers, lowland conifers, upland hardwoods, and lowland hardwoods. Several high quality woodland areas were identified during this NFI. The majority of the Township is characterized by dense woodlands, which create breathtaking scenic views. Some areas of logging are currently present, which contributes to the economic viability of the Township.

The NFI identified 10,470 acres of woodland within the Township, which constitutes 46% of the Township's total land use. Table 4 shows a comparison of NFI identified woodland acres compared to the Community Forest Plan (2005).



**Table 4. Comparison of findings of forest acres by forest type within Long Lake Township.**

<b>Forest Type</b>	<b>Community Forest Plan (acres)</b>	<b>NFI (acres)</b>
Developed Forest Land	n/a	2,885
Upland Conifers	2,044	3,076
Lowland Conifers	237	445
Upland Hardwoods	5,134	3,757
Lowland Hardwoods	275	307
<b>TOTAL</b>	<b>7,690</b>	<b>10,470</b>

### **THREATENED AND ENDANGERED SPECIES**

Niswander Environmental generated a Threatened and Endangered Species Map that shows data collected from the Michigan Natural Features Inventory database (Fig. 5). This map shows Sections with known occurrences of Threatened, Endangered and Special Concern Species as well as a Rarity Index of each area of occurrence that scores the areas based on biodiversity. A large portion of the Township contains a high probability for the presence of Threatened or Endangered Species. This is likely due to the presence of the numerous lakes and unique wetlands that characterize the Township. Eleven Threatened or Endangered Species or Areas of Special Concern were observed in Long Lake Township. Loons, pileated woodpeckers, imperiled wetland types such as bogs and significant mesic forest types were observed throughout many of the Natural Areas. Their occurrences were taken into account during the Natural Areas ranking.

### **VIEWSHEDS**

Viewshed protection is one way that the Township can try to protect and maintain its valued rural character by preserving the visual landscape and scenic views. Preserving the existing landscape fabric of the Township's hillside and lake areas protects the scenic quality of the Township both for visitors as well as for residents.

Niswander Environmental identified and evaluated Long Lake Township Scenic viewsheds and generated a Scenic Views and Corridors Map (Fig. 6). The scenic quality of the Township, with its rolling hills, large tracks of protected natural areas and idyllic lake and wetland features resulted in numerous scenic viewsheds being identified. Viewsheds were determined to comprise individual scenic vistas and view corridors from key scenic roads (both public and private) or public parks.

The most identifying scenic features of the Township are the scenic view corridors from public roads, primarily roads running east-west in the upper two tiers of the Township sections, both public and private roads encircling Long Lake where vistas of the lake were possible, and several two-track public roads traversing Pere Marquette State Forest in the southwest portion of the Township. Scenic viewshed determination often followed steep slopes across the Township. Some of the rural subdivisions and sections of public roads (Cedar Run Road, Barney Road, and



North Long Lake Road) in the northeast portion of the Township had the most expansive views to the northeast and southeast and included almost one-third of the total hillside views within the Township. These were among some of the steepest areas of the Township with the majority of the forested slopes greater than 25%. The views from M-72, which runs almost the entire length of the northern portion of the Township, were the most scenic in the northeast corner of the Township with views of the rolling forested hillsides south and southeast. East Long Lake Road provided scenic views of the forested ridges and natural rolling landscape south of South Twin Lake.

In the northwest portion of the Township, Cedar Valley Road provided numerous scenic views of the Cedar Run Creek and its associated high quality cedar/hemlock forest. The Cedar Valley Road crossed the Cedar Run Creek in several scenic locations. The large high quality forested tract to the east of the Cedar Run Creek had significant steep slopes but limited vistas due to the lack of public roads and the forested nature of the slopes and valleys. Views of the forested ridges were possible from Cedar Run Road and Goodrick Road and from M-72 as it turned northwest leaving the Township. Development is occurring in the area but appears to be of a clustered nature to limit the amount of disturbance and maintain open space, which are critical development strategies in scenic areas with significant steep slopes (this area was designated as Rural Preserve in the Long Lake Township Comprehensive Plan). Scenic views of the forested ridge south of Cedar Run Road in the northwestern portion of the Township were available from Cedar Run Road but the road dead ends into private property with no cul-de-sac. Scenic views of a high quality bog associated with the Cedar Run Creek were available from the bridge on Cedar Run Road in the northwest section of the Township.

Any and all views of Long Lake and the Township's smaller lakes were considered significant viewsheds. Much of Long Lake is obstructed by private homes on long linear parcels and lack of public access via public roads or parks. The most expansive and accessible views of Long Lake were along its northern border at North Long Lake Road. A portion of the road runs within only a few yards of the lake creating safety issues for the Township and one access point, the beach at Taylor Park, provides expansive views of the Lake to the south and southeast but the view was obstructed from the road. The southern half of Long Lake and high quality beech/hemlock/oak upland forest was best viewed from the scenic winding Outer Road on the lake Peninsula but accessibility was limited. This similar mature/secondary growth upland hardwood complex was viewed along scenic tree-lined South Long Lake Road and the westbound portion of Secor Road west of Bass Lake Road. West Long Lake Road was designated a scenic road as it passed through a high quality palustrine scrub shrub/forested wetland area and creek at the southwest edge of Long Lake. Crescent Shores Road passed through a high quality tamarack bog and terminated at a boat launch which provided scenic views from the western edge of Long Lake. An expansive view of Long Lake was also possible from Lake Drive just south of Crescent Shores Road.

Most of the Township's smaller lakes had at least one accessible scenic view. North Long Lake Road provided views of North Twin Lake and its associated unspoiled shoreline, South Twin Lake, and Coffield Lake (areas designated as Rural Preserve in the Long Lake Township



Comprehensive Plan). Skiver Road provided scenic views of a high quality fringe bog and wetland just northwest of Long Lake. The MDNR public access point on the northern edge of Cedar Lake provided a key scenic vista point for most of picturesque Cedar Lake. Forest Lodge Road provided scenic views of both Page Lake and its associated exceptionally high quality mature beech/maple forest and lowland conifer forest that stretched south. Scenic views of Huellmantel Lake were provided along East Long Lake Road and Huellmantel Lake Road. A scenic view of Dyer Lake looking southwest at the undeveloped shoreline was possible along Boone Road. Scenic views of Bass Lake and much of its undeveloped shoreline and associated high quality upland forest were available at the public access point (boat launch) at the end of Fishing Site Road. Scenic road corridor status was designated for Bass Lake Road (a rolling dead end road west of Bass Lake that runs east-west through semi-mature oak/pine/aspens/maple forest) and the road that followed the western edge of Bass Lake (a dead end road through a depression wetland). The scenic drive along two-track Fischer Road, Lake Dubonnet Trail, Buckley Road, and Heniser Road provide impressive views of Lake Dubonnet, its associated high quality wetland fringe, scenic white pine forests and various high quality wetland complexes. These wetland complexes include two exceptionally high quality open bogs off Buckley Road and Lake Dubonnet Trail and a high quality wet meadow off Lake Dubonnet Trail. Bellows Lake Road is a scenic two-track public road that provides impressive scenic views of two more exceptionally high quality open kettle bogs and secluded Bellows Lake with its associated cedar swamp perimeter.

Striker Lake, Lyons Lake, Lost Lake and many of the Township's smaller lakes had limited scenic views either due to their inaccessibility or because significant shoreline development limited public views or vistas (Striker Lake).

#### **NATURAL AREAS**

Natural Areas are public and private land that are primarily undeveloped and includes lands devoted to active or passive recreational use or lands retained for visual or natural resource protection purposes. Natural Areas typically contain wetlands, woodlands, watercourses, floodplains, or active recreation areas. However, not all of these features present in the Township were included in the Natural Areas identified during this NFI, since some were located in primarily developed areas or lacking in natural qualities. The Township currently maintains many Natural Areas, some of which were discussed in the Community Plans section of this report. Each Natural Area contains several survey and photograph locations where data specific to the site was taken during the field investigation (Fig. 7); this detailed information is accessible in the NFI GIS attributes.

The NFI identified 12,442 acres of Natural Areas within the Township, which constitutes approximately 55% of the Township's total land area. Wetlands constituted 1,367 acres or 11% of the identified Natural Areas. Lakes constituted 3,708 acres or 30% of the Natural Areas. Woodlands constituted 8,032 acres or 65% of the Natural Areas.

As previously described, the Natural Areas were ranked and placed within one of three Priority Areas based on the points obtained in its criteria ranking (Table 2). Nine (9) Natural Areas



ranked as Priority One Areas total 10,583 acres, which constitutes 41% of the Township's total land use. Twenty (20) Natural Areas were ranked as Priority Two Areas totaling 1,398 acres, which constitutes 6% of the Township's total land use. Finally, fifty-two (52) Natural Areas were ranked as Priority Three Areas totaling 461 acres, which constitutes 2% of the Township's total land use (Table 3). All Natural Areas are shown, with Priority Area classification, on the Natural Areas Map (Fig. 8). The sites were ranked on a scale of 1 to 54 points.

Due to the relatively undeveloped nature of much of the Township, a large number of sites were identified as Priority One Natural Areas during this inventory. These Priority One Natural Areas contain a diverse array of ecosystems including wetlands, woodlands, open fields, lakes, and streams. Many unique features and high quality resources are found within these sites, including MNFI listed threatened, endangered and special concern species. A large portion of these Priority One Natural Areas are located within the west and south portion of the Township and surrounding Long Lake itself. Much of this area is currently designated as natural or recreational areas on the Township's land use map, and many of these parcels are owned by the State of Michigan or Long Lake Township.

In addition to the publicly owned sites, many privately owned parcels are located in Priority One Natural Areas that may provide opportunities for protection of these significant resources. The areas around the lakes in particular are highly attractive locations for development and are currently under pressure. New residential subdivisions were observed amongst several of the Natural Areas.

In order to determine if opportunity exists for private property management or perhaps parcel acquisition, Niswander Environmental evaluated the extent of large parcels (>20 acres) within the identified Natural Areas (Fig. 9). Thirty-nine large parcels were located in Priority One Natural Areas. The property owners of these 39 parcels were contacted and 10 were selected for further investigation based on potential significance to the Township and granted private access (Fig. 10). A qualitative evaluation of these properties was conducted to determine the extent of high quality features present. The natural resources found on these properties reflect the condition of the Priority One Natural Areas throughout the Township. This analysis does not create any specific designation for these properties nor is it intended to rank the quality of these individual properties. These properties were evaluated only because of the willingness and cooperation of the property owners who granted Niswander Environmental complete access to their private property. It is recommended that all parcels within designated Natural Areas be evaluated when there is a proposed change in land use. The following is a summary of the findings on these properties:

### *Girl Scouts Fair Winds Council Property (PIN 08-014-011-00)*

This 265-acre property is located in Sections 14 and 15 of Long Lake Township, along the northeastern shores of Long Lake. This property is perhaps the most significant parcel in the Township from a natural features perspective due to the number of habitat types, quality of lakes and wetlands, overall size and extent of natural buffer, and general composition of its woodland habitat.



This property contains three high quality lakes: Fern Lake, Page Lake, and Long Lake. The frontage along Long Lake is undisturbed and consists of a mature cedar/hemlock forested wetland, which provides a significant natural buffer. Other species present along the shores of the lake include alder, willow, red maple, and a diverse collection of sedges, rushes, and ferns. Fern Lake is entirely confined within the property, and is undeveloped. Similarly to the forested fringe on Long Lake, the edge of Fern Lake has a forested wetland buffer comprised of cedar, white birch, red maple, hemlock, and several types of sedges. A majority of Page Lake is contained within the property, and this too is buffered by a high quality cedar swamp. Each lake appears to be clean and is very clear, providing excellent habitat for a variety of fish, mammals, amphibians, and birds.

