Black Lake Watershed Stewardship Initiative

Nonpoint Source Pollution Management Plan

June 2002

Plan Prepared by:

Huron Pines Resource Conservation and Development Council

501 Norway
Grayling, MI 49738
(989) 348-9319

With Assistance from:
Cheboygan Conservation District
Northeast Michigan Council of Governments
Tip of the Mitt Watershed Council

Funding provided by the Michigan Department of Environmental Quality and the U.S. Environmental Protection Agency.

Project Partners

Black Lake Association
Black Lake Sportsman Club
Black River Marina
Black River Ranch
Canada Creek Ranch
Cheboygan Conservation District
Cheboygan County Road Commission
Cheboygan County Soil Erosion Program
City of Onaway
District #4 Health Department
Franklin Hydro, Inc.
Headwaters Land Conservancy
Huron Pines Resource Conservation and Development Council
Little Traverse Conservancy
Michigan Department of Environmental Quality
Michigan Department of Natural Resources
Michigan Groundwater Stewardship Program
Michigan State University Extension
Montmorency County Conservation Club
Montmorency County Road Commission
Northeast Michigan Council of Governments (NEMCOG)
Onaway State Park
Otsego County Road Commission
Pigeon River County State Forest
Presque Isle Conservation District
Presque Isle County Development Commission
Presque Isle County Road Commission
SEE-North
Sturgeon for Tomorrow
Tip of the Mitt Watershed Council
United States Department of Agriculture-
Natural Resources Conservation Service (USDA-NRCS)
United States Fish and Wildlife Service (USFWS)
Upper Black River Watershed Restoration Committee
Weyerhauser

TABLE OF CONTENTS

LIST OF TABLES

1. Introduction

The Black Lake Watershed is well known for its recreational opportunities and aesthetic appeal. Boating, swimming, and fishing are popular activities among year-round residents, seasonal residents, and tourists. Not only is Black Lake itself heavily utilized, but many tourists come to the area to enjoy the Pigeon River Country, hunting, fishing, and canoeing/kayaking opportunities afforded by the Black River.

Black Lake has a healthy and diverse fishery resource. The Lake is famous for its population of lake sturgeon that is self-sustaining, but is threatened. A very limited fishing season, every February, allows for five lake sturgeon to be harvested. The Lake's fishery also includes muskellunge, northern pike, yellow perch, walleye, and bass.

The major rivers within the watershed are also important recreation areas. Canada Creek has a community of permanent and seasonal residents, called Canada Creek Ranch, who mostly live along the riverbank or on the shoreline property of Lake Geneva and the other small lakes within the development. Kleber and Tower Ponds on the Upper Black River also are heavily used for recreation. Tomahawk Creek, Canada Creek, and the East Branch of the Black River are located in areas favored by hunters and anglers, as well as hikers and campers.

The Pigeon River Country State Forest encompasses about 120 square miles, much of which is in the Black Lake Watershed. It is the largest contiguous block of state-owned land in Michigan's Lower Peninsula. The area is managed separately from other state forest lands in the area. Because of the unique features within the forest (Michigan's only elk herd, numerous high quality rivers and lakes, and the wilderness atmosphere of the area), more protective land and water management policies are in place than on most state forest lands. Work is ongoing to preserve, protect, and enhance the wildlife corridors and habitat in the area outside of the boundaries of the Pigeon River Country State Forest.

A. Geographic Description

The Black Lake Watershed is large, encompassing 547 square miles or 350,000 acres. It comprises 37.7 percent of the 1,461-square-mile Cheboygan River Watershed. A ratio of the size of Black Lake's watershed to the surface area of the Lake (watershed-to-surface area ratio) can be a helpful tool in determining how susceptible a lake and its tributaries are to pollution. Lakes in which the ratio of watershed area to lake area is high are more susceptible to nutrient enrichment and other types of pollution throughout the watershed than lakes with small ratios. Black Lake's watershed is 35.04 times larger than the surface area of the Lake (a ratio of 35.04:1, or simply 35.04). This is fairly high for large lakes in Northern Michigan. For example, the watershed-to-surface area ratio for Burt Lake is 14.8 and for Mullett Lake, only 9.74.

The Black Lake Watershed lies between the Mullett Lake Watershed on the west; the Thunder Bay Watershed to the south; and in the north and east the Lake Huron Watershed. In the north and northeast portion of the Black Lake Watershed, the boundary lies about a

mile and a half north of the Lake itself, generally following the contour of the shoreline. On the east side, south of the Bearinger-North Allis Township line, the boundary of the watershed extends eastward, reaching its eastern-most point about halfway between Rainy and Emma Lakes in the southern part of Presque Isle County. It is here that the watershed reaches its maximum width of 21 miles. The boundary begins to bend back west and south, staying north of Atlanta except for a slight dip south about a mile north of Double Lake in Montmorency County. Here is the southernmost extent of the watershed; it reaches a maximum length of 36 miles. From there, the watershed boundary follows a line almost straight west, through the town of Hetherton and west another six miles. Then it bends northward and the western edge of the watershed runs nearly straight north-south from highway M-32 in Otsego County to Devereaux Lake Road in Cheboygan County. There it cuts in sharply to the shore of the northwest corner of Black Lake, at the Lower Black River.

Several rivers and streams flow into Black Lake. The major tributaries to the Lake are the Upper Black River (57 river miles) and the Rainy River (24 river miles). Additionally two major rivers flow into the Upper Black and indirectly into Black Lake: Canada Creek and the East Branch (21 river miles each). Other important tributaries include Tomahawk Creek, Milligan Creek, Stony Creek, Mud Creek, Hardwood Creek, Van Hellens Creek, Rattlesnake Creek, Packer Creek, and Fast Creek. Numerous smaller streams also flow into Black Lake and its tributary rivers.

The watershed contains mostly forested and open space, much of which is state land. Agriculture uses comprise a relatively small percentage of the entire watershed. Besides Onaway, Canada Creek, and Tower there are minimal amounts of urban areas mostly contained in several small communities and strips of residential development along roads and shorelines.

B. Previous Planning Efforts

In 1991, the *Black Lake Watershed Nonpoint Source Management Plan* was developed completing the third phase of a five phase project to develop a management plan for the entire Cheboygan River Watershed. Immediate grant funding to implement the recommendations was not obtained. However, implementation to correct problems, specifically streambank erosion on the Upper Black River, was initiated. The Upper Black River Watershed Restoration Committee was established as a result of the 1991 planning effort and has successfully raised funds and restored numerous erosion sites and repaired road/stream crossings, as well as addressed other resource management issues, such as thermal pollution from beavers.

The 1991 Watershed Management Plan included a description of the characteristics and water resources of Black Lake and its watershed based on a review of resource management practices throughout the watershed.

Insert CHEBOYGAN RIVER WATERSHED MAP

backside of MAP

In order to better understand the watershed, it was divided into eight subwatershed units: the Upper Black River, Rainy River, Canada Creek, East Branch-Black River, Milligan Creek, Tomahawk Creek, Stony Creek, and the immediate shoreline subwatershed of Black Lake.

An inventory of nonpoint source pollution sites was conducted in each of the subwatersheds. A summary of the main activities and recommendations developed in the 1991 Plan follows. Using both off-site and on-site assessment techniques, the streams were prioritized for problem potential. A field survey was then performed on the highest priority streams. Streambank erosion, road/stream crossing problems, and agricultural impacts were the predominant types of problems discovered.

The Black Lake shoreline was surveyed for the presence of Cladophora, a species of algae which can indicate the location of nutrient pollution. Cladophora growth was common in some developed portions of the shoreline, indicating possible shoreline management problems. A review of shoreline soils indicated that many areas have severe limitations for on-site septic systems.

A detailed land use/cover type map was compiled for areas within a 1000-foot perimeter of the shoreline primarily as a means of identifying wetland areas. It revealed that wetlands comprise a large portion of the shoreline area.

A questionnaire was distributed to most of Black Lake's riparian property owners as a means of evaluating current shoreland management practices and identifying areas where better management efforts are needed.

Finally, water quality sampling and analysis was performed to verify present water quality and, on the tributaries, to identify water quality impacts from problem areas. The sampling results were mostly consistent with past investigations. Some water quality impacts were evident following a rain event but even those samples reflected the good quality of the water and the relatively undisturbed status of the watershed.

Based on the information gathered on natural characteristics and problem conditions throughout the Black Lake Watershed, a set of management recommendations was developed for protecting water quality. Because the water quality is good and problems are relatively few, most of the recommendations were proactively aimed at water quality preservation.

Summary of the Priority Recommendations from the 1991 Plan:

1. Develop a proactive agricultural management program to decrease additional nonpoint source pollution from agricultural areas.

2. Implement a water quality monitoring program on the Upper Black River.

3. Develop a wetland protection program, which focuses on citizen involvement and long-term protection efforts.

4. Develop a shoreline land use program to better assess nonpoint source impacts from shoreline areas and work towards correction of problem sites and education of riparians.

5. Establish a realtors education program to encourage better understanding of regulations affecting management of shoreline properties.

6. Provide the City of Onaway with information about best management practices for stormwater management and encourage the development of a stormwater management plan.

7. Establish a road/stream crossing problem prevention and remediation program.

8. Promote forestry best management practices that protect water resources for the private citizen and forestry contractors in the area.

9. Provide educational brochures to canoe livery owners and patrons on resource management projects.

In spite of the overall good condition of the watershed, nonpoint source pollution problem sites were present in a number of areas. Recommendations also included remedial actions for the most serious problem sites, including:

1. Stabilize identified erosion sites along the tributaries of Black Lake.

1. Correct erosion and runoff problems in agricultural areas within the watershed through the implementation of best management practices.

2. Develop demonstration septic system and greenbelt projects in shoreline areas.

C. Current Planning Effort

In 2000 a new effort was launched by Huron Pines Resource Conservation and Development Council to update the 1991 Plan. Changes in the watershed over the past decade were expected to alter recommended actions to protect and improve the water quality within the Black Lake Watershed. A partnership approach was taken to reassess the most significant problems and threats facing the water quality of Black Lake and its tributaries.