Semi-mature upland forests are somewhat common in Long Lake Township, but many have been subjected to or are in the process of logging. The upland woodlots contained within the Girl Scouts property are largely undisturbed and fairly old. Upland deciduous forest is present in the northern portions of the property, especially along Timbers Trail. These areas as a whole can be classified as a mature beech/maple forest. The huge canopy trees have created a relatively open understory comprised of young saplings (beech and sugar maples), and American holly. The presence of wildflowers could not be verified due to the timing of the assessment, but it appears that a diverse population of wildflowers likely exists in the understory.

The western portion of the property boasts a mature mesic forest dominated by very large hemlock and beech. It is estimated that this forest has been untouched for a considerable time, as many of the hemlocks and beech are likely over one hundred years old. These large canopy trees have shaded out competitive species, creating an open understory. A winding rustic access road through the rolling terrain and deep ravines of this area enhances this scenic environment.

The upland forest in the northeastern portion of the property is fairly mature as well, but not as pristine in comparison to the western portion of the parcel. Dominant canopy species present in this portion include red oak and sugar maple, with some beech and aspen. Like much of the property, the terrain here is very rolling. A high quality scrub-shrub wetland exists within the interior of this forest. The wetland is comprised of winterberry holly, hemlock, red maple, leatherleaf, sphagnum, buttonbush, yellow birch, blueberry, and a variety of ferns and sedges. This wetland is very dense and hummocky, and is considered to be of high quality due to its size, diversity, and lack of invasive species. It appears that this wetland may have a hydrologic connection to Fern Lake.

The remainder of the property consists of rolling upland fallow field. A brief assessment revealed that most of the fields consist of invasive grasses and forbs such as timothy and spotted knapweed, although other species such as common milkweed, goldenrods, and asters are also present. These areas present an excellent opportunity for prairie and grassland restoration.

Private Property (PIN 08-015-022-00)

Directly west of the Girl Scouts Fair Winds Council Property lies a 23-acre undeveloped property owned by a private company. This parcel, located in Section 15, is entirely wooded and



contains limited areas of high quality mature mesic forest, similar to that found in the western portion of the adjacent Girl Scouts property. The southern portion of this property, on the north side of an access road, is dominated by huge beech and hemlock. However, it appears that much of this area has been and continues to be harvested for timber. Numerous trails weave throughout the property to access areas for logging. The southern portion of this property is of high quality, but it diminishes northward. Areas that have seen historic logging sites are dominated by dense stands of sugar maple, while recently cleared areas contain young sugar maple, beech, ash, fern, and raspberry. It should be noted that several estate homes are being constructed to the west, on the shores of Long Lake. This parcel appears to be under pressure for development as some clearing is occurring.

*Scenic Trails Council/Gilbert Pines Property (PIN 08-007-011-00)*

This 212-acre property is located along the northern shores of Cedar Lake, in Section 7 of Long Lake Township. This property is unique to the Township in that it features a relatively undeveloped lake (Cedar Lake) and a DNR-designated trout stream in Cedar Run Creek. This property, which had been owned by the Boy Scouts, also offers rolling terrain, northern hardwood forests, pine forests, high quality forested wetlands, and fern meadows. Additionally, an extensive trail system runs throughout the parcel.

The most significant natural feature within the property is Cedar Lake and Cedar Run Creek. The creek and its riparian corridor is richly diverse, offering several distinct habitat types including sedge meadows, emergent and scrub-shrub wetlands, and a cedar/hemlock swamp. In addition to the cedar and hemlock that buffers the watercourse, common species present along this wetland corridor include alder, birch, cattail, red maple, and various sedges and ferns. The creek itself is clear and relatively swift, and offers abundant cover for fish and other stream biota in fallen timber, deep pools, shallow riffles, and undercut banks. Cedar Run Creek provides exceptional cool water habitat for trout.

Hardwood upland forest also comprises a substantial portion of the property. Sugar maple, cherry, and aspen are the most common species present in these areas, although some forested areas also contain oak and pine as well. The overall age and density of the upland forested areas varies depending on past harvesting activities; some areas are moderately young and fairly dense, while others are classified as semi-mature second-growth forests. The vegetative composition of the younger, dense areas is not as diverse as the more mature stands, however.

*South Long Lake Forest Properties (PIN's 08-035-003-00 and 08-035-002-00)*

The properties known as South Long Lake Forest consist of two private parcels that are located in Section 35 of Long Lake Township. A majority of this area is comprised of beech/maple forest, although other species such as aspen, hemlock, white birch, and white pine are also common. As is common with large tracts of land, the northern upland forest contained within the property varies in terms of maturity, density, species composition, and overall quality, but its value lies in the sheer combined size of these undeveloped parcels.



Although most of these properties are comprised of upland forest, several areas of high quality wetland are present as well. The southern parcel contains a mature cedar/hemlock forested wetland in the southwestern portion and a buttonbush swamp in the northwestern portion. Both appear to be isolated, but were likely historically connected to the adjacent Long Lake prior to development. A depressional kettle bog dominated by leatherleaf exists within the northern parcel. Kettle bogs have a consistently high groundwater table and typically contain a diverse assortment of acid-dependent species such as leatherleaf, tamarack, sphagnum, cranberry, and bog rosemary. Areas such as these are generally high quality and often contain rare flora and fauna, although none were observed during the site assessment in October 2006.

Private Property (PIN 08-125-013-00)

This 25-acre private parcel is located in Section 34 along the southern border of Long Lake Township. A high quality wetland complex lies on both the east and west side of South Long Lake Road. The wetland and surrounding upland mixed forest are the most significant natural features on the property. This wetland, which appears to have been historically connected to Long Lake prior to development, is exceptionally diverse and contains emergent, scrub-shrub, and forested components. Common species observed within the wetland include cedar, hemlock, winterberry, alder, leatherleaf, red maple, sphagnum, yellow birch, white birch, cattail, and various sedges, rushes, grasses, and ferns. This wetland is very large, and extends south and east out of the Township.

The surrounding upland mixed forest also offers great diversity and is of moderate to moderately high quality due to its relative maturity, lack of invasive species, and diverse vegetative community. Dominant canopy trees found atop the rolling terrain include sugar maple, red maple, white pine, aspen, white birch, red oak, beech, hemlock, cedar, and fir. The amount of differing habitat types and quality of these communities is a significant benefit for wildlife.

Private Property (PIN 08-017-006-00)

This 52-acre property is located along the eastern shore of Cedar Lake, in Section 17 of Long Lake Township. A majority of this property, especially in the northern half, is comprised of open field dominated by ferns and spotted knapweed. Several red pine plantations are present as well. The southern and western portions of the property consist of a coniferous upland forest and cedar swamp. Both are relatively mature and of moderately high quality. The wetland is fairly diverse and offers not only exceptional wildlife habitat, but also a significant natural buffer along the eastern edge of Cedar Lake.

Private Property (PIN 08-017-007-00)

Immediately north of the property described above lies another private parcel that is of moderately high quality. This property, approximately 42 acres in size, consists of pine forest, mixed upland forest, and lowland coniferous forested wetland. One home with several outbuildings is present in the western portion of the property along Cedar Lake. The pine forest present in the northeastern section of the parcel is dense and contains primarily jack pine, while the mixed upland forest throughout the majority of the parcel is dominated by sugar maple,



cherry, red pine, hemlock, oak, and beech. Openings within the forested upland areas generally contain non-native species such as spotted knapweed.

The cedar swamp forest along the eastern edge of Cedar Lake is of moderately high- quality and is comprised of the same species found to the south within the 52-acre private property previously mentioned. Cedar dominates this area, but the wetland also contains a diverse assortment of plant species such as alder, white birch, red maple, and various sedges, grasses, and ferns.

*Private Property (PIN 08-005-004-00)*

This 68-acre wooded property is located in the northern part of Section 5 in Long Lake Township. A majority of this private parcel is comprised of relatively high quality upland forest dominated almost exclusively by sugar maple and American hornbeam. Steep ridges and deep ravines distinguish this property from many others in the Township. The forest can be classified as semi-mature with an open understory consisting of sapling maple, ash, hornbeam, and basswood; very few true shrubs were observed. It appears as though a substantial population of wildflowers may be present in the spring. Most of the canopy trees consist of sugar maples that are likely 50-75 years of age. This forest extended west as of at least 1998; an evaluation of aerial photographs shows that this area, too, was likely of moderately high quality. Much of the forestland to the west has already been developed, however, and it appears as though more is designated for the surrounding area.

*Private Property (08-019-013-00)*

This 30-acre property lies along the northern shore of Bellows Lake in Section 19 of Long Lake Township. A majority of the property consists of mixed upland forest dominated by oak, sugar maple, white pine, spruce, hemlock, white birch, aspen and beech. An unpaved access driveway leads from County Road 610 back through the upland forest to a residence. Like many properties in this section of the Township, the terrain is rolling in nature and features a nice diversity of species. Overall, the composition of the upland forest located on the property is fairly common within the Township, but still of moderate quality.

In addition to the mixed upland forest, the northern portion of the property along the County Road contains a red pine plantation, while the southern portion of the property along Bellows Lake consists of an emergent/scrub-shrub wetland. This wetland buffer is of moderately high quality and dominated by sedges, although other common species include alder, silky dogwood, leatherleaf, white birch, and red maple. Bellows Lake is relatively undeveloped and is utilized by several state-listed species, including the common loon and bald eagle. Bellows Lake and its wetland buffer is the most significant natural feature on this property.

## **CORRIDORS ANALYSIS**

Niswander Environmental conducted a corridor analysis and subsequently generated a map depicting existing and potential wildlife corridors within the Township (Fig. 11). These corridors were selected based on connectivity between identified Natural Areas as well as correlation with the Township's land use category of open space or natural area/recreation



designation. A majority of these corridors currently exist due to the presence of lakes, wetlands, woodlands, or streams. Several other areas were identified that could potentially be created or restored to serve as a corridor due to their present agricultural or open space nature. Existing and potential corridors are identified separately on the Corridors Map.

**LAND USE TRENDS ANALYSIS**

Niswander Environmental conducted a trends analysis by evaluating land use of identified Natural Areas (Table 5). The Township’s land use map from 2000 was incorporated with the Natural Areas map (Fig. 12) to determine how the Natural Areas are being used and how these areas could be protected in the future. As shown in Table 5, the land use category for a majority of the Natural Areas (65%) is Forested/Undeveloped.

Table 5. Land Use of Priority Natural Areas

Land Use of Natural Areas	Total Acreage	% of Natural Area	% of Township Area
Agricultural	240	2	1
Forested/Undeveloped	8,142	65	36
Residential	354	3	2
Water	3,706	30	16



Identification of the significant natural features in the Township is key to determining the future land use and preservation plan for the Township. The NFI will allow for responsible/integrated land use and also provide a tool for measuring how the Township's natural features change over time and what management strategies might be needed to protect them. Finally, this NFI will allow for an evaluation of what effect a proposed project will have on natural features at a landscape level. The following is a discussion of the natural features that are of primary concern to the Township and the recommended steps for protecting them.

### **FLOODPLAINS**

Floodplains are regulated by the State of Michigan under Part 31 of the Natural Resources and Environmental Protection Act, 1994 PA 451. A permit is required when developing areas designated as floodplain, and no development is permitted within designated floodway. Due to the numerous lakes, there is a large amount of floodplain present within the Township. The Floodplain Map generated by this NFI can be used for planning purposes; however, it is recommended that the FEMA Flood Insurance Studies be used when evaluating individual properties.

### **STEEP SLOPES**

Currently, the Township's steep slopes are generally intact and do not experience significant amounts of erosion due to their primarily wooded nature. However, vegetation removal along these steep slopes would likely cause erosion that could result in significant damage to not only the slopes themselves, but also to the water quality of the Township due to an inevitable increase in sediment loading to the lakes. The generation of the Steep Slope Map is the first step in the process of protecting these steep slopes and associated natural features. The results of this NFI indicate that the Township may need to consider a steep slope ordinance to protect these natural resources. The purpose of a steep slope ordinance is to regulate the intensity of use in steep slope areas to limit soil loss, erosion, excessive stormwater runoff, degradation of surface water, and loss of personal property. Steep slope ordinances typically require an analysis of slopes greater than 15% to show that the impacts have been minimized and that slopes have been adequately protected with appropriate soil erosion control measures during and after construction. Disturbances to slopes greater than 25% should be avoided except when no feasible or prudent alternatives exist.

### **WETLANDS AND WATERCOURSES**

The Wetlands and Watercourses Map (Fig. 3) and the Regulated Wetlands Map (Fig. 3a) will provide the Township with a tool to protect and enhance existing wetlands. The maps show more detailed information on the location and types of wetland than was previously available and thus will enable the Township to be better informed during the site review process. Furthermore, wetlands can be evaluated in a landscape context. However, the map provides only potential and approximate location of wetlands and does not determine specific boundaries. Furthermore, while it was the intent to map all wetlands, it is possible that additional wetland areas may occur that were not mapped. Likewise, the likely regulatory status of the inventoried was not determined based on individual site visits and thus may change upon further investigation. Therefore, a professional wetland delineation and jurisdictional assessment will still be required



for any new development. In addition, it should be noted that the MDEQ has the final jurisdictional authority on wetlands and watercourses in the State of Michigan.

The Township does not currently have a Wetland and Watercourse Ordinance that would protect these natural features from irresponsible development. The Township currently relies on the State of Michigan's laws (Part 303, Wetlands Protection and Part 301, Inland Lakes and Streams) to protect their wetlands, lakes, and streams. While these laws would apply to a large portion of the water features within the Township, they do not protect isolated wetlands smaller than 5 acres nor do they address any local concerns such as fragmentation or land use issues. A local wetland ordinance can provide greater protection than the state (MDEQ) can enforce. Specifically, a local ordinance can regulate isolated wetlands more than 2 acres and isolated wetlands less than 2 acres that are determined to be essential to the protection of the communities Natural Features. Therefore, the Township would benefit from a local wetland and watercourses ordinance that would prohibit development within a lake, stream, or wetland that is not in the best interest of the Township. In addition, the wetlands within the Township currently experience little invasive species due to its fairly undeveloped nature. Since disturbance often prompts the invasion of these species, development affecting small wetlands or areas determined essential to the Township will likely result in their degradation.

The Township is rightly trying to preserve their wetlands through acquisition of property into their open space system, and there is potential for further property acquisition. However, a large portion of the Township's wetlands will continue to lie on private property that is open for development. These areas will not likely be protected by the Township unless a local ordinance is adopted. The Wetlands and Watercourse Map (Fig. 3) and Regulated Wetlands Map (Fig. 3a) will provide the Township with tools to implement a new wetlands ordinance. A Wetlands and Watercourse Map is required by the State of Michigan prior to a local ordinance being adopted.

These maps are meant to be dynamic tools that can be integrated with the Township's GIS and updated as new information becomes available (*i.e.*, wetland delineations and jurisdictional assessments are completed).

#### **WOODLANDS**

This NFI identified woodland areas that are of high quality and should be protected as discussed in the Results section. The Woodlands Map will provide a tool for the Township to better achieve their goal of preserving its rural character and natural beauty by protecting its woodland resources through preservation and encouragement of reforestation. The Township does not currently have any ordinances to protect these resources. Therefore, Niswander Environmental recommends adopting a Woodland Ordinance or Natural Features Overlay District that would designate Protected Woodland Areas. These areas would require a permit from the Township before any development may take place, and would likely require replacement of certain trees when removal is inevitable.

Several mesic deciduous forest stands with beech dominant and sugar maple sub-dominant were observed around the periphery of Long Lake. These sites were of particular importance, as many



of the beech were old growth timber and this region represents the northwest limit of beech dominated forests. In the absence of disturbance, beech and maple gain almost complete dominance in a stand due to their ability to shade out all competing tree species and understory vegetation (Dickman and Leefers, 2003). These communities support a rich diversity of spring ephemerals, perennial herbs, and unique chlorophyll-free parasitic and saprophytic seed plants (Cohen, 2000).

### **THREATENED AND ENDANGERED SPECIES**

Threatened, Endangered, and Special Concern species are currently protected by both the State (Michigan Department of Natural Resources) and federal (U.S. Fish and Wildlife Service) laws. In areas of known occurrence, a survey must be conducted for these species to determine what effect any disturbance would have. Therefore, these species will likely be protected by current laws. However, further protection may be assured by expanding knowledge of the location of such species through detailed evaluation of designated Natural Areas, as well as acquisition of sensitive properties.

### **VIEWSHEDS**

Viewshed protection is a relatively new concept and tool for urban planners. Identifying key community viewsheds and establishing strong viewshed standards protects both the property rights of the individual landowner and the community by avoiding the exploitation of the rural landscape.

Several forms of viewshed protection ordinances have been successfully adopted and implemented by various communities across the United States. Typically, Scenic Resource Overlay Zones or individual Viewshed Protection Ordinances are developed to minimize the impact of man-made structures and grading on views of existing landscapes and open spaces as seen from designated public roads. Some viewshed ordinances are tied to steep slope protection and pertain to new developments that are planned for hillsides with specific slope grades or within a certain distance of a major ridgeline.

The Township has laid the groundwork for viewshed protection in its recently adopted Long Lake Township Comprehensive Plan (November, 2005). Five viewshed corridors were specifically identified. Some of the possible viewshed protection management practices include:

- Standards for impervious surfaces
- Standards for restricting the amount of vegetation clearing
- Deep isolation distances
- Vegetation buffers
- Clustered design patterns for new developments or increasing lot sizes in some instances



- Scenic easements comprised of natural (and often existing) vegetation, particularly in heavily wooded view corridors
- Deeper setbacks in heavily wooded areas (which may require side and rear setback requirements)
- Easements of one hundred feet along roads in the Rural Preserve and Low Density Residential areas, and fifty feet in Moderate Density Residential areas
- Manage the scale and placement of buildings

Additionally, other potential management considerations adopted in other communities may include:

- Standards for building materials for new structures be selected for low reflectiveness
- Standards for discouraging planting of tree row screens where wide vistas along public roads are desired
- Standards for utility corridors (ex. requiring underground placement, restricting cell tower placement on scenic hilltops, restricting placement of wind power turbines)
- Standards for site lighting particularly on or near significant scenic ridgelines
- Organize open space systems within new developments to protect viewsheds, natural resources, wildlife and creek corridors, riparian habitats, trail linkages, and ridgeline resources
- Minimize cut and fill, earthmoving, grading operations and other land disturbances on the natural terrain ensuring that finished slopes are compatible with existing land features
- Promote architecture and designs that are compatible with hillside terrain thereby minimizing visual impacts
- Require all development on hillsides where grade exceeds 15% to submit a Hillside Development Plan outlining contoured grading techniques to ensure the buildings, streets and drives can be accommodated safely with a minimum amount of grading
- Restricting any and all development on hillsides with slopes greater than 30 %
- Require new developments to protect visually or environmentally significant areas with conservation lots owned and maintained by homeowners' associations.



The Township has recommended that the portion of North Long Lake Drive that passes within yards of Long Lake be either relocated behind the lakeshore homes or by creating a reliever route around the existing North and West Long Lake Road intersection. This stretch of North Long Lake Drive provided the most expansive and unobstructed view of Long Lake. It is understandable why the road improvements must be made but the trade-off will be the loss of the greatest vantage point for viewing the single most significant lake feature of the Township.

#### **NATURAL AREAS**

The Priority One Natural Areas, identified by ranking the existing natural features within the Township, should be protected to the greatest extent possible. These areas are integral parts of protecting the Township's natural resources and rural character. The criteria developed for ranking these sites included connectivity to adjacent Natural Areas in addition to number of parcels covering the area. These criteria were incorporated in order to determine which areas would be best for acquisition by the Township. Portions of the Priority One sites are already either public or natural area/recreational land use.

Numerous privately owned parcels containing Priority One Natural Areas also exist within the Township. Acquisition of such private parcels adjacent to existing publicly owned Natural Areas would likely ensure their protection. The following private parcels that were evaluated in the field during the NFI should also be protected to adequately protect these valuable resources.

**SITE 1 Girl Scouts Fair Winds Council Property (PIN 08-014-011-00) and Adjacent Private Property (PIN 08-015-022-00)**

These two sites are immediately adjacent to each other. The 23-acre property owned by a private company lies directly west of the Girl Scouts property and thus it would be beneficial to manage these sites together. Overall, the Girl Scouts Fair Winds Council Property is one of the most significant parcels in Long Lake Township due to its lack of development, distinctive assemblage of plants and animals, and unique biotic communities. Niswander Environmental recommends protection of the property, the majority of which requires virtually little management. The lower-quality open fields on this parcel offer excellent potential for prairie restoration, which would significantly increase the quality of the property.

**SITE 2. Scenic Trails Council/Gilbert Pines Property (PIN 08-007-011-00)**

The Scenic Trails/Gilbert Pines property is one of the most valuable parcels in the Township from a natural features standpoint, primarily due to the Cedar Run Creek and its high quality riparian corridor.

**SITE 3. South Long Lake Forest Properties (PIN's 08-035-003-00 and 08-035-002-00)**

The properties that comprise South Long Lake Forest are of considerable value to the Township because they are among the last remaining large tracts of undeveloped forest. In addition, this area is adjacent to a large publicly-owned property; the acquisition of South Long Lake Forest would aid in the preservation of the Township's high quality natural features.



SITE 4. 25-Acre Private Property (PIN 08-125-013-00)

The exceptional diversity of the wetlands on this property is of critical value to the Township from a natural features perspective. Although the property itself is relatively small in comparison to other Priority One Natural Areas, it is largely undeveloped (with the exception of South Long Lake Road and an access driveway) and separated from the South Long Lake Forest Properties only by natural beech/maple forest. Preserving this property would further add to a contiguous high quality tract of land.

SITE 5. 52-Acre Private Property (PIN 08-017-006-00) and 42-Acre Private Property (PIN 08-017-007-00)

These adjacent properties are significant because of the high quality cedar/hemlock swamps found in the western portion of the parcels, around the eastern shores of Cedar Lake. The perimeter forested wetlands add a critical and sizable buffer around the lake, which provides important habitat for wildlife while ultimately aiding in the water quality of Cedar Lake.

SITE 6. 68-Acre Private Property (PIN 08-005-004-00)

This property is a valuable resource to Long Lake Township due to its unique topographic characteristics, lack of invasive species, maturity, and overall general character and of the woodlot. Additionally, and perhaps more importantly, residential development is rapidly encroaching upon this property, primarily from the west. Protecting this property would aid in retaining the Township's unique and critical natural features.

SITE 7. 30-Acre Private Property (08-019-013-00)

Many of the natural features associated with this property are common within Long Lake Township. The southern portion of this parcel, however, is comprised of a moderately high quality emergent/scrub-shrub wetland that buffers Bellows Lake to the south.

If possible, Niswander Environmental recommends conducting individual management plans for these parcels to aid in their preservation.

In addition to wetlands and woodland ordinances, another way of protecting these Natural Areas is by adopting a Natural Features Setback Ordinance that would require a buffer between any development and the adjacent natural feature. This would aid in maintaining their integrity by minimizing the "edge effect" that occurs when natural features are fragmented. Typically, a Natural Features Setback is maintained as a vegetated buffer at least 25 feet wide.