This report summarizes the results of updated nonpoint source inventories and involvement of the community to develop a long-term strategy for water quality protection in the Black Lake Watershed.

2. Designated Uses and Water Quality Summary

The Water Resources Commission Act (P.A. 451 of 1994, Part 31, Chapter 1) requires all waters of the State of Michigan to be of the quality to meet seven designated uses: 1) agriculture; 2) navigation; 3) industrial water supply; 4) public water supply; 5) warm water fishery; 6) habitat for indigenous aquatic life and wildlife; and 7) partial or total body contact recreation. An eighth designated use, cold water fishery is applicable for many rivers and lakes in Michigan.

The Michigan Department of Environmental Quality will be conducting water quality monitoring in the Black Lake Watershed in 2003 and the data will be used to verify if the designated uses are all being met.

Based on available information, Black Lake has good water quality and currently meets all seven of the designated uses. Active designated uses include agriculture, navigation, industrial water supply, warm water fishery, habitat for aquatic life, and total body contact recreation. Although Black Lake's water quality is adequate for public water supply it is not being used for this purpose. Black Lake's major tributaries–Upper Black River (and some of the tributaries) meet all eight of the designated uses. Most of the other tributaries meet six to seven of the designated uses, with the exception of navigation due to their small size and a few that do not support cold water fishery (Bowen Creek and Rainy River). A variety of activities and changing land uses in the watershed threaten some of the designated uses (Table 1).

Table 1: Black Lake Watershed Threatened Uses	
	• **Navigation (N)**
	• **Habitat for indigenous aquatic life and wildlife (H)**
	• **Partial or total body contact recreation (R)**
	• **Cold water fishery (C)**

A. Watershed Concerns

A Watershed Steering Committee, called the Black Lake Watershed Advisory Council, was established to re-assess the watershed concerns and to provide input into the overall planning effort. Advisory Council members included local government officials, conservation groups, environmental organizations, regional planning agencies, health departments, and other stakeholders within the Black Lake Watershed. The main role of the Advisory Council was to identify the many different issues and concerns occurring within the watershed and review the work involved with updating the Plan. The list below is comprehensive of all the issues threatening the water resources in the Black Lake Watershed identified by the Advisory Council. A prioritized list follows.

Table 2: Concerns and Threats to Designated Uses (listed in order of priority, beginning with the highest)	N	H	R	C
Stormwater discharges to lakes and rivers and increasing urbanization		♦	♦	♦
Agricultural pollution from fertilizers, animal waste, livestock access		♦	♦	♦
Golf courses/fertilizers and pesticides		♦		♦
Recreational use (ORVs, campgrounds)	♦	♦		♦
Road/stream crossings	♦	♦		♦
Local land use decision making and lack of zoning enforcement	♦	♦	♦	♦
New construction/subdivision development without adequate regulations and oversight	♦	♦		♦
Parcel splits/fragmentation	♦	♦		♦
Oil and gas development and pipelines	♦	♦	♦	♦
Wetland destruction/loss		♦		♦
Forest management planning and logging activities	♦	♦		♦
Need for land protection of sensitive areas		♦		
Chlorides/brine on roads		♦		♦
Streambank erosion	♦	♦		♦
Erosion in steep areas around lakeshore	♦	♦		♦
Lawn care/fertilization and pesticide use		♦		♦
Increasing algae blooms/nuisance aquatic plants		♦		♦
Pollution from septic systems		♦		♦
Destruction of greenbelts and shoreline vegetation		♦		♦
Loss of wildlife/aquatic habitat		♦		♦
Water withdrawal				♦
Waterfowl impacts/nutrients, swimmer's itch		♦		
Mercury contamination		♦		♦
pH problems, acid rain		♦		♦
Dams (fish movement)			♦	♦
Boats/wave runners		♦	♦	
Industrial discharges		♦		♦
Threatened and endangered species		♦		
Beaver activity (water temperature, sediment such as sand and silt, spawning, insect production)	♦	♦	♦	♦

Historic nutrients in sediments		♦		♦
Exotic species (e.g., zebra mussels, Eurasian water milfoil)		♦		
Commercial/tribal fishing		♦		♦
Underground storage tanks		♦		
Abandoned wells		♦		
Improper dumping including household hazardous waste		♦		
Landfill/ground water contamination		♦		
Long-term air quality		♦		♦
Lack of natural river designation		♦		♦

Navigation (N) ● Habitat for indigenous aquatic life and wildlife (H) ● Partial or total body contact recreation (R) ● Cold water fishery (C)

B*. Known and Suspected Pollutants in the Black Lake Watershed*
Sediment, nutrients, and toxics such as oils, grease, and heavy metals were identified as the main pollutants of concern that threaten the designated uses in the Black Lake Watershed. Below is a list of the known and suspected pollutants.

Table 3: Known and Suspected Pollutants

Impaired Use	*Pollutants**
Navigation	Sediment (k)
Habitat for indigenous aquatic life/wildlife	Sediment (k) Nutrients (s) Oils, grease, heavy metals (s) Pesticides (s)
Partial and total body contact recreation	Nutrients (s) Bacteria (s)
Cold water fishery	Sediment (k) Nutrients (s) Oils, grease, heavy metals (s) Pesticides (s)

* k = known s = suspected

C. Sources of Pollutants in the Black Lake Watershed
With 547 square miles or 350,000 acres there are numerous potential sources of pollutants to the water resources in the Black Lake Watershed. Land uses range from large tracts of state forests to the resort communities (urban areas) of Canada Creek Ranch and the City of Onaway. Diverse land uses equals a diverse amount of activities and many potential sources of nonpoint source pollution. The main activities contributing

nonpoint source pollution for each primary pollutant of concern in the Black Lake Watershed are described in Table 4 below.

Table 4: Sources of Pollutants in the Black Lake Watershed

Pollutant	*Sources*
Sediment	Lakeshore and streambank erosion (k) Road/stream crossings (k) Livestock in streams (s) New construction (s) Logging activities (s)
Nutrients	Lawn care on shoreline properties (k) Septic systems (s) Livestock in streams (s) Road/stream crossings (k) Lakeshore and streambank erosion (k) Stormwater discharges in urban areas (s) Manure applications and management (s) Golf courses (s) New construction (s)
Oils, grease, and heavy metals	Stormwater discharges in urban area (s) Road/stream crossings (k)
Pesticides	Lawn care on shoreline properties (s) Agricultural fields (s) Golf courses (s)
Bacteria	Septic systems (s) Stormwater discharges in urban areas (s) Livestock waste (s)

* k = known s = suspected

D. Causes for Each Pollutant Source in the Black Lake Watershed

Understanding the potential causes of the pollution is essential in developing goals and action strategies. Below (Table 5) is a list of the causes connected to each pollutant source.

Table 5: Pollutant Sources and Causes		
Pollutants	*Pollutant* Source	*Cause*
Nutrients (P and N) (k)	Agricultural fields (s)	Over or improper fertilizer applications, lack of soil testing or/and buffer strips (s)
	Septic systems (s)	Outdated, poorly maintained, and improperly designed systems (s)
	Golf courses (s)	Heavy applications of fertilizers and pesticides (s) Lack of buffer strips in riparian areas (s)
	Manure applications and management (s)	Over application of manure (s), lack of proper storage for manure (s), inadequate testing of soil properties (s)
	Lawn care on shoreline properties (k)	Use of phosphorus fertilizer (s), over application of fertilizers (s), removal of native shoreline vegetation (k)
	Stormwater discharges in urban areas (k)	Inadequate treatment of stormwater (s)
Sediment (k)	Agricultural fields (s)	Poor soil conservation practices (s)
	Lakeshore and streambank erosion (k)	Shoreline development and removal of shoreline vegetation (k), angler and canoeist access (k), road/stream crossings (k)
	Livestock in streams (s)	Unrestricted access and no alternative water source (s)
	Logging activities (s)	Inadequate buffer strips near streams (s)
	New construction (s)	Lack of proper erosion control and stormwater management measures (s)
	Road/stream crossings (k)	Undersized and short culverts (k), lack of runoff diversions (k), inadequate fill on road surface (k), lack of vegetation
	Stormwater discharges in urban areas (k)	Inadequate treatment of stormwater (s)
Bacteria (k)	Septic systems (s)	Outdated, poorly maintained, and improperly designed systems (s)
	Urban stormwater (s)	Pet waste
	Livestock in streams (s)	Unrestricted access and no alternative water source (s)
Oils, grease and metals (k)	Stormwater discharges in urban areas (k)	Inadequate treatment of stormwater that may contain oils, grease, heavy metals, etc. (s)
Pesticides	Lawn care on shorelines (s) Agricultural fields (s) Golf courses (s)	Over or improper application Over or improper application Over or improper application

* k = known s = suspected

E. Watershed Goals

The mission of the Black Lake Watershed Stewardship Initiative is to protect and enhance the water quality of Black Lake and its tributaries by reducing current and future polluted runoff. A goal to address each threatened designated use was developed and is listed in Table 6.

Table 6: Watershed Goals to Address Threatened Uses

Navigation	Maintain navigation in the rivers and lake by reducing any sediment inputs.
Aquatic life/wildlife	Protect the diversity of aquatic habitats within the Black Lake Watershed by reducing the contribution of sediment, nutrient, and toxic pollutants.
Partial or total body contact	Maintain the excellent recreational opportunities in the rivers and lake by reducing bacteria and nutrient contributions.
Cold water fishery	Reduce sediment and nutrient loads which threaten to harm habitat conditions for the cold water fishery in Black Lake's tributaries.

F. Water Quality Summary

The Black Lake Watershed has four designated uses that are threatened: 1) navigation; 2) aquatic life/wildlife; 3) partial or total body contact; and 4) cold water fishery.

Project Goals: The mission of the Black Lake Watershed Stewardship Initiative is to protect and enhance the water quality of Black Lake and its tributaries by reducing current and future polluted runoff. Specific goals related to the designated uses are as follows:

1) Maintain navigation in the rivers and lake by reducing any sediment inputs.

2) Protect the diversity of aquatic habitats within the Black Lake Watershed by reducing the contribution of sediment, nutrient, and toxic pollutants.