**LAND USE OF NATURAL AREAS AND CORRIDORS**

The Existing Land Use of Natural Areas Map (Fig. 12) shows the Natural Areas identified in this NFI by Priority with the land use classifications identified in 2000. Since most of the Natural Areas lie within the Forested/Undeveloped land use classification, the Township is provided with



opportunity to protect these areas from irresponsible future development. The results of this NFI, and comparison of new parcel maps with historic maps, indicate that new development is occurring in fragmented areas throughout the Township. This fragmentation can quickly isolate Natural Areas and undermine the goals of the Township. This NFI is critical in identifying how to protect the Priority Areas by incorporating available parcels into the Township's natural areas and recreational sites and by determining proper zoning within the Township to direct future land use decisions. Therefore, Niswander Environmental recommends referring to this NFI when making site plan approval decisions to ensure that linkages between Natural Areas are maintained and that habitat fragmentation is avoided. Maintaining large blocks of Natural Areas and connectivity between the smaller portions is key to the integrity of the Township's natural resources.

#### **SUMMARY**

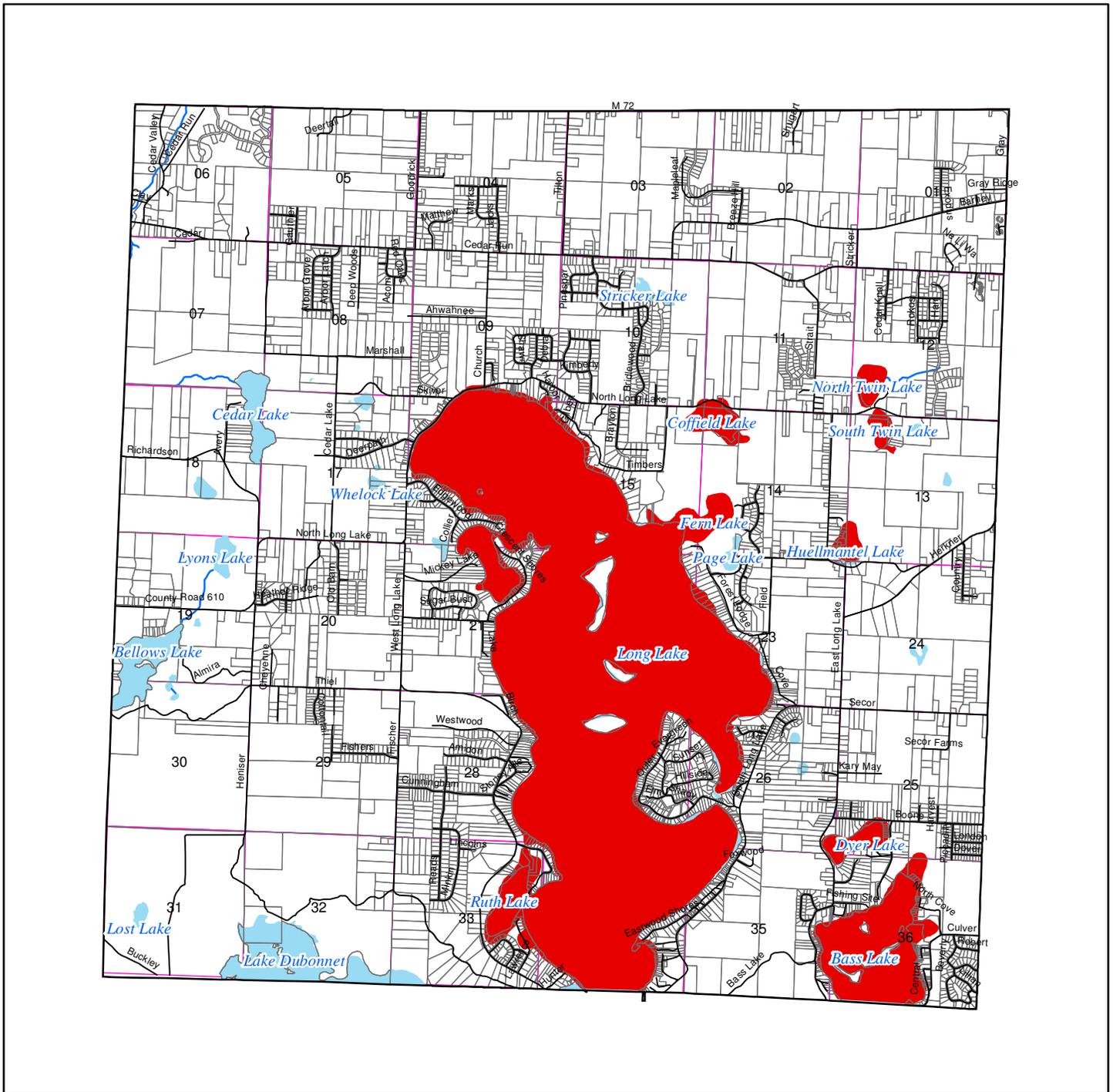
This report provides a brief summary of the findings of the NFI and Priority Natural Areas; however, it should be noted that the NFI has been developed in a GIS and is intended to be used on a daily basis by the Township staff when evaluating land use. The power of the GIS-based NFI is that detailed information, including photographs, quality assessment, restoration potential, ownership, land use, aerial photographs, field assessment data, connectivity, and disturbance can all be assessed instantaneously with the click of a button. The NFI has the potential to affect immediate and long term land use decisions. The Township now has the information necessary to uphold their land use decisions and to educate residents about not only the importance of the natural resources they own, but also what they can do to protect them.



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Long Lake Township Natural Features Inventory  
**Figure 1. FEMA Floodplain Map**  
 October 14, 2006



**Legend**

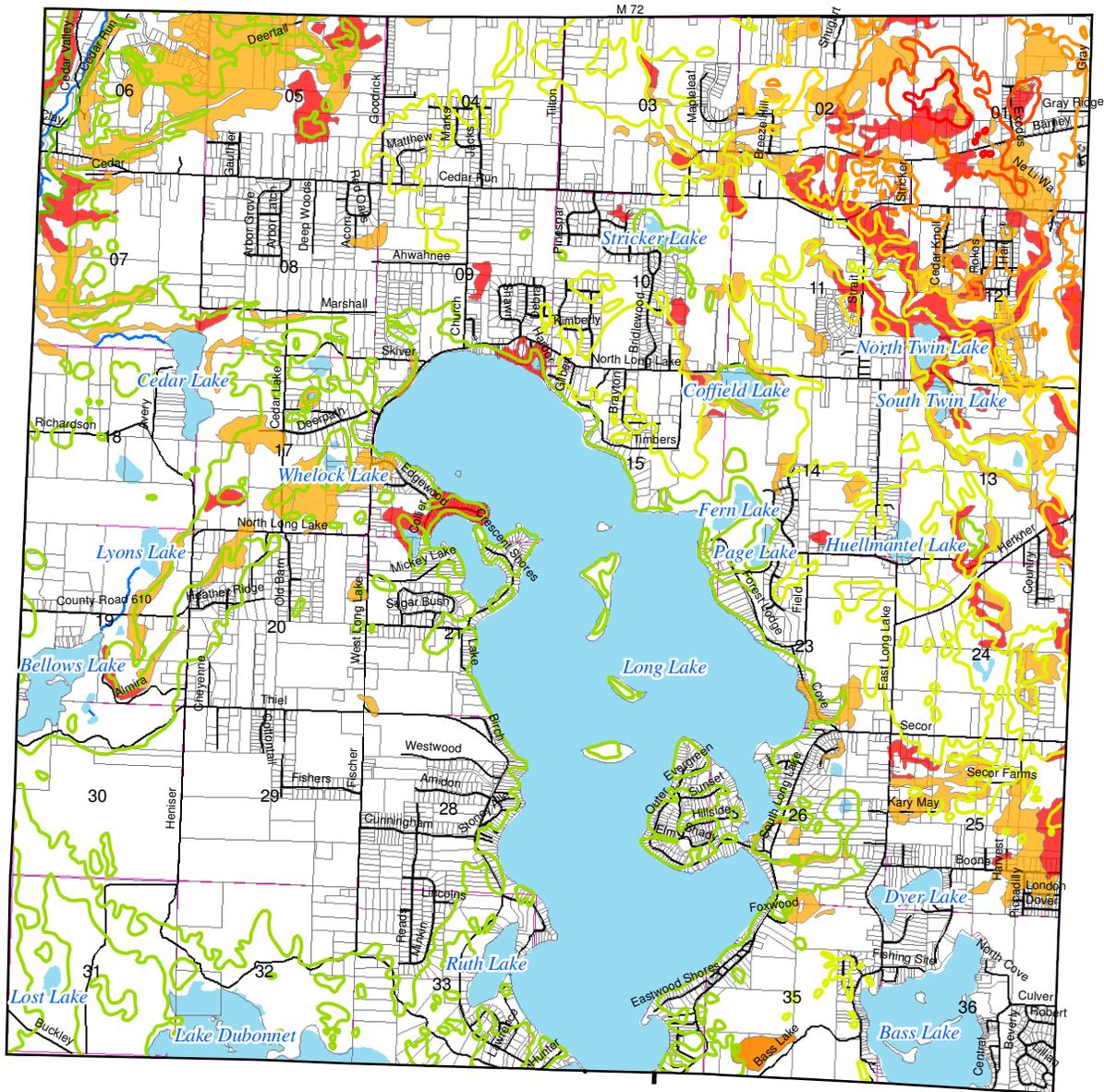
 Zone A (100-year Floodplain)	 Lakes	 Roads
 Rivers	 2005 Parcels	



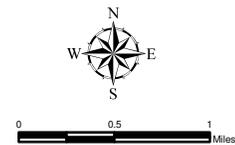
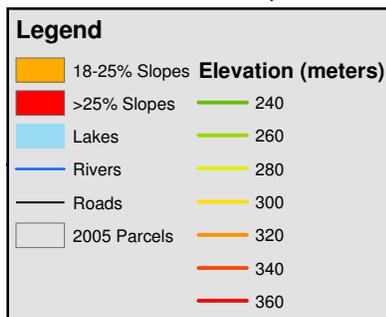
**NISWANDER ENVIRONMENTAL, LLC**

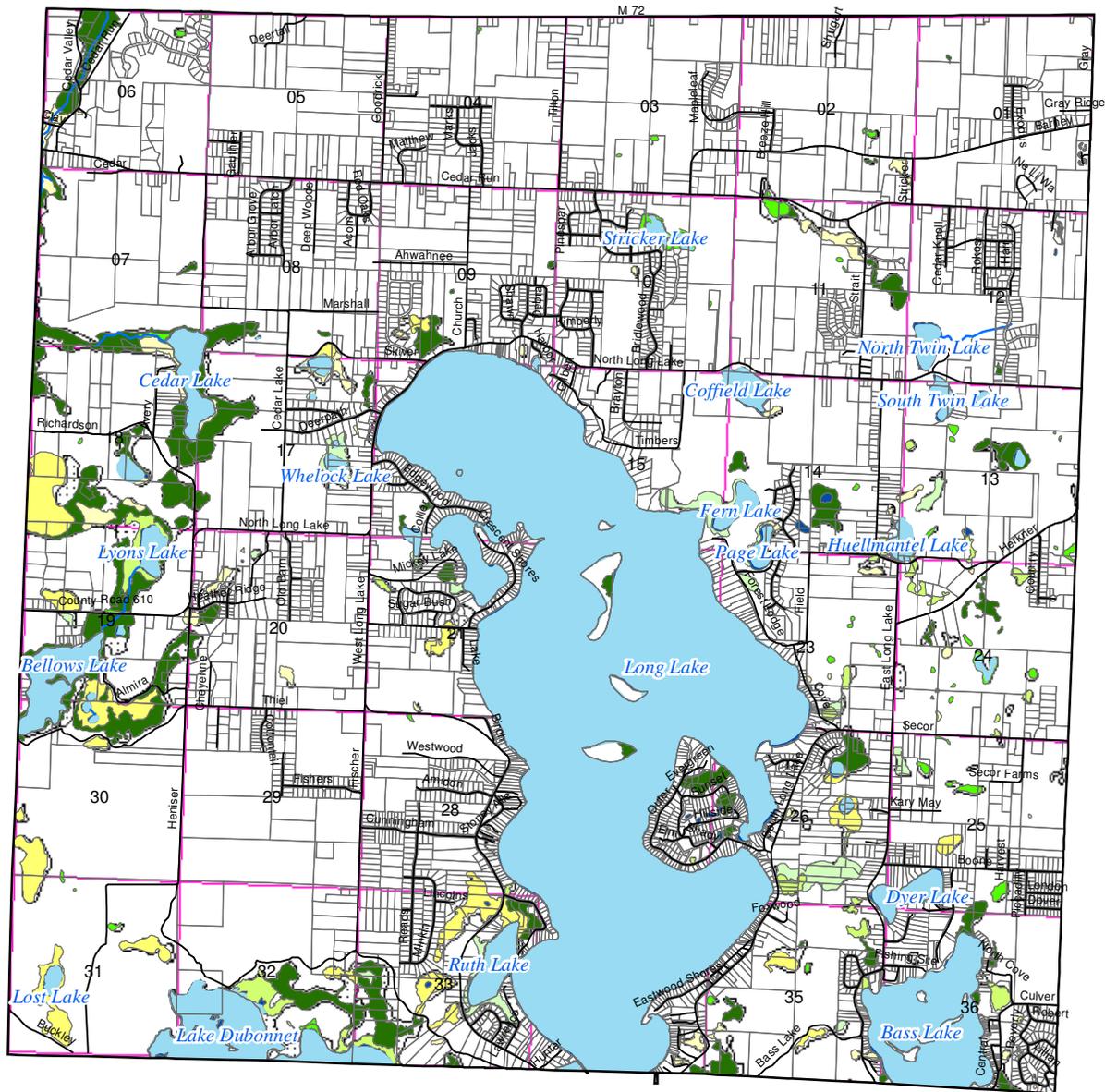


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Long Lake Township Natural Features Inventory  
**Figure 2. Topography and Steep Slopes Map**  
 October 14, 2006





Long Lake Township Natural Features Inventory  
**Figure 3. Wetlands and Watercourses Map**

October 14, 2006



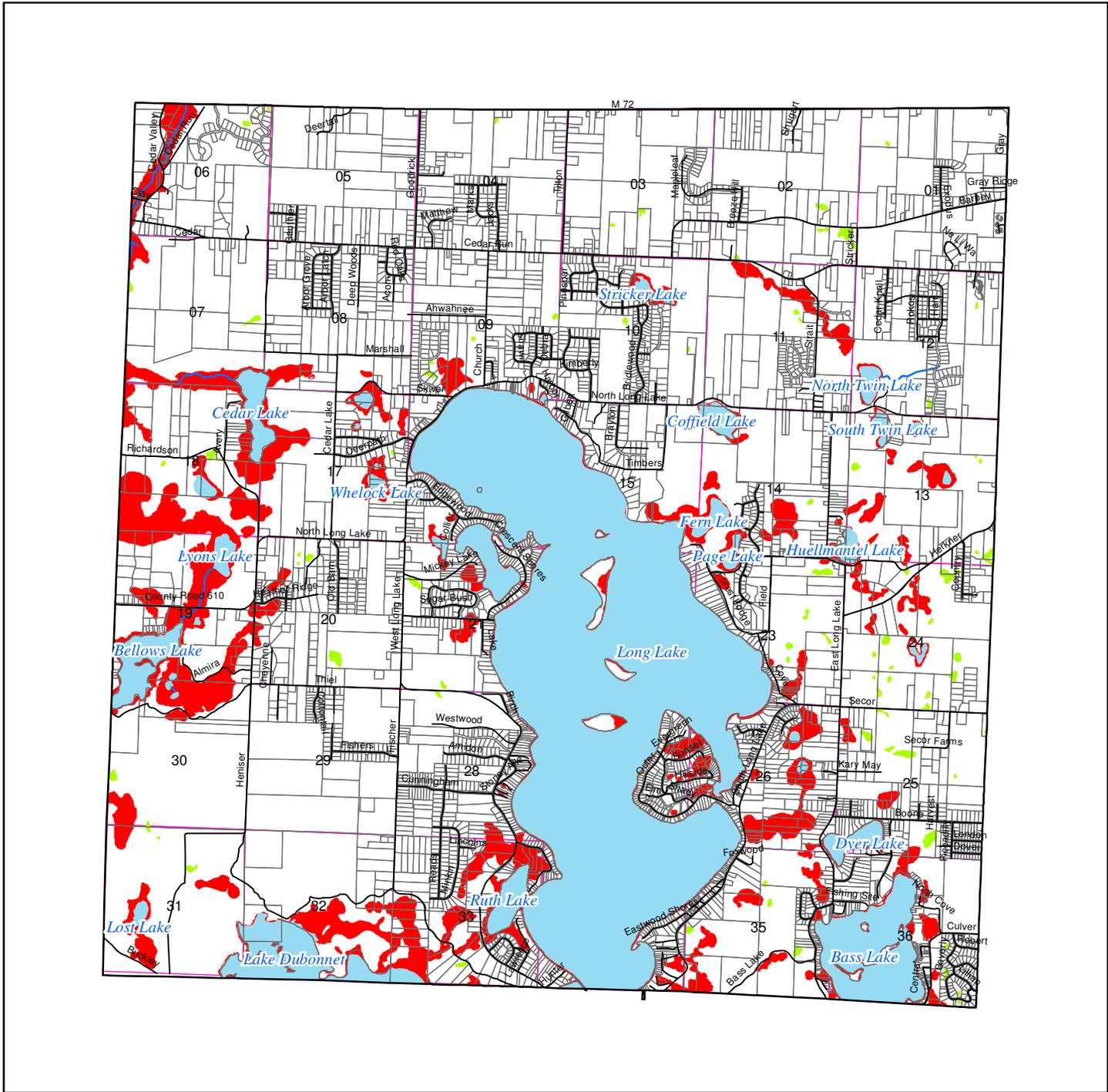
Legend			
	Bog Complex		Lakes
	Emergent		Forested
	Emergent/Scrub-Shrub		Unconsolidated Bottom
	Scrub-Shrub		Hydric Soils
			Rivers
			Roads
			2005 Parcels



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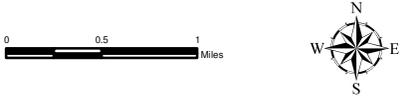
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# Long Lake Township Natural Features Inventory

## Figure 3a. Regulated Wetlands Map

November 15, 2006



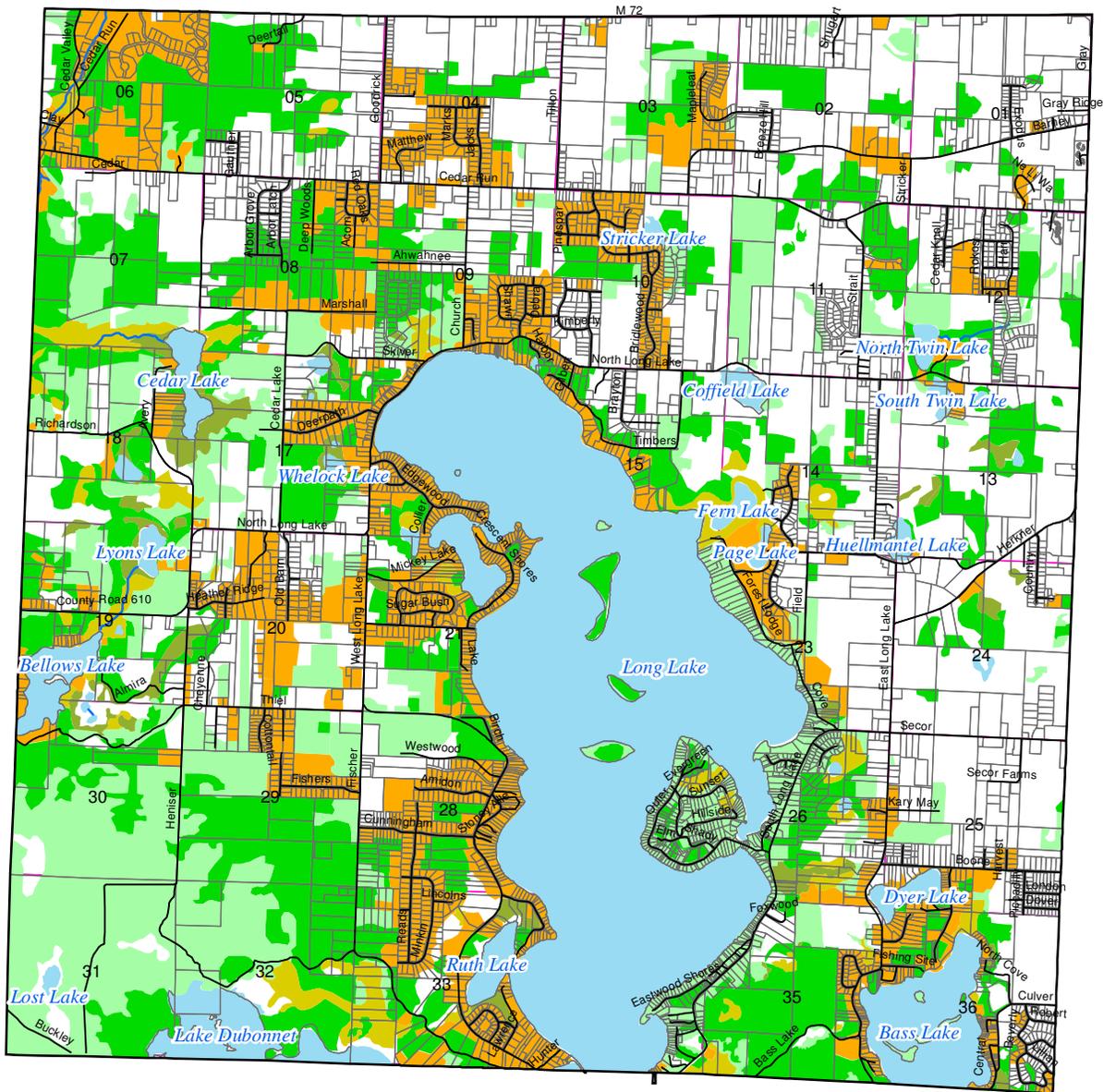
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<span style="color: lime;">■</span> Not Regulated	<span style="color: blue;">—</span> Rivers
	<span style="border-bottom: 1px solid black;">—</span> Roads
	<span style="border: 1px solid gray;">□</span> 2005 Parcels



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# Long Lake Township Natural Features Inventory