3) Maintain the excellent recreational opportunities in the rivers and lake by reducing bacteria and nutrient contributions.

4) Reduce sediment and nutrient loads which threaten to harm habitat conditions for the cold water fishery in Black Lake's tributaries.

Navigation

Navigation is threatened in the Upper Black River and locations in Black Lake from increasing sediment. Lakeshore and streambank erosion along with road/stream crossings are known sources of sediment pollution. Suspected sources of sediment include livestock in streams, new construction, and logging activities.

Lakeshore and streambank erosion is often a result of the removal of shoreline vegetation. Angler and canoeing access points are another source of erosion on the Black River. Improperly sized culverts and lack of runoff diversions are the main reason for erosion and sedimentation associated with road/stream crossings.

Livestock access to streams for a watering source can destroy the bank and cause erosion and sedimentation. New construction in the shoreline area can also contribute sediment, particularly if inadequate erosion controls are used. Not maintaining buffer strips during logging is also suspected of contributing to erosion and sedimentation.

Habitat Protection for Aquatic Life/Wildlife

Aquatic habitat is threatened throughout the watershed from sediment, nutrients, and toxic chemicals, such as oils, grease, heavy metals, and pesticides. Sediment impacts aquatic habitat by covering spawning areas, which makes feeding difficult, clogs gills, and reduces aquatic insect populations. Nutrients harm wildlife by encouraging excessive aquatic plant growth that can deplete oxygen supplies when it decomposes. Toxic chemicals harm aquatic life by weakening immune systems and making organisms more susceptible to disease. They can also harm reproduction and if concentrations of the toxic materials are high enough they can kill aquatic life.

Sources of sediment pollution are the same as mentioned above under threats to navigation. Known sources of nutrient pollution include lakeshore and streambank erosion, road/stream crossings, and lawn care on residential properties. Suspected sources of nutrient pollution include septic systems, livestock in streams, stormwater discharges in urban areas, manure application and management, golf courses, and new construction. Oils, grease, and heavy metals are known to be contributed from stormwater discharges in urban areas and road/stream crossings. Pesticides may be contributed from agricultural fields and lawns.

Nutrients often attach to sediment particles. When erosion from lakeshores, streambanks, and road/stream crossings occurs, it contributes not only sediment but also nutrient pollution. Residential properties and golf courses are suspected sources of fertilizers which can contribute nutrients that encourage nuisance plant and algae growth. Septic systems in shoreline areas contribute nutrients such as nitrogen and phosphorus that can migrate to the lake.

High beaver populations and their associated dams have also been identified as a source of impact to aquatic habitat in the cold water rivers and streams throughout the watershed. There are many factors that contribute to high beaver populations including the elimination of natural predators, such as wolves, decreases in beaver harvest due to the reduction of fur prices, and food supply increases due to more aspen forests. The impacts on the habitat from beaver include thermal pollution from water that discharges from beaver dams and results in lower dissolved oxygen levels. In certain locations beaver can also limit fish movement including movement to spawning areas. Managing beaver populations is complicated by the presence of Hungerford's crawling water beetle, an endangered species. The Hungerford's beetle inhabits riffle zones downstream of beaver dams and the Upper Black River has many locations that are ideal habitat for the Hungerford's crawling water beetle.

Recreation (Partial and Total Body Contact)
Nutrient pollution can stimulate nuisance levels of aquatic plant and algae growth which disrupt recreational activities and make swimming and boating undesirable. In addition, high bacteria counts can make it unsafe for swimming. In some locations of Black Lake riparians have recently complained about nuisance levels of native aquatic plants. Reducing nutrient inputs is vital to maintain the diversity and quality of recreational opportunities in this watershed.

Sources and causes of nutrients have been described previously. Suspected sources of bacteria include–stormwater discharges in urban areas, manure application and storage, and livestock access to streams. Stormwater discharge from Onaway can collect and deposit pet and wildlife waste into Stony Creek and Bowen Creek. Excessive application of manure, runoff from manure piles, or livestock access to streams can all be causes of bacteria pollution from agricultural sites.

Cold Water Fishery
The majority of the rivers and streams in the watershed also support a cold water fishery. Sediment, nutrient, dams, and toxic pollution (oils, grease, heavy metal, and pesticides) can all be harmful to a cold water fishery.

In rivers, sediment may be the most harmful pollutant to the cold water fishery. In addition to destroying habitat and harming fish, the sediment adds to the overall bed load of the river. This extra sediment (often sand) bed load makes the river or streams wider and shallower creating conditions suitable for increased water temperatures (thermal pollution).

Chapter Two: Priority Area

The priority area is that portion of a watershed that is most sensitive to environmental impacts, and which has the greatest likelihood to affect water quality and aquatic habitat. USGS topographic maps were used as a base for delineating the priority area. Supplemental information was used to identify sensitive areas. Other sources used included, USDA Soil Surveys, Groundwater Education in Michigan (GEM) ground water studies, the Farrand map of surficial geology, and a Tip of the Mitt Watershed Council survey of shoreline wetlands.

The priority area for Black Lake Watershed includes the following areas:

1. Areas within 1,000 feet of the following features
    A. Black Lake
    B. Other inland lakes in the watershed
    C. Tributary streams (including intermittent drainages)
    D. Contiguous wetlands. For the Black Lake Watershed, a contiguous wetland is defined as being within 1,000 feet of Black Lake, or within 500 feet of streams or other lakes within the watershed.
    E. Urban areas which drain to surface waters, typically via storm sewers

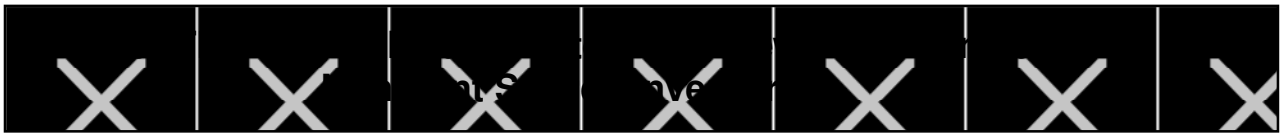
2. Areas of steep slopes contiguous with any priority perimeter described above. Regarding water resources, the definition of a steep slope seems to range widely in the literature (from 8-25%). For this priority area determination, a 10% slope (or 1:10 ratio, or 6 degrees) or greater is recommended.

3. Areas of ground water recharge.

The nonpoint source pollution inventories focused on the priority areas.

Insert BLACK LAKE WATERSHED Map

back of Map



Introduction
Nonpoint source pollution is the primary pollution threat facing the water resources of the Black Lake Watershed. An extensive nonpoint source inventory was conducted for the priority areas within this 350,000-acre watershed. This inventory includes an assessment of stormwater flows throughout the watershed, shoreline pollution, agriculture impacts, streambank erosion, road/stream crossing impacts, and existing land use. The purpose of the nonpoint source management plan is to inventory pollution sources, determine the priority areas of concern, and develop management recommendations which can be easily implemented and which will enhance and protect the water resources of the Black Lake Watershed.

1. Stormwater Inventory
Stormwater, also called urban runoff, is that water which flows across the land surface during rainfall or snowmelt. Impervious surfaces (streets, roofs, sidewalks, etc.) generate much more stormwater runoff than natural forested, or even agricultural land uses.

Black Lake has one significant urban area within the watershed, the City of Onaway. A portion of all the City has paved streets with curbs, gutters, and subsurface drainage pipes called storm sewers. The main purpose of these storm sewers is to prevent flooding and water damage. Unfortunately, substances (such as bacteria from pet and animal wastes, fertilizer, oil and grease, sediment, heavy metals, salt, etc.), which find their way onto the streets and sidewalks, are likely to be washed into the watershed's tributaries by rainfall or snowmelt. A multitude of studies from around the nation and world have documented that urban stormwater is a serious source of pollution.

To better understand the potential impact from stormwater to Black Lake, an inventory and assessment of the storm sewer system in Onaway was conducted. This consisted of identifying the land uses (e.g., commercial, residential, open space) within the city boundaries, reviewing maps of storm sewers provided by the City of Onaway, delineating drainage areas, identifying locations of stormwater inlets and outlets, and estimating pollutant loading using models developed during nationwide studies. Water sampling and testing were not conducted. However, water quality studies by the Watershed Council have documented that the pollution and water quality impacts of storm sewer effluent from other Northern Michigan communities is similar to the predictive model. The table summarizes the stormwater characteristics in Onaway using formulas that estimate pollutant loadings. The formula takes into account annual rainfall and typical pollutant loadings from the different land use types. The estimates are based for storm events.

The results indicate that the storm sewers are contributing a significant amount of pollution to Black Lake's tributaries. The storm sewers predominantly drain the west side of the City

to Bowen Creek and ultimately the Upper Black River. The east side of the City has surface runoff to Stony Creek. The only other area in the watershed that is similar to Onaway is the Canada Creek Ranch development. Although there is no industrial or commercial development it contains a fairly large medium-density residential neighborhood. The community of Tower has a very small cluster of homes and businesses as well.

Minimizing or eliminating the pollutant loads from stormwater in urban-like areas in the watershed will require many different approaches including educating citizens about stormwater and safe disposal of household hazardous materials, working with the City of Onaway on street cleaning, and minimizing impervious surface from new developments in critical areas in the watershed, and installing sediment basins and other stormwater BMPs where appropriate.

Table 7: Storm Sewer Summary

Total area of City of Onaway	1,035 acres
Percent of Watershed	<1%
Land use in city:	
Percent undeveloped	54%
Percent commercial/industrial	13.5%

Percent residential	28%
Percent agricultural	4.6%
Percent impervious area	24.0%
Area of city draining to lake or river via storm sewers	679 acres
Percent of city draining to lake or river via storm sewers	66%
Estimated pollution contributions from storm sewers (annual storm events only not base flow) Phosphorus Sediment	 518 lbs 146,308 lbs

2. Shoreline Pollution Inventory

A shoreline survey to identify locations of nutrient pollution (using an algae called Cladophora as an indicator), bottom sediment type, and shoreline development characteristics was conducted for Black Lake when the management plan was developed in 1991. For the updated plan we reinvestigated areas with Cladophora to assess changes.