## Figure 4. Woodlands Map

October 14, 2006

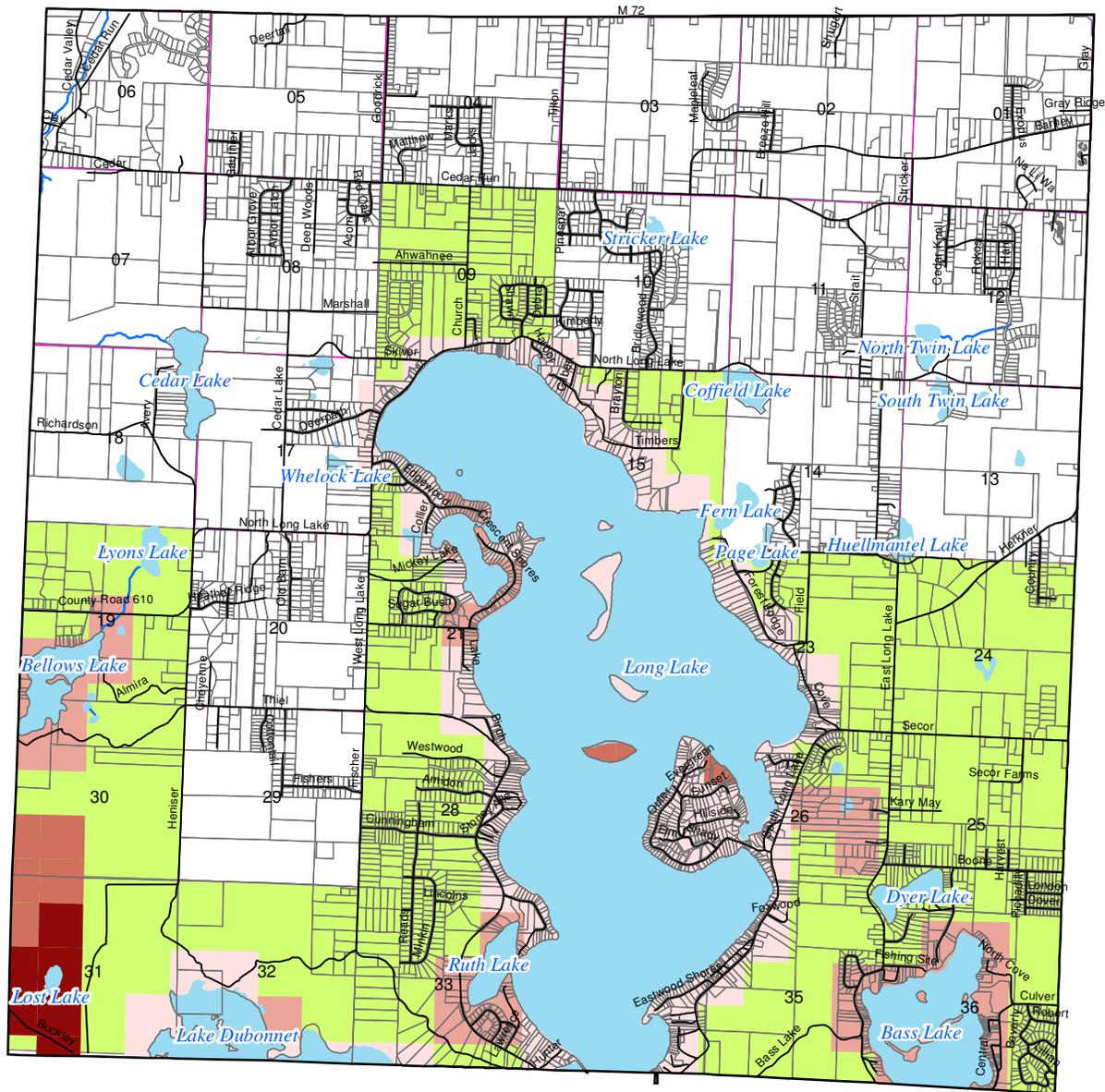


Legend			
	Developed Forest Land		Lakes
	Upland Conifers		Rivers
	Upland Hardwoods		Roads
	Lowland Conifers		2005 Parcels
	Lowland Hardwoods		



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Long Lake Township Natural Features Inventory  
**Figure 5. Threatened and Endangered Species Map**  
 October 14, 2006



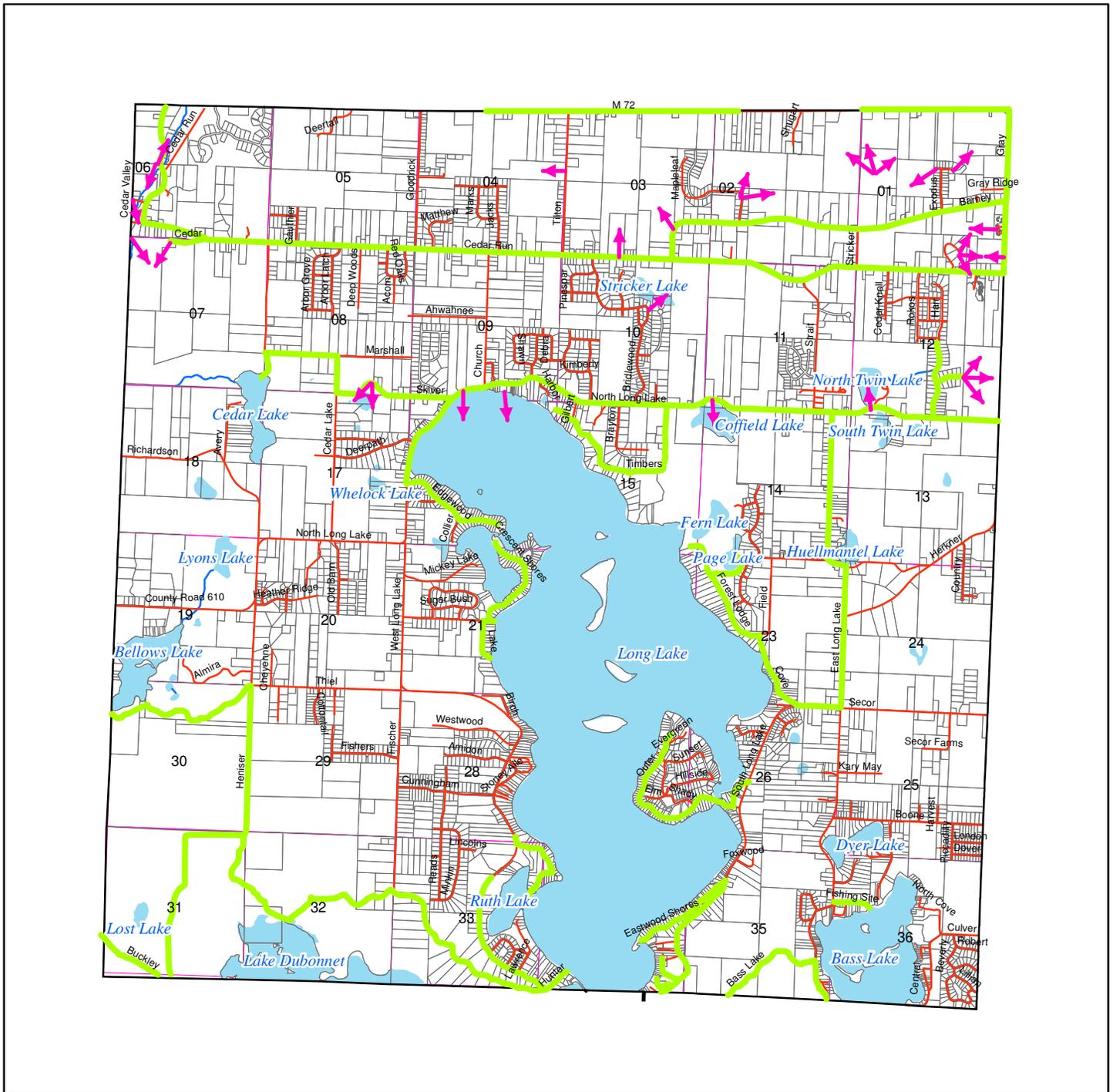
Legend	
MNFI Rarity Index	10.01 - 15.00
Biodiversity Score	15.01 - 20.00
0.00 - 5.00	20.01 - 25.00
5.01 - 10.00	Sections w/ T&E Occurrence
	Lakes
	Rivers
	Roads
	2005 Parcels



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Long Lake Township Natural Features Inventory  
**Figure 6. Scenic Views and Corridors Map**  
 October 14, 2006



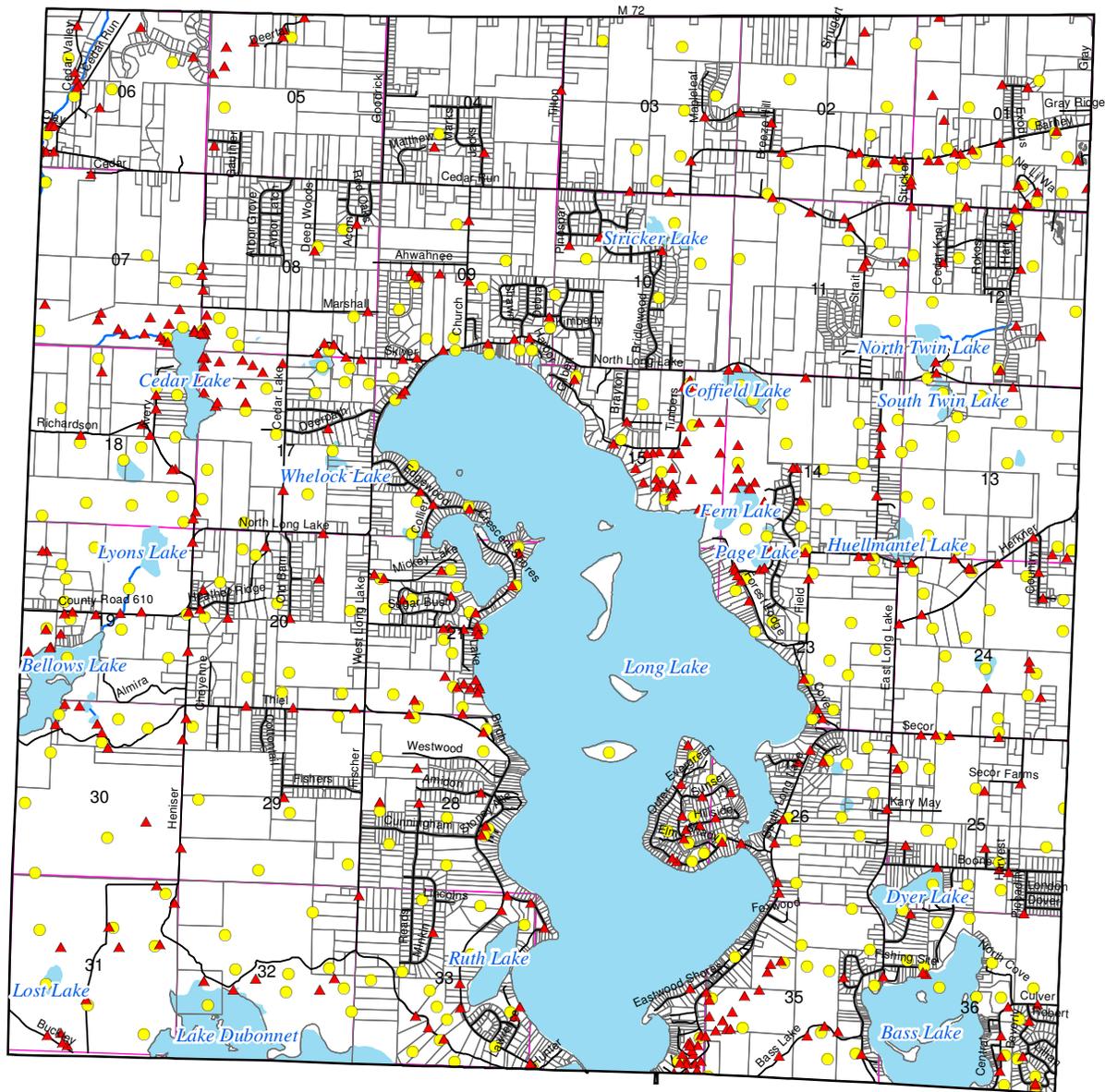
**Legend**

- Scenic Corridor
- Rivers
- Roads
- Lakes
- 2005 Parcels
- Township Boundary
- Scenic View

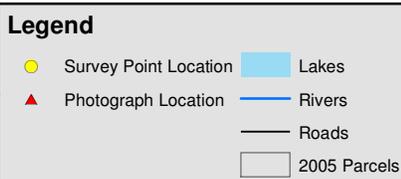
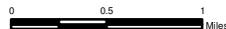