Cladophora is a branched, filamentous, green algae that occurs naturally in small amounts in Northern Michigan lakes, mostly on rocky shorelines. The presence of Cladophora can indicate locations where relatively high concentrations of nutrients, particularly phosphorus, are entering a lake. Sources of these nutrients can be due to natural conditions, however, the majority of Cladophora growths can be traced to cultural sources (such as lawn fertilization, septic systems, poor agricultural practices, soil erosion, and wetland destruction). These nutrients can contribute to an overall decline in lake water quality. Additionally, septic systems that are not adequately treating wastewater can pose a potential health risk due to bacterial and viral contamination.

Periodic repetition of shoreline algal surveys are important for identifying chronic problem sites as well as recent occurrences. They are also valuable for determining long-term trends of near shore nutrient inputs associated with land use changes, and for assessing the success of remedial actions. Because the Black Lake shoreline is a mixture of sand and gravel, a Cladophora study is just one method for assessing nutrient inputs from shoreline areas.

Approximately 427 property parcels were inventoried for Cladophora in the 2001 updated survey. The number is approximate because exact property boundaries and recent lot splits were not always evident. In 2001, 114 sites with significant Cladophora growths were identified. Most of the Cladophora growths were in the light category (51%), 34% were more-or-less medium, and only 7% were classified as heavy growths. There were 15% fewer growths of Cladophora than in 1991 (when 156 Cladophora growths were noted), and 20% of the growths were lighter in nature.

Sandy bottom substrate (generally unsuitable for Cladophora growths) was present in front of many parcels. However, many lots in areas of sandy bottoms had seawalls or rock rip-rap placed for erosion control, which allows for the growth of Cladophora if the water is high enough. The remainder of the shoreline was predominantly cobble and gravel or a mixture of sand and gravel. Mucky or mucky-sand bottom types were found in a few locations.

The nutrient requirements for Cladophora to achieve large dense growths are greater than the nutrient availability in lakes with good water quality, such as Black Lake. Therefore the presence of Cladophora can indicate locations where relatively high concentrations of nutrients, particularly phosphorus, are entering the lake.

Reducing nutrient inputs from shoreline properties will require an integrated approach of education and restoration. Recommended actions include working with lakeshore homeowners to promote good property management practices and working with the area health departments and residents to address areas with poor soils for septic systems.

[Insert map]

Table 8: Black Lake 2001 Cladophora Survey Summary	
Shoreline Property Parcels Surveyed	427
Percent Parcels with Cladophora	27%
Cladophora Growths Total:	114
Cladophora Density High	8
Cladophora Density Medium	39
Cladophora Density Light	58
Cladophora Density Very Light	9

3. Agricultural Inventory
Nonpoint source pollution contributions from agricultural areas have been well documented nationwide. Two counties within the watershed--Cheboygan and Presque Isle, have ongoing agricultural activities within the critical area identified for the Black Lake Watershed. For the Black Lake Watershed Stewardship Initiative the location and any associated nonpoint source pollution problems were documented for agricultural producers in the watershed.

The Cheboygan Conservation District and Natural Resource Conservation Service conducted the inventory of the agricultural activities. A data sheet was completed for each site that described location and type of farm, distance to nearest tributary, and any obvious nonpoint source pollution problems. Aerial photos, plat maps, topographic maps, along with field checking were used to identify area farms. A ranking of nonpoint source pollution problems of severe, moderate, and minor at the site was given to each site. A total of 18 farms were inventoried (11 severe, 5 moderate, and 2 minor). The majority of the farms (15) are in Presque Isle County. Sixteen of the 18 farms have livestock.

The most common problems identified at the farm sites were livestock in streams and lack of animal waste storage areas. The herd sizes at the farms were generally low. Best management practices recommended include fencing for livestock exclusion, providing livestock crossings, and animal waste management. Estimated costs to install best management practices at all 18 sites are $643,500 (see Agricultural Inventory Report).

4. Streambank Erosion Inventory
Soil erosion is one of the largest sources of sediment pollution to lakes and streams in Northern Michigan. The water resources in the Black Lake Watershed are no exception. The largest and navigable tributaries were inventoried for streambank erosion including the Rainy River, Stony Creek, Upper Black River (including the East Branch and Canada Creek) and McMaster Creek.

The tributaries in the Black Lake Watershed were inventoried for streambank erosion. Data was collected on each streambank erosion site. The information included location, size, cause, and severity of the site. Aerial photos, plat maps, and topographic maps were used for the inventory. A ranking of nonpoint source pollution problems of severe, moderate and minor were used for each site. A total of 34 sites were identified (11severe, 9 moderate, and 14 minor). The Cheboygan Conservation District conducted the streambank erosion inventory.

The most common problems identified in this inventory were caused by bends in the river, recreational use, and animal access. Recommended best management practices include stairways, bank seeding or planting, fencing and rock rip-rap. Estimated costs to install best management practices at all 34 sites are $313,596. (See the Streambank Erosion Inventory.)

Table 9: Location and Severity of Streambank Erosion Sites			
Subwatershed	**Severe**	**Moderate**	**Minor**
Black Lake			1
Canada Creek		3	
Upper Black River	7	5	10
McMaster Creek			1
Rainy River	4	1	1
Stony Creek			1

5. Road/Stream Crossing Inventory

Where a road crosses a stream it provides access and a conduit for pollution. The road/stream crossing inventory was conducted to comprehensively identify and document all of the road crossing sites on the tributaries in the Black Lake Watershed.

Potential road/stream crossings were identified using a variety of map sources and field exploration. Each crossing that appeared to have regular flow connected to Black Lake was inventoried. With the exception of private drives, all vehicle access roads were included. All potential sites were investigated. In some instances, no crossing was present, or there appeared to be no significant flow (and therefore no significant pollutant contribution) during any time of the year. These locations were not identified as numbered crossings and do not appear in the inventory.

Each site was visited to assess potential problems that may contribute nonpoint source pollution and impact water quality. Data collected at the crossings included detailed information about the location, road characteristics (width, shoulder, drainage, surface); culvert condition; and erosion and runoff problems. Basic stream characteristics such as width, depth, current, and substrate were also recorded. An example data sheet appears in the Inventory.

In order to help prioritize road/stream crossings for improvement, a severity ranking index was used. The ranking rated the soil type, steepness of the approaches, impacts to habitat, and other conditions. Three classifications are used in the severity ranking, severe (30 points or more); moderate (16-29 points); and minor (under 15 points).

The total number of sites inventoried was 127 sites (45 severe, 38 moderate, and 44 minor). The estimated cost to install best management practices at all 127 sites is $5,900,978. Best management practices recommended include culvert replacement and extension, runoff diversions, paving, vegetation planting, and many others. The table below summarizes the crossings by each subwatershed. (Specific information on the individual sites is included in a separate Black Lake Watershed Road/Stream Crossing Inventory.)

Table 10: Severity Ranking of Road/Stream Crossings

SUBWATERSHED	SEVERE	MODERATE	MINOR
Canada Creek (Packer Creek, VanHellen Creek, Lake Geneva Drain, Oxbow Creek)	6	4	
Fisher Creek	1	3	1
Cold Creek		2	2
Upper Black River (Saunders Creek, Hardwood Creek, McMaster's Creek, Little McMaster's Creek, Lyons Creek, Sturgis Creek Bowen Creek, Gillis Creek, Canal, One Un-named Tributary, Cains Creek, Doriva Creek)	15	5	16

East Branch - Black River	2	1	1
Milligan Creek (Lewis Creek, Gokee Creek, Adair Creek, Spring Creek)	6	2	3
Mud Creek	1	2	2
Rainy River (West Branch - Rainy River, Healy Creek)	4	4	6
East Branch - Rainy River		3	1
Little Rainy River	4	6	
Stony Creek	2	4	8
Stewart Creek		2	3
Tomahawk Creek	4		1
TOTAL	45	38	44

6. Existing Land Use

The NEMCOG Geographic Information System (GIS) was used to conduct an assessment of existing land uses. The digital land use polygons were placed over the 1998 digital aerial photo images. These were then modified to reflect the current land use at the time that the aerial photos were taken. The categories of land use were updated using the Michigan Resource Inventory System (MIRIS) classifications. Those classifications were then merged into 10 categories for map display purposes: Residential, Commercial, Industrial, Institution/Recreational, Agricultural, Nonforest, Upland Forest, Lowland Forest, Wetlands, and Surface Water. The following descriptions are detailed findings for the study area of Black Lake. Due to the size of the watershed, only the lands within the critical area were updated, 1995 data was used in areas outside of the priority (critical) area. A Land Use Map appears on the next page, followed by a description of the Land Use categories.

Residential

Residential land use includes residential dwelling structures such as: single family or duplexes, multi-family low rise residential, multi-family medium & high rise residential, and mobile home parks. The total residential land use in the priority area was 2.3%.

Commercial

The commercial land use category includes classifications related to the sale of products and services such as: central business districts, shopping centers/malls, strip commercial, and neighborhood compact groups of stores that are surrounded by noncommercial uses. This category includes parking areas related to the commercial businesses. The total commercial land use in the Black Lake Watershed is 0.2% of the total.

Industrial

Industrial land use includes manufacturing and industrial parks, light industries that fabricate or package products, oil and gas drilling and related production facilities, lumber mills, chemical plants, brick-making plants, large power facilities, waste product disposal areas, areas of stockpiled raw materials, and transportation facilities that normally handle heavy materials. The total industrial land use in the Black Lake Watershed priority areas was 1.3%.

Institution/Recreational

Institution/recreational land use includes a variety of classifications such as education, government, religious, health, correctional, and military facilities, all indoor and outdoor recreational facilities, and all cemeteries. The buildings, parking areas, and immediate grounds are included in this category, however all surface water, forest, barren land, and wetlands associated with these facilities are entered into their own respective categories. The total institution/recreational land use in the priority areas was 0.4%.