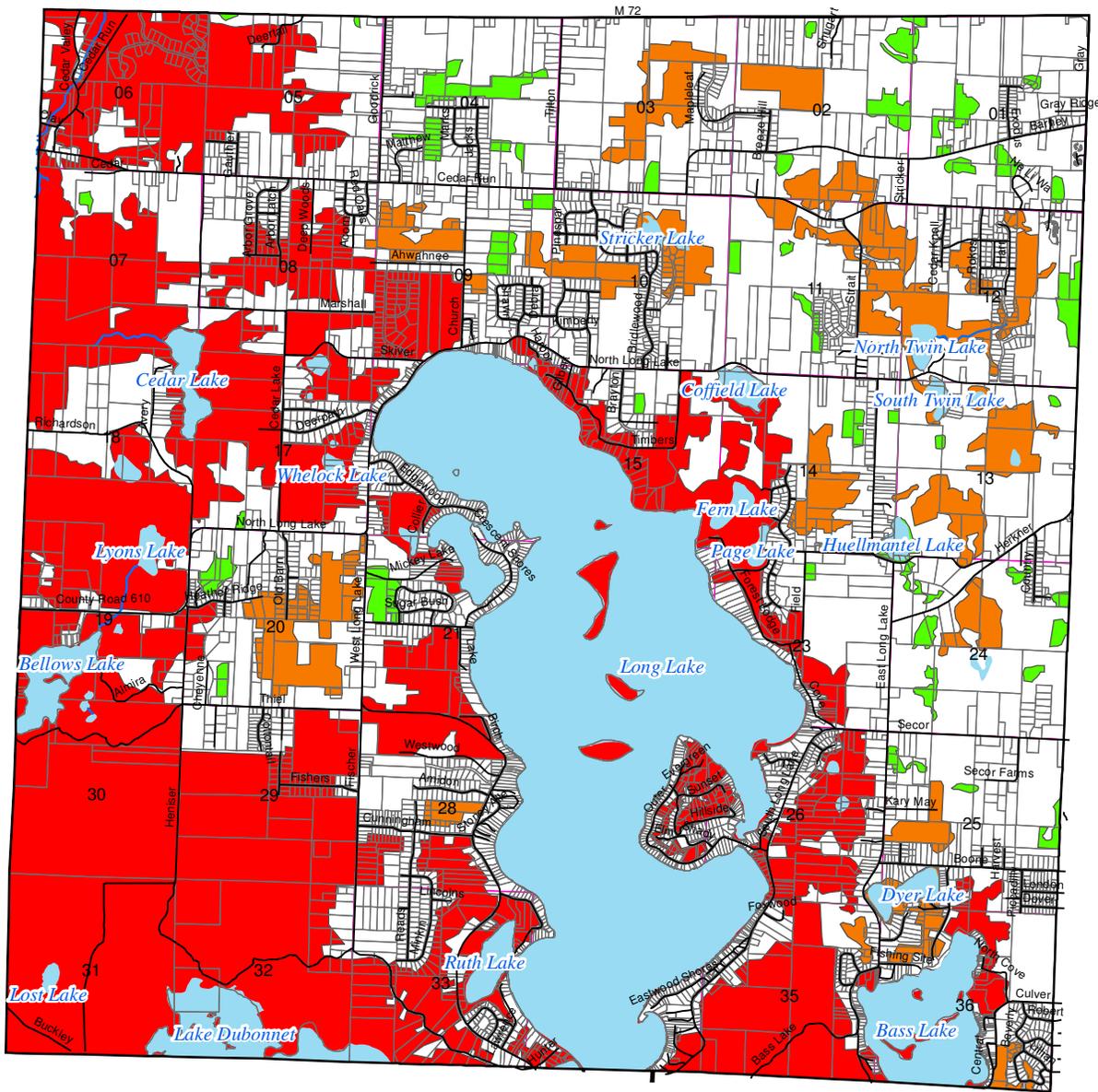
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Long Lake Township Natural Features Inventory  
**Figure 7. Survey and Photograph Locations Map**  
 October 14, 2006

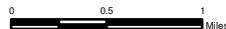




# Long Lake Township Natural Features Inventory

## Figure 8. Natural Areas Map

October 14, 2006

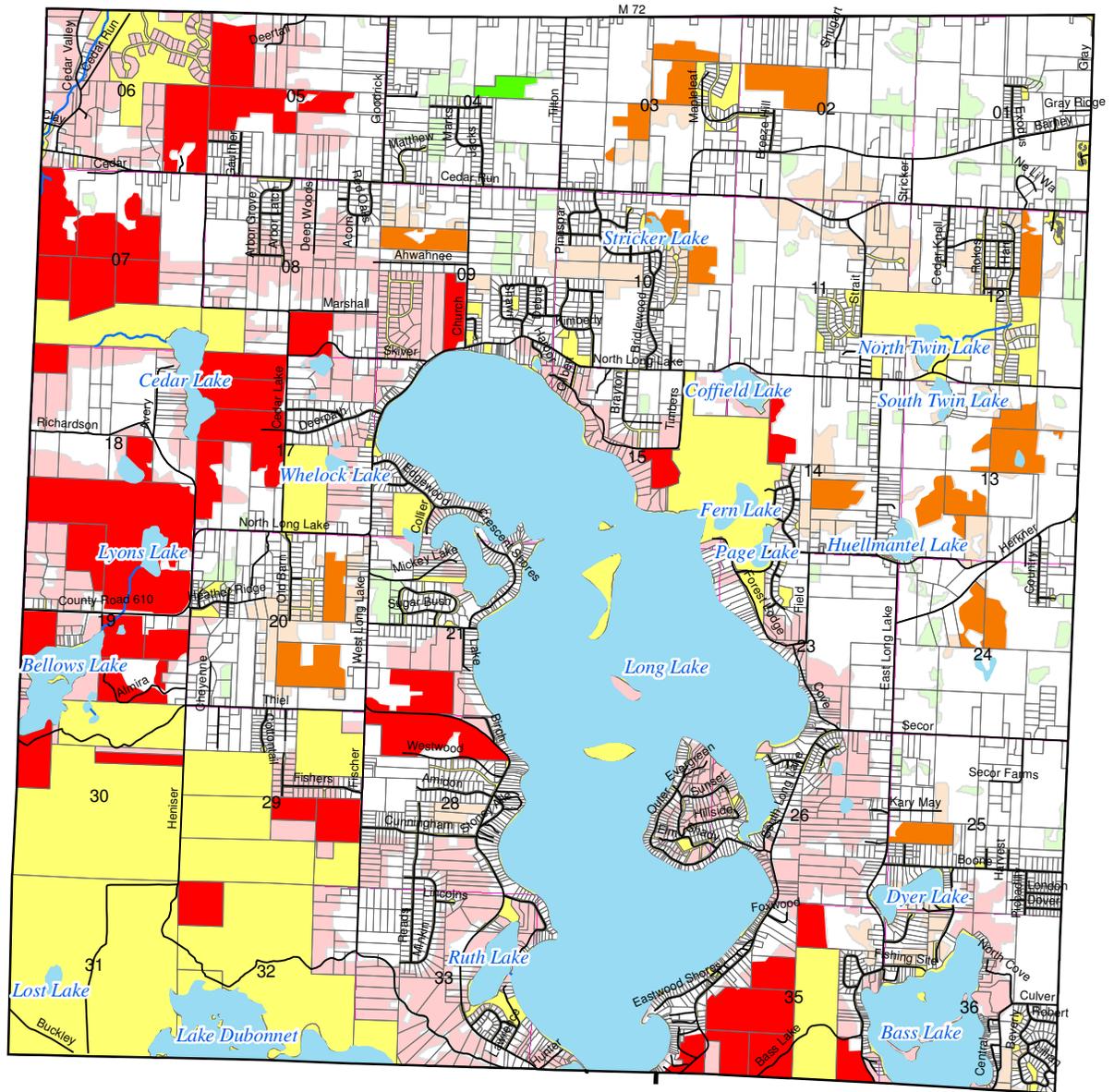


Legend	
<b>Natural Areas</b>	
Identified by Niswander Environmental	
<span style="display:inline-block; width:15px; height:15px; background-color:red; border:1px solid black;"></span> Priority One	<span style="display:inline-block; width:15px; height:15px; background-color:lightblue; border:1px solid black;"></span> Lakes
<span style="display:inline-block; width:15px; height:15px; background-color:orange; border:1px solid black;"></span> Priority Two	<span style="display:inline-block; width:15px; height:15px; background-color:lightblue; border:1px solid black;"></span> Rivers
<span style="display:inline-block; width:15px; height:15px; background-color:lightgreen; border:1px solid black;"></span> Priority Three	<span style="display:inline-block; width:15px; height:15px; border:1px solid black;"></span> Roads
	<span style="display:inline-block; width:15px; height:15px; border:1px solid black;"></span> 2005 Parcels

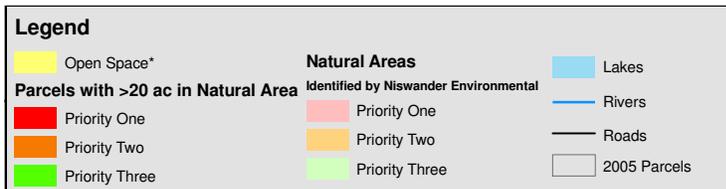
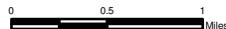


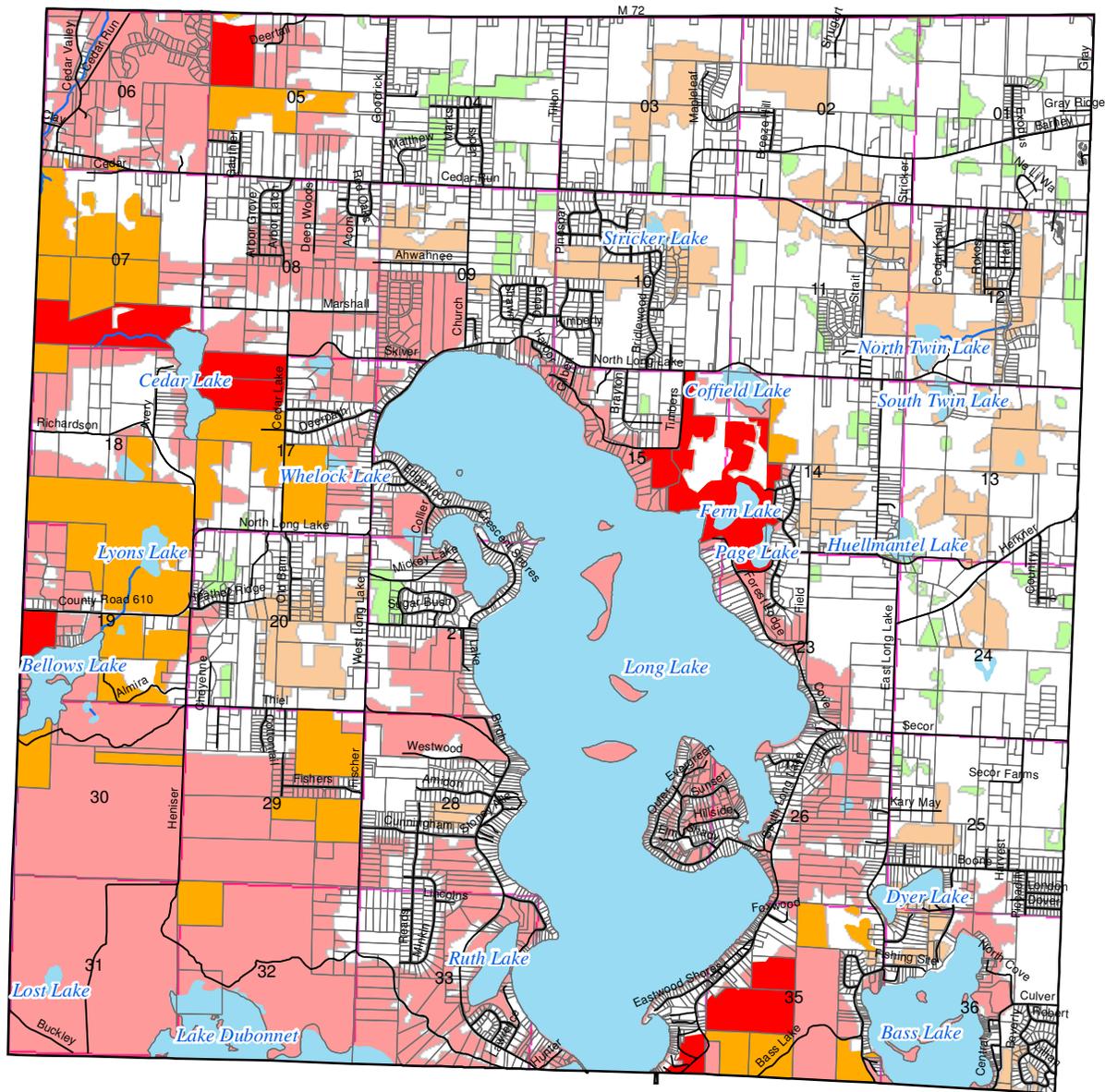
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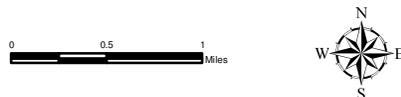