Agricultural

The agricultural land use category generally includes land that is used for the production of food and fiber, but also includes land used for non-food livestock such as horses. These classes are: cropland, orchards (including vineyards and ornamental horticulture), confined feeding operations for livestock of any kind, permanent pasture lands, farmsteads, greenhouse operations, and horse training areas. The total agricultural land use in the Black Lake Watershed priority area was 12.4%.

Nonforest

Nonforest land includes “open land” and rangeland classifications such as barren land, herbaceous open land, and shrubland. Herbaceous open land is usually subjected to continuous disturbance such as mowing, grazing, or burning, and typically it can have a variety of grasses, sedges, and clovers. Shrubland is land in transition from being open to becoming an eventual forest. There are native shrubs and woody plants like blackberry, dogwood, willow, sumac, and tag alder. The nonforest land in the Black Lake Watershed priority area is 7.9% of the total land area.

INSERT LAND USE MAP (need to get from Alicia)

back of MAP

Upland Forest
Forest land use areas are generally at least 10% stocked by trees of any size. The upland forest category includes upland hardwoods like oak, maple, and beech, other upland species like aspen and birch, species of pine like red, white or jack pine, and other upland conifers like white spruce, blue spruce, eastern hemlock, and balsam fir. Upland forest in the Black Lake Watershed priority area comprises the majority of land use with a total of 47.8% of the land area.

Wetlands
Wetlands are areas that have hydric soils, water-loving (hydrophytic) vegetation, and the presence of water for a portion of the year (wetland hydrology). This land use category includes primarily marshes, bogs, and scrub-shrub swamps. It does not include all wetlands. Lowland forests are separated, but are still wetlands. Some of the more common wetlands found in the Black Lake Watershed include marshes and scrub-shrub swamps along the riverbanks. The wetlands category in the Black Lake Watershed priority area covers 3.6% of the land.

Lowland Forest
Lowland forest areas, commonly known as swamps are the largest type of wetland found in the Black Lake Watershed. Lowland hardwoods include ash, elm, red maple, cottonwood, and others. Lowland conifers include cedar, tamarack, black and white spruce, tag alder, and balsam fir. The lowland forest in the Black Lake Watershed priority area covers 17.9% of the total land area. It is necessary to combine the wetlands percentage with the lowland forest percentage for a more accurate assessment of the total amount of wetlands within the priority area (21.5%).

Surface Water
The surface water category includes areas such as lakes, reservoirs, ponds, rivers, and streams. Surface water in the Black Lake Watershed priority area covers 6.3% of the total land area.

Understanding changes in land use and their patterns provides the knowledge base to determine the steps to maintaining healthy ecosystems and communities. The results of the existing land use assessment will be used along with the summary of land use regulations to determine the best recommended actions.

7. Summary of Land Use Regulations

Implementation of land use policies and regulations can be an important strategy used by local, state and federal units of government for protecting water quality. In addition to their benefits for aquatic resources, planning and zoning are tools used for ensuring the conservation of wildlife habitat, providing for sustainable development, protecting property values, and maintaining community character.

Townships located in a county with zoning can have the option of having the county handle the entire planning and zoning program or administering their own. The counties of Presque Isle, Cheboygan, and Otsego all have master plans and zoning ordinances. All of the townships within the Black Lake Watershed that lie within these counties fall under the zoning of their respective county, except for Allis Township in Presque Isle County which has its own zoning. In addition, the City of Onaway administers its own municipal program.

Within the Black Lake Watershed, there are no townships that are considered unzoned. Montmorency County does not have zoning at the county level, but the three watershed townships within this county (Briley, Montmorency, and Vienna) administer their own program.

To help determine the adequacy of regulatory coverage for aquatic resources within the Black Lake Watershed, local zoning ordinances were reviewed to evaluate what, if any, "environmental provisions" were in place. The following topics were looked at: vegetative buffer strips along the riparian corridor, building setbacks along the riparian corridor, septic system regulations (in addition to policies of the District Health Department, such as inspections at the time of sale, maintenance requirements, replacement of faulty systems), management of post-construction stormwater runoff, minimum lot width for riparian lots, open space provisions, and hazardous waste. Additional environmental provisions that stood out were also noted, and comprehensive master plans were also analyzed.

The ordinance review for this section was conducted using the files of the Northeast Michigan Council of Governments. For those local units of government without an ordinance on file at the NEMCOG office (or in instances where the ordinance seemed to be outdated), individual government units were contacted by Huron Pines RC&D staff. In those instances, a representative was informed of the project and generally made the necessary information available.

In every instance where a zoning ordinance had been adopted, a check was done to ensure that a current, comprehensive master plan was also in place. The master plan is essential for guiding the planning & zoning process, incorporating public input, and providing the necessary validation for the zoning regulations. For planning efforts to be successful, it is widely recognized that these documents must be kept up to date. Zoning laws that do not have a foundation within a community's master plan generally will not stand up to legal challenges. Cheboygan County is currently working on modifying their zoning ordinance to be consistent with the recently adopted and updated master plan. The table below is a summary of planning and zoning jurisdictional units, with the date of the zoning ordinance and master plan.

Table 11: Planning & Zoning Jurisdictional Units within the Black Lake Watershed

Township/City	Jurisdiction	Zoning Ordinance Adoption/Update Date	Master Plan AdoptionUpdate Date
Waverly	Cheboygan County	1983	2002
Grant	Cheboygan County	1983	2002
Aloha	Cheboygan County	1983	2002
Forest	Cheboygan County	1983	2002
Walker	Cheboygan County	1983	2002
Nunda	Cheboygan County	1983	2002
Beringer	Presque Isle County	1987	1980
North Allis	Presque Isle County	1987	1980
Case	Presque Isle County	1987	1980
Allis	Allis Township	2000	not available
City of Onaway	City of Onaway	1997	1980
Charlton	Otsego County	2002	1998
Corwith	Otsego County	2002	1998
Vienna	Vienna Township	1981	1999
Briley	Briley Township	1999	2000
Montmorency	Montmorency Township	1988	1988

Table 12 provides a review of land use policies contained within county, township, and municipal zoning ordinances that pertain to water quality. It does not indicate whether there is a complete absence of resource protection in a specific area, nor does the presence of a zoning regulation guarantee that a resource is well managed.

In the following table, local zoning regulations are summarized by the governmental unit that has jurisdiction for a particular area, as summarized in the previous table. This summary provides an overview; it should not be regarded as the complete explanation of the regulation.

Even once local government units have “good” land use policies in place, there is still work that needs to be done– the governing body must make decisions regarding infrastructure and zoning in accordance with their up-to-date master plan.

Recent legislative changes mandate periodic updates of master plans. This requirement will help make master plans more effective. The real value of a master plan is its use by planning commissions for guidance in setting zoning standards and decision making. Of course the value of a master plan and zoning ordinance is determined by how well it is enforced. Without adequate enforcement these land use tools become ineffective.

It is important to note that land use planning and zoning is but one tool of watershed protection. Even the best policies must be used in conjunction with educational outreach programs for the public and local government officials, land protection efforts for critical habitat areas, and on-the-ground implementation of best management practices.

Table 12: Summary of Natural Resource Protection Measures

Governmental Units

Env. Provisions	Cheboygan County	Presque Isle County	City of Onaway	Otsego County	Briley Twp.	Montmorency Twp.	Vienna Township	Allis Twp.
Veg. Buffer Strips	Buffer strips must be at least 40 ft in width along water. There is also a special river designation for the Black -- with 100 ft buffer strips along mainstream and 75 ft for tributaries.	Not Addressed	Not Addressed	No more than 30% of the width of the shoreline vegetation can be removed	Areas within 70 ft of water must be maintained in their natural state	35 ft greenbelt	No more than 30% of the width of the shoreline vegetation can be removed	Preservation within 35 feet.
Setbacks Along Shoreline	40 ft in general, but in the River Protection District, there is a standard of 200 ft from the mainstream and 150 ft from tribs.	30 ft	Not Addressed	50 ft	70 ft	45 ft	25 ft	35 ft.
Septic Systems	Must be at least 100 ft from the water's edge, but 150 ft back from the River Protection District on the Upper Black	Not Addressed	-----	Not addressed	No septic systems allowed within 70 ft of surface water	Septic tanks 75 ft and absorption fields 100 ft from high water mark	Not addressed	Not addressed.
Stormwater Runoff	Not Addressed	Not Addressed	Not addressed sufficiently	For developments with more than 15,000 sq. ft of impervious surface.	Not addressed	Not addressed	Not addressed	Encourage on-site retension overall not adressed sufficiently
Min. Lot Width for Riparian Parcels	100 ft, with a requirement of 200 ft on the mainstream of the Upper Black (River Protection District)	75 ft	Not Addressed	50 ft	100 ft	70 ft	Not addressed	200 ft
Open Space Provisions	Preservation of open space is encouraged through a PUD density bonus	Preservation of open space is encouraged through a PUD density bonus	Preservation of open space in PUD section	Preservation of open space is encouraged through a PUD density bonus	Not addressed	Not addressed	Not addressed	PUD, set aside of 40% for open space and vegetation preserved on steep slopes 20%
Other Notable Regs	500 ft lake & stream overlay district. Prohibition on landfills and toxic waste w/in 300 ft of water's edge. Special "County" Natural River Zoning for the Upper Black River (based on the state's model)	No other notable regulations	Soil erosion control section	No other notable regulations	Fertilizer or other chemical use is not allowed within 70 ft of surface water	Not addressed	Not addressed	No other notable regulations

8. Beaver Dam Inventory

Mention the word beaver to residents in the Black Lake Watershed and the likely response may not be too favorable. Beaver populations have increased in recent years due to a number of factors–the lack of predators being perhaps the most significant. Besides humans, the timber wolf was a significant predator of beaver, and its extirpation in the Lower Peninsula has left humans as the only predator. Human predation of beavers, which has been predominantly from trapping, has declined due to decreasing demand and values of beaver pelts. Another factor contributing to the increase in beaver populations is timber management techniques that result in an abundance of food supply. A current trend is to clear-cut forests and encourage aspen regeneration, a favorite food of the beaver.

The unfavorable reaction to beaver from humans is in response to loss of property and trees from beaver or the impacts the beaver dams have on the water quality of the rivers. Beaver dams hold back the water creating small ponds, and the water in these ponds can become very warm. When the warm water discharges into the river it raises the overall temperature of the river. Warmer water holds less oxygen than colder water (e.g., when water is heated over a stove the oxygen forms bubbles and escapes to the air). Warmer water therefore means less oxygen which can be stressful to trout and other aquatic organisms. This type of impact is often referred to as thermal pollution.

Since 1993, the Upper Black River Watershed Restoration Committee has been involved in a beaver management and control effort to try to reduce the negative impacts from the large beaver population on the Upper Black River. A combined approach of monitoring temperature, beaver trapping, and beaver dam removal has been used successfully to minimize the impacts of thermal pollution on the Upper Black River. The East Branch and Canada Creek have been included in these efforts.

The 2002 inventory documents the location using the global positioning system (GPS) data and the number of beaver dams located along the main tributaries to Black Lake (Table 13).

The most recent inventory of dams in the Black Lake Watershed demonstrates how the control effort on the Upper Black River has managed the population to minimize impacts on other aquatic life. No control efforts have been in place for Milligan Creek although temperature monitoring has been done. The Rainy River, Little Rainy River, and Milligan Creek still have a higher than sustainable population of beaver in their subwatersheds.

The control efforts have been beneficial for water quality and trout. Additional management that addresses forest activities and food supply should be included in a strategy to maintain sustainable beaver populations.

Table 13: 2002 Beaver Dam Inventory – Black Lake Watershed	
Tributary	**Number of Dams**
Upper Black River	8
East Branch-Upper Black River	2
Canada Creek	7
Rainy RIver	39
Little Rainy River	14
Milligan Creek	19

Review of Pollutant Sources and Causes

After all of the nonpoint source pollution and land use inventories were conducted the sources and causes were reevaluated and are described in the table below.

Table 14: Pollutant Sources and Causes After the Inventories		
Pollutants	*Pollutant* Source	*Cause*
Nutrients (P and N) (k)	Agricultural fields (k)	Over or improper fertilizer applications (k), lack of soil testing (s), and buffer strips (k)
	Septic systems (k)	Outdated, poorly maintained, and improperly designed systems (k)
	Golf courses (s)	Heavy applications of fertilizers (s) and pesticides (s) Lack of buffer strips in riparian areas (s)
	Manure applications and management (k)	Over application of manure (k), lack of proper storage for manure (k), inadequate testing of soil properties (s)
	Lawn care on shoreline properties (k)	Use of phosphorus fertilizer (s), over application of fertilizers (s), removal of native shoreline vegetation (k)
	Stormwater discharges in urban areas (k)	Inadequate collection and treatment of stormwater (k)

Sediment (k)	Agricultural fields (s)	Poor soil conservation practices (s)
	Lakeshore and streambank erosion (k)	Shoreline development and removal of shoreline vegetation (k), angler and canoeist access (k), road/stream crossings (k)
	Livestock in streams (k)	Unrestricted access and no alternative water source (k)
	Logging activities (s)	Inadequate buffer strips near streams (s)
	New construction (k)	Inconsistent land use regulations and enforcement (k). Lack of proper stormwater management measures (s).
	Road/stream crossings (k)	Improperly sized culverts (k), lack of runoff diversions (k), inadequate fill on road surface (k), lack of vegetation
	Stormwater discharges in urban areas (k)	Inadequate treatment of stormwater (k)
Bacteria (k)	Septic systems (s)	Outdated, poorly maintained, and improperly designed systems (s)
	Urban stormwater (s)	Pet waste
	Livestock in streams (s)	Unrestricted access and no alternative water source (s)
Oils, grease and metals (k)	Stormwater discharges in urban areas (k)	Inadequate treatment of stormwater that may contain oils, grease, heavy metals, etc. (k)
Pesticides	Lawn care on shorelines (s) Agricultural fields (s) Golf courses (s)	Over or improper application (k) Over or improper application (s) Over or improper application (s)

* k = known s = suspected

After the completion of the nonpoint source inventories the project partners and Advisory Council prioritized the pollutants of concern (Table 15) and how they most affect the designated uses (Table 16). Two pollutants were given a priority ranking of one–nutrients and sediment. Nutrients is the priority pollutant for Black Lake and sediment is the priority pollutant for the Upper Black River and other tributaries. Maintaining Black Lake's good water quality will require minimizing the amount of nutrient pollution that enters the lake from adjacent properties and the tributaries. Minimizing existing and new sediment contributions is the key to maintaining and improving the Upper Black River's good water quality and associated recreational activities. Nutrients often attach to soil particles directly linking sediment and nutrient pollution.

Table 15: Black Lake Priority Pollutants

Pollutants	*Priority Ranking*
Nutrients	1
Sediment	1
Oil, metals, pesticides (toxics)	2
Bacteria	3

Each pollutant has a differing effect on the primary designated uses. Nutrient and sediment pollution are the primary pollutants of concern for both protecting the cold water fishery and maintaining the diversity of aquatic life.

Table 16: Pollutant Priorities for Each Designated Use

Designated Uses	*Pollutant*	*Priority Ranking*
Habitat	Sediment Nutrients Oil, metals, and pesticides	1 2 3
Cold water	Sediment (streams) Nutrients (lake) Oils, metals, pesticides Bacteria	1 1 2 3
Recreation	Nutrients Bacteria Sediment	1 2 3
Navigation	Sediment	1

Reducing and preventing the pollutants lies in addressing the priority sources. The sources were first prioritized by category, e.g., all of the road/stream crossing sites were compared and prioritized according primarily to severity. The Advisory Council discussed

and voted on the ranking across the categories. The table below describes the results for the ranking of the pollutants and the main sources.

Table 17: Pollutant Information Following the Inventory			
Pollutants	***Ranking***	***Sources***	***Ranking***
Sediment	1	Road/stream crossings	1
		Lakeshore/streambank erosion	2
		Livestock access/management	3
		Lakeshore development/construction	4
		Stormwater runoff/urban	5
		New construction	6
Nutrients	1	Lawn care/shoreline property management	1
		Agriculture nutrient management	2
		Septic systems	3
		Livestock access	4
		Road/stream crossing/erosion	5
		Stormwater runoff/urban	6
		New construction	7
Oils, metals, and pesticides (toxics)	2	Stormwater runoff/urban	1
		Road/stream crossings	2
		Lawn care	3
		Agriculture fields	4
		Golf courses	5
Bacteria	3	Stormwater runoff/urban	1
		Livestock access	2
		Septic systems	3

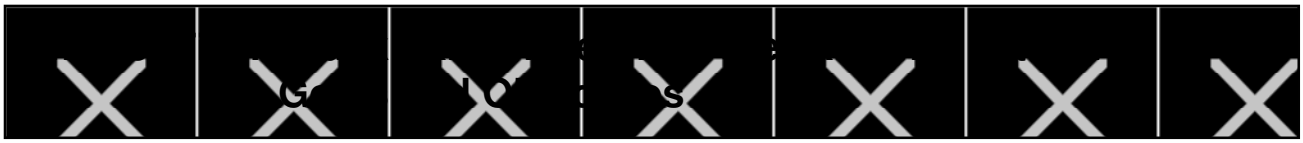
The next step was to rank the pollutant sources and causes overall throughout the watershed. A ranking system using a high, medium, and low priority ranking was used at this phase. Below is a summary of the priority sources and causes for the Black Lake Watershed.

Table 18: Black Lake Watershed Priority Pollutant Sources and Causes

Pollutant Source	*Rank*	*Cause*	*Rank*
Agricultural nutrient management	high	Over application of manure, lack of proper storage for manure, inadequate testing of soil properties	medium
Agricultural practices	high	Lack of buffer strips	medium
Golf courses	low	Heavy applications of fertilizers and pesticides Lack of buffer strips in riparian areas	medium
Lakeshore and streambank erosion	high	Shoreline development and removal of shoreline vegetation, angler and canoeist access, road/stream crossings	high

Lawn care on shoreline properties	high	Use of phosphorus fertilizer, over application of fertilizers, misuse and over use of pesticides, removal of native shoreline vegetation	high
Livestock in streams	high	Unrestricted access and no alternative water sources, no buffer strips	medium
Logging activities	low	Inadequate buffer strips near streams	low
New construction	medium	Lack of enforcement/public awareness on proper erosion control and stormwater management measures	high
New construction	medium	Varied standards/regulations for riparian setbacks, shoreline vegetation strips, percent of lot allowed to develop, etc.	medium
Road/stream crossings	high	Undersized and short culverts, lack of runoff diversions, inadequate fill on road surface, lack of vegetation	high
Septic systems	high	Outdated, poorly maintained/located, and improperly designed systems	high

Shoreline property management	high	Directing runoff from house, driveway, fire pit, etc. directly to lake or river, increasing impervious surface in riparian areas, etc.	medium
Stormwater discharges in urban areas	low	Inadequate treatment of stormwater that may contain oils, grease, heavy metals, pet waste, etc.	medium



1. Goals and Objectives

The following goals were developed based on the priority pollutant rankings. Table 19 lists the main objectives to accomplish the four primary goals.

Goal 1: Aquatic life and wildlife – Protect the diversity of aquatic habitats within the Black Lake Watershed by reducing the contribution of sediment, nutrient, and toxic pollutants. Improve the health and habitat of the Rainy River.

Goal 2: Cold water fishery – Reduce sediment and nutrient loads which threaten to harm habitat conditions for the cold water fishery in the Upper Black River and its tributaries.

Goal 3: Partial or total body contact – Maintain the excellent recreational opportunities in Black Lake, Upper Black River, and other tributaries by reducing sediment and nutrient contributions.

Goal 4: Navigation – Maintain navigation in Black Lake and its tributaries by reducing any sediment inputs.