Long Lake Township Natural Features Inventory  
**Figure 9. Large Parcels within Natural Areas**  
 October 14, 2006





Long Lake Township Natural Features Inventory  
**Figure 10. Parcels Investigated within Priority One Natural Areas**  
 October 14, 2006



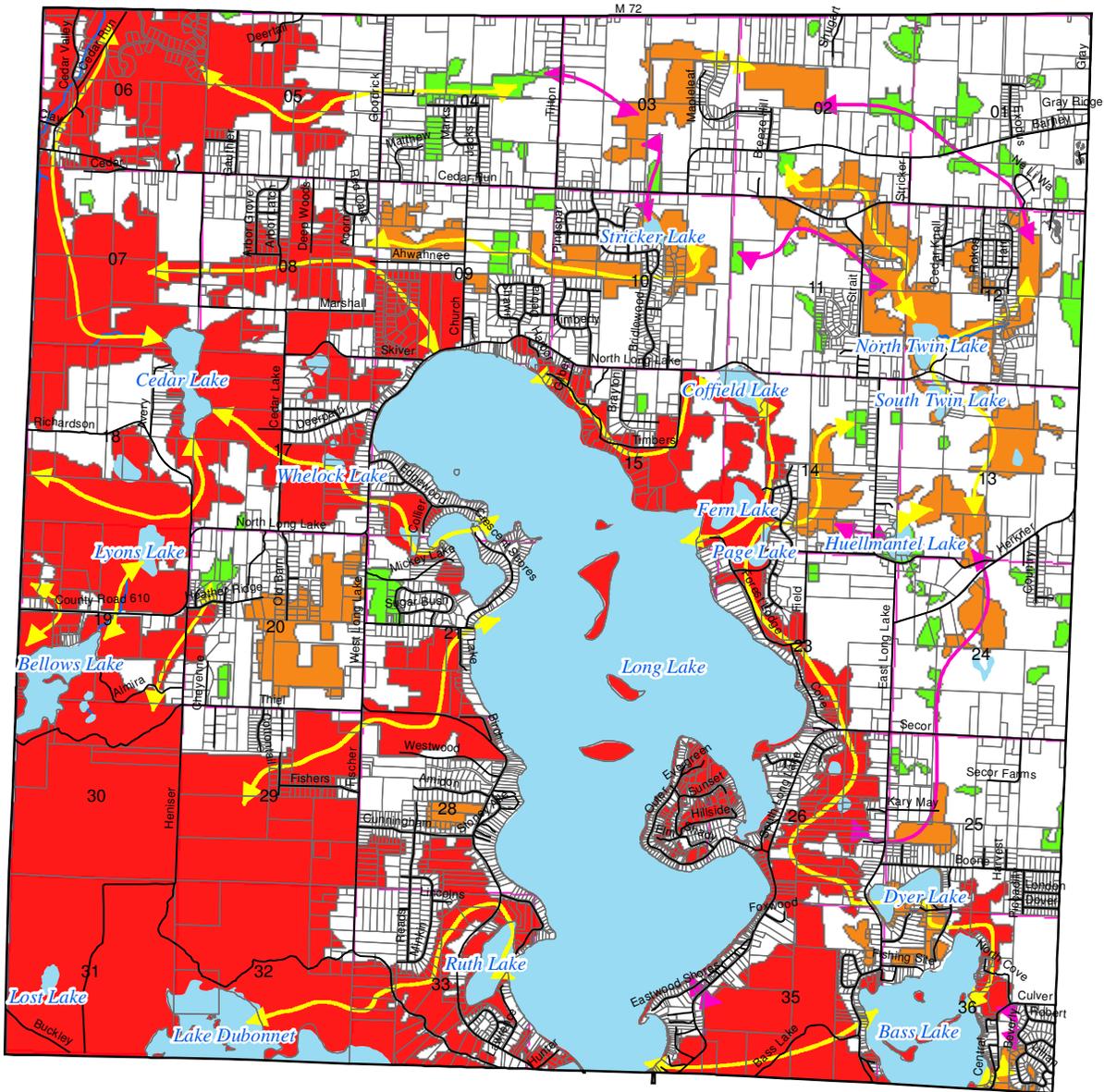
**Legend**

<span style="color: red;">■</span> Priority One Parcels Investigated	<b>Natural Areas</b>	<span style="color: lightblue;">■</span> Lakes
<span style="color: orange;">■</span> Priority One Private* Parcels > 20 acres	<b>Identified by Niswander Environmental (displayed at 50%)</b>	<span style="color: blue;">—</span> Rivers
	<span style="color: red;">■</span> Priority One	<span style="color: gray;">—</span> Roads
	<span style="color: orange;">■</span> Priority Two	<span style="border: 1px solid gray;">□</span> 2005 Parcels
	<span style="color: green;">■</span> Priority Three	



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# Long Lake Township Natural Features Inventory

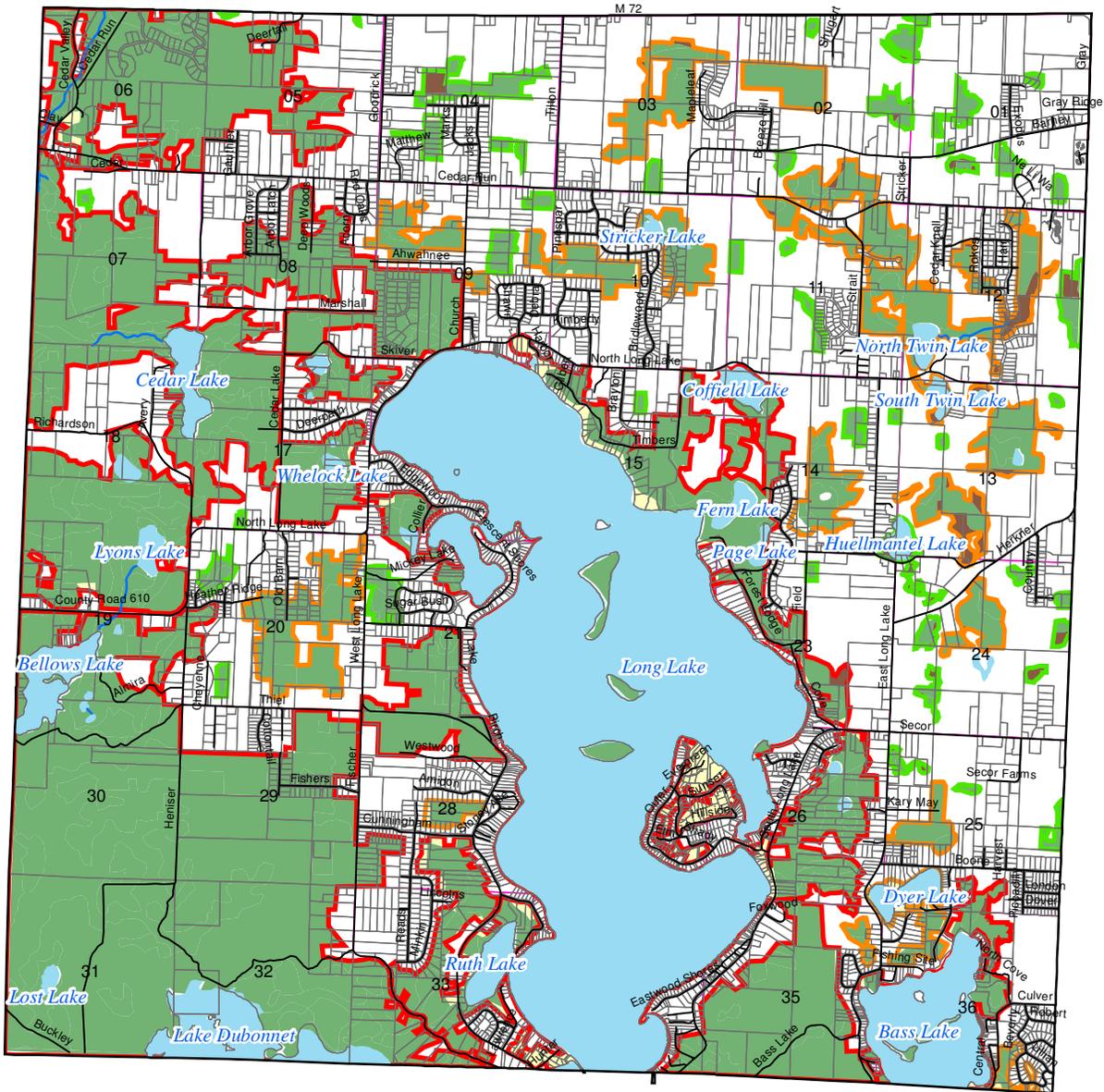
## Figure 11. Wildlife Corridors

October 14, 2006

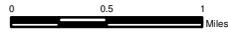


Legend	
	NE Existing Wildlife Corridors
	NE Potential Wildlife Corridors
<b>Natural Areas</b>	<b>Identified by Niswander Environmental</b>
	Priority One
	Priority Two
	Priority Three
	Lakes
	Rivers
	Roads
	2005 Parcels





Long Lake Township Natural Features Inventory  
**Figure 12 Land Use of Natural Areas**  
 October 14, 2006



Legend	
<b>Land Use of Natural Areas</b>	<ul style="list-style-type: none"> <li><span style="display: inline-block; width: 15px; height: 10px; background-color: yellow; border: 1px solid black;"></span> Residential</li> <li><span style="display: inline-block; width: 15px; height: 10px; background-color: orange; border: 1px solid black;"></span> Industrial</li> <li><span style="display: inline-block; width: 15px; height: 10px; background-color: red; border: 1px solid black;"></span> Commercial</li> <li><span style="display: inline-block; width: 15px; height: 10px; background-color: pink; border: 1px solid black;"></span> Institutional</li> <li><span style="display: inline-block; width: 15px; height: 10px; background-color: brown; border: 1px solid black;"></span> Agriculture</li> <li><span style="display: inline-block; width: 15px; height: 10px; background-color: green; border: 1px solid black;"></span> Forest/Undeveloped</li> </ul>
	<ul style="list-style-type: none"> <li><b>Natural Areas</b></li> <li>Identified by Niswander Environmental</li> <li><span style="display: inline-block; width: 15px; height: 10px; border: 2px solid red;"></span> Priority One</li> <li><span style="display: inline-block; width: 15px; height: 10px; border: 2px solid orange;"></span> Priority Two</li> <li><span style="display: inline-block; width: 15px; height: 10px; border: 2px solid green;"></span> Priority Three</li> </ul>
	<ul style="list-style-type: none"> <li><span style="display: inline-block; width: 15px; height: 10px; background-color: lightblue; border: 1px solid black;"></span> Lakes</li> <li><span style="display: inline-block; width: 15px; height: 10px; border-bottom: 1px solid blue;"></span> Rivers</li> <li><span style="display: inline-block; width: 15px; height: 10px; border-bottom: 1px solid black;"></span> Roads</li> <li><span style="display: inline-block; width: 15px; height: 10px; border: 1px solid gray;"></span> 2005 Parcels</li> </ul>



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