Table 19: Black Lake Watershed Project Goals and Objectives

Goals	Objectives
Aquatic life **Cold water fishery** **Recreation** **Navigation**	***Reduce the amount of sediment by:*** Stabilizing erosion at road/stream crossings. Utilizing best management practices at agricultural sites in the critical areas; including restricting livestock from streams, installing buffer strips, and improving manure management. Correcting most severe lakeshore erosion sites. Restoring streambank erosion sites. Reducing the pollutant load from stormwater in Onaway. Improving the installation of soil erosion control measures at new construction sites. Removing sediment deposits to improve spawning habitat.
Aquatic life **Cold water fishery** **Recreation**	***Reduce the amount of nutrients by:*** Decreasing the pollutant load from stormwater in the urban areas. Reducing the amount of fertilizer used on residential lawns. Improving manure application rates and times and manure storage. Stabilizing erosion at road/stream crossings. Restricting livestock from streams. Educating about septic system maintenance.

Table 19: Black Lake Watershed Project Goals and Objectives	
Goals	**Objectives**
Aquatic life **Cold water fishery** **Recreation**	***Reduce the amount of toxins (oils, grease, heavy metals, and pesticides) by:*** Reducing the pollutant load from stormwater in urban areas. Restoring erosion sites and diverting runoff at road/stream crossings. Reducing the amount of pesticides used on residential lawns. Improving pesticide application rates on agricultural land. Decreasing the improper disposal of household hazardous materials.
Recreation	**Reduce the amount of bacteria by:** Reducing the pollutant load of stormwater in urban areas. Restricting livestock from streams and manure storage and application. Improving the maintenance of septic systems. Providing suggestions for managing pet waste in riparian corridors and Onaway. Restoring navigation in impaired areas by removing sediment.

2. Recommended Actions to Protect Water Resources in the Black Lake Watershed
The Black Lake Watershed Stewardship Initiative Advisory Council developed an integrated approach to reduce existing sources of sediment and nutrient pollution and prevent future contributions. The integrated approach involves installing systems of best management practices; working with local community members and local governments; and implementing a variety of information and education activities.

For each action step, the Advisory Council has identified the organizations that are best suited to implement the task along with estimated costs to implement each item. A timeframe of 10 years was used to determine the scope of activites and the estimated costs for implementing the tasks.

The following actions are organized by topic area and listed in priority order. The action steps were prioritized by considering the pollutant of concern and the ranking.

Road/Stream Crossing Recommendations:

1. Repair road/stream crossings in the watershed to reduce polluted runoff from entering waterways.

Responsible Organizations: Huron Pines RC&D Council; Cheboygan, Presque Isle, Otsego, and Montmorency County Road Commissions

Time Line: Ten years, ongoing

Estimated Cost: $5,900,978

2. Sponsor “Better Back Roads” programs for Cheboygan, Otsego, Presque Isle, and Montmorency Counties Road Commission employees.

Responsible Organizations: Huron Pines RC&D Council; Cheboygan, Presque Isle, Otsego, and Montmorency County Road Commissions

Time Line: One to three years to establish program, and regular ongoing education

Estimated Cost: $20,000

3. Work with Cheboygan, Presque Isle, Otsego, and Montmorency Counties Road Commissions to develop a protocol to address water quality issues associated with road work.

Responsible Organizations: Huron Pines RC&D Council; Cheboygan, Presque Isle, Otsego, and Montmorency County Road Commissions

Time Line: One to four years

Estimated Cost: $8,000

River and Stream Protection Recommendations:

1. Install best management practices on the priority streambank erosion sites.

Responsible Organizations: Huron Pines RC&D Council, Cheboygan, Presque Isle, Montmorency Conservation Districts, Tip of the Mitt Watershed Council, Upper Black River Watershed Restoration Committee, Sturgeon for Tomorrow, NEMCOG

Time Line: Ten years

Estimated Cost: $313,596

2. Conduct water quality monitoring on the Rainy River to learn more about its hydrology, temperature fluctuations, and overall nutrient levels.

Responsible Organizations: Tip of the Mitt Watershed Council, Huron Pines RC&D Council, Michigan Department of Environmental Quality

Time Line: One to ten years

Estimated Cost: $30,000

3. Disseminate information on shoreline property management to streambank property owners. Educate river and stream riparian property owners on the importance of shoreline habitat and install a demonstration of a restored natural shoreline.

Responsible Organizations: Tip of the Mitt Watershed Council, Upper Black River Watershed Restoration Committee, Sturgeon for Tomorrow, Huron Pines RC&D Council

Time Line: Three to five years, ongoing

Estimated Cost: $25,000

4. Continue regular maintenance on existing (12) in-stream sediment basins located on the Upper Black River and its tributaries to remove excess sand bed load and improve water quality and aquatic habitat.

Responsible Organizations: Michigan Department of Natural Resources, Michigan Department of Environmental Quality, Upper Black River Watershed Restoration Committee, Huron Pines RC&D Council, Black Lake Association, Sturgeon for Tomorrow

Time Line: Ten years, ongoing maintenance

Estimated Cost: $25,000 a year up to $500,000

5. Identify suitable sites, and install up to five additional in-stream sediment basins to reduce sand bed load to improve navigation, water quality, and aquatic habitat.

Responsible Organizations: Huron Pines RC&D Council, Black Lake Association, Strugeon for Tomorrow, Michigan Department of Environmental Quality, Tip of the Mitt Watershed Council, U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers

Time Line: One to ten years, ongoing maintenance

Estimated Cost: $300,000

Agricultural Recommendations:

1. Install best management practices on all agricultural sites identified in the inventory.

   Responsible Organizations: Cheboygan and Presque Isle Conservation Districts, Natural Resource Conservation Service, and Huron Pines RC&D Council

   Time Line: Three to ten years

   Estimated Cost: $643,500

2. Utilizing existing organizational meetings, build relationships (increase opportunities for dialogue) with agricultural producers and share information on existing agricultural funding programs and best management practices.

   Responsible Organizations: Cheboygan and Presque Isle Conservation Districts, Natural Resource Conservation Service, and Huron Pines RC&D Council

   Time Line: Three to five years, ongoing

   Estimated Cost: $20,000

3. Target specific locations or topics as a method to disseminate information to identified agricultural producers on best management practices. Targeted locations might include areas in the watershed with severe karst and a targeted topic might include manure management.

   Responsible Organizations: Cheboygan and Presque Isle Conservation Districts; Natural Resource Conservation Service; and Huron Pines RC&D Council

   Time Line: Two to five years, ongoing

   Estimated Cost: $10,000

Stormwater Recommendations:

1. Educate residents and businesses in Onaway and Canada Creek Ranch about nonpoint source pollution and how to reduce it on their property.

   Responsible Organizations: Tip of the Mitt Watershed Council, NEMCOG, Huron Pines RC&D Counci

   Time Line: One to three years, ongoing

Estimated Cost: $8,000

2. Partner with other groups to promote recycling and safe disposal of household hazardous waste.

Responsible Organizations: NEMCOG, Tip of the Mitt Watershed Council, Black Lake Association, Upper Black River Watershed Restoration Committee

Time Line: Two to five years, ongoing

Estimated Cost: $5,000

3. Work cooperatively with the City of Onaway to develop a strategy to improve quality and decrease quantity of stormwater runoff. Possible best management practices might include frequent street sweeping, improvement of storm sewers with the planned wastewater treatment plant, and review or development of emergency response plans for spills of hazardous materials.

Responsible Organizations: Tip of the Mitt Watershed Council, City of Onaway, NEMCOG, Huron Pines RC&D Council

Time Line: One to seven years

Estimated Cost: $15,000

4. Install demonstration best management practice at a commercial and/or residential site (e.g., rain garden, rain barrels).

Responsible Organizations: Tip of the Mitt Watershed Council, NEMCOG, Huron Pines RC&D Council

Time Line: One to five years

Estimated Cost: $20,000

5. Work with Cheboygan, Presque Isle, Otsego, and Montmorency Counties to explore the advantages of adopting a stormwater ordinance to reduce runoff from new construction.

Responsible Organizations: Tip of the Mitt Watershed Council, NEMCOG, MSU Extension, County Soil Erosion Officers, Black Lake Association

Time Line: Three to ten years

Estimated Cost: $60,000

Shoreline Pollution Recommendations:

1. Educate Black Lake property owners who had evidence of Cladophora at their property on how to reduce nutrient pollution from the site. Offer on-site assessments to property owners to assist with nutrient reduction.

Responsible Organizations: Tip of the Mitt Watershed Council, Black Lake Association

Time Line: Three to six years, ongoing

Estimated Cost: $18,000

2. Encourage voluntary inspection of septic systems at sale of property and work with area health departments to consider requiring the inspections.

Responsible Organizations: Black Lake Association, Cheboygan and Presque Isle Counties Health Departments, Tip of the Mitt Watershed Council, MSU Extension

Time Line: Two to ten years

Estimated Cost: $22,000

3. Use a variety of tools (seminars, one-on-one communications, advertisements, mailings, education packets for new shoreline property owners and realtors, etc.) to educate riparians about good property management, including, but not limited to lawn maintenance, shoreline vegetation strips, and septic system maintenance.

Responsible Organizations: Tip of the Mitt Watershed Council, Black Lake Association, MSU Extension

Time Line: One to ten years, ongoing

Estimated Cost: $60,000

4. Educate shoreline residents on the importance of shoreline habitat and install a demonstration of a restored natural shoreline.

Responsible Organizations: Tip of the Mitt Watershed Council, Black Lake Association

Time Line: Three to five years

Estimated Cost: $8,000

5. In identified areas with known septic system problems, assist homeowners with finding solutions to address the problems (e.g., septic modifications, maintenance districts), as well as investigate alternative solutions to improve long-term wastewater treatment around Black Lake.

Responsible Organizations: Tip of the Mitt Watershed Council, Black Lake Association, Cheboygan and Presque Isle Counties Health Departments

Time Line: Two to ten years

Estimated Cost: $50,000

Land Use Recommendations:

1. Identify sensitive areas in the Black Lake Watershed, including wetlands and ground water recharge areas, to help local governments with planning decisions and to promote voluntary land protection.

Responsible Organizations: NEMCOG, Little Traverse Conservancy, Headwaters Land Conservancy, Michigan Department of Natural Resources, MSU Institute of Water Research, Natural Resource Conservation Service, Tip of the Mitt Watershed Council

Time Line: One to five years, ongoing

Estimated Cost: $60,000

2. Work cooperatively with Cheboygan County Zoning Department and other units of government in the watershed as they update and modify their zoning ordinance.

Responsible Organizations: NEMCOG, Tip of the Mitt Watershed Council, Huron Pines RC&D Council, Black Lake Association

Time Line: One to ten years, ongoing
Estimated Cost: $75,000

3. Conduct programs to promote how to reduce nonpoint source pollution impacts from new development for public officials, contractors, landowners, realtors, and developers.

Responsible Organizations: Tip of the Mitt Watershed Council, NEMCOG, County Soil Erosion Officers, Huron Pines RC&D Council

Time Line: One to three years, ongoing

Estimated Cost: $30,000

4. Work cooperatively with public land managers to reduce nonpoint source pollution from forestry activities, park facilities, state forest recreation areas, and public access locations.

Responsible Organizations: Huron Pines RC&D Council, Michigan Department of Natural Resources, Tip of the Mitt Watershed Council, Black Lake Association, Upper Black River Watershed Restoration Committee

Time Line: One to five years

Estimated Cost: $100,000

5. Conduct surveys of residents to determine support for and understanding of zoning, natural resource protection, and other land use management tools.

Responsible Organizations: Tip of the Mitt Watershed Council, MSU Extension, NEMCOG

Time Line: One to five years

Estimated Cost: $10,000

6. Sponsor workshops/trainings for local government officials and residents based on the results of surveys to improve zoning and on recent legislative changes that require updates of master plans and language to allow for open space zoning. Other topics of importance to cover include enforcement and community involvement.

Responsible Organizations: Tip of the Mitt Watershed Council, MSU Extension, NEMCOG, Huron Pines RC&D Council

Time Line: One to five years, ongoing

Estimated Cost: $8,000

7. Evaluate expanding natural rivers/scenic river boundary for Upper Black River or strengthen county/township zoning requirements to contain similar standards.

Responsible Organizations: Upper Black River Watershed Restoration Committee, NEMCOG, Tip of the Mitt Watershed Council, Huron Pines RC&D Council

Time Line: One to ten years

Estimated Cost: $25,000

8. Conduct resource inventories (GIS maps) for local governments that identify significant resources and help local units of government with updating master plans, selecting areas best suited for development, and making planning decisions.

Responsible Organizations: Tip of the Mitt Watershed Council, NEMCOG, Huron Pines RC&D Council

Time Line: One to ten years

Estimated Cost: $75,000

9. Develop a human and beaver dam management plan that evaluates impacts from existing Michigan Department of Environmental Quality data on dams in the watershed and addresses how to minimize the impacts of the dams on water quality.

Responsible Organizations: Michigan Department of Environmental Quality, U.S. Fish and Wildlife Service, Huron Pines RC&D Council, Tip of the Mitt Watershed Council, Upper Black River Watershed Restoration Committee, Black Lake Association, Franklin Hydro Inc., Federal Energy Regulatory Commission

Time Line: Three to eight years

Estimated Cost: $10,000

10. Assist counties and townships with updating master plans to incorporate water quality protection elements and better manage sensitive areas.

Responsible Organizations: NEMCOG, Tip of the Mitt Watershed Council, MSU Extension, Huron Pines RC&D Council

Time Line: One to ten years

Estimated Cost: $150,000

11. Assist private landowners in priority areas with the development of forest management plans that include best management practices and protecting sensitive areas.

Responsible Organizations: Cheboygan, Presque Isle, Otsego, and Montmorency Counties Conservation Districts; Huron Pines RC&D Council

Time Line: One to three years, ongoing

Estimated Cost: $25,000

12. Work with townships surrounding the City of Onaway to coordinate planning efforts and incorporate development standards to minimize runoff.

Responsible Organizations: Tip of the Mitt Watershed Council, NEMCOG, MSU Extension, Huron Pines RC&D Council

Time Line: One to three years

Estimated Cost: $10,000

13. Work to improve regional cooperation between local units of government in the watershed. Sponsor meetings or address land use issues at other existing forums to improve communication and encourage the adoption of consistent and effective standards.

Responsible Organizations: NEMCOG, Tip of the Mitt Watershed Council, MSU Extension, Huron Pines RC&D Council

Time Line: One to five years, ongoing

Estimated Cost: $40,000

14. Develop a strategy to offer continual training for local planning officials (Michigan Society of Planning indicates average time of service for a planning commissioner is three years) to insure new officials are receiving adequate training.

Responsible Organization: NEMCOG, Tip of the Mitt Watershed Council, MSU Extension, Huron Pines RC&D Council

Time Line: One to ten years, ongoing

Estimated Cost: $30,000

15. Monitor the effectiveness and enforcement of zoning regulations in the Black Lake Watershed to identify specific problems.

Responsible Organizations: NEMCOG, Black Lake Association, Upper Black River Watershed Restoration Committee, Huron Pines RC&D Council, Tip of the Mitt Watershed Council, Cheboygan, Presque Isle, and Otsego Counties Planning Commissions

Time Line: One to four years, ongoing

Estimated Cost: $40,000

16. Encourage golf courses within the priority area to participate in the Turfgrass Environmental Stewardship Program.

Responsible Organizations: NEMCOG, Black Lake Association, Upper Black River Watershed Restoration Committee, Huron Pines RC&D Council, Tip of the Mitt Watershed Council, MSU Extension, Groundwater Stewardship Program

Time Line: One to eight years

Estimated Cost: $5,000

17. Develop relationships with golf courses in the priority area to potentially provide assistance to identify nonpoint source pollution problems and work on implementing best management practices.

Responsible Organizations: NEMCOG, Black Lake Association, Upper Black River Watershed Restoration Committee, Huron Pines RC&D Council, Tip of the Mitt Watershed Council, MSU Extension, Groundwater Stewardship Program

Time Line: One to ten years

Estimated Cost: $20,000 up to $75,000

General Education Recommendations:

1. Develop a shorter version of the Watershed Management Plan to be distributed to all local government officials and other interested parties in the watershed.

Responsible Organizations: Tip of the Mitt Watershed Council, NEMCOG, Huron Pines RC&D Council

Time Line: One year, distribution–one to two years, ongoing

Estimated Cost: $15,000

2. Develop a media plan to promote the Plan's activities and educate about nonpoint source pollution. Invite more community involvement and recruit more partners.

Responsible Organizations: Tip of the Mitt Watershed Council, NEMCOG

Time Line: One year, ongoing

Estimated Cost: $5,000

3. Develop an annual bulletin to disseminate to watershed residents, including lakeshore property owners and river riparians that provides updates on any implementation activities and useful tips to reduce nonpoint source pollution.

Responsible Organization: Tip of the Mitt Watershed Council, NEMCOG

Time Line: One to five years

Estimated Cost: $20,000

4. Conduct a watershed tour to showcase the best management practices installed to reduce nutrient and sediment pollution to Black Lake and its tributaries.

Responsible Organization: NEMCOG, Huron Pines RC&D Council

Time Line: Three to five years

Estimated Cost: $5,000

5. Develop a logo for the implementation project to be used by all project partners to promote project work and increase residents connection with the Black Lake Watershed.

Responsible Organizations: Black Lake Watershed Advisory Council, Tip of the Mitt Watershed Council, Upper Black River Watershed Restoration Committee

Time Line: One year

Estimated Cost: $1,000

6. Install a permanent display in a good location that informs about the Black Lake Watershed.

Responsible Organizations: Tip of the Mitt Watershed Council, Black Lake Association, Upper Black River Watershed Restoration Committee

Time Line: One to five years

Estimated Cost: $6,000

7. Conduct an annual program for students (e.g., calendar contest, tour, special program on lake sturgeon) to increase their awareness of the watershed.

Responsible Organizations: NEMCOG, SEE-North, Tip of the Mitt Watershed Council, Sturgeon for Tomorrow, Black Lake Association, Upper Black River Watershed Restoration Committee

Time Line: One to five years, ongoing

Estimated Cost: $6,000

8. Coordinate student water quality monitoring of tributaries in the Black Lake Watershed and involve them in activities to reduce pollution in the watershed.

Responsible Organizations: SEE-North, Onaway High School, Black Lake Association, Upper Black River Watershed Restoration Committee, Sturgeon for Tomorrow, Tip of the Mitt Watershed Council, Franklin Hydro, Inc., NEMCOG

Time Line: One to ten years, ongoing

Estimated Cost: $30,000

3. Information and Education Strategy

The long-term protection of Black Lake's water quality will depend on the values and actions of future generations. Educating the residents of Black Lake Watershed about how their actions impact water quality is a priority. Increasing awareness and ultimately changing behaviors is the long-term antidote for water quality protection. Target audiences for education programs are identified in the table below.

Table 20: Information & Education Strategy Target Audiences

Sources	*Target Audiences*	*Specific Target Audiences*	*Priority*
Urban stormwater	Homeowners Local government officials	Urban homeowners and residents, riparian property owners, and local government officials (townships bordering cities)	7
Recreation, improper use and disposal of hazardous materials (cleaners, paints, etc.)	Students	High school students	5
New construction in watershed	Local government officials Construction business	Local planning officials Contractors Surveyors	4
Livestock in streams	Agricultural landowners	Agricultural landowners with livestock (cattle, horses, sheep, etc.)	3
Lawn care	Homeowners	Riparian property owners, urban homeowners, and all watershed residents in priority area	1
Manure management	Agricultural landowners	Agricultural landowners with livestock (cattle, horses, sheep, etc.)	9
Septic system improvement and maintenance	Homeowners	Riparian property owners	2
Shoreline development	Contractors, Realtors, Homeowners	Shoreline property builders/contractors, realtors, homeowners	6
Streambank erosion	Recreation groups Homeowners	Anglers, canoeists, large property owners, agricultural producers (without livestock)	10
Road/stream crossings	Road Commissions	Road Commission managers, crew workers	8

The Information and Education Strategy was developed using existing knowledge of the target audiences. Consideration of the targeted audiences' perspectives was used to create the message and identify delivery mechanisms. Additional review of the message will be done prior to the implementation of any education program.

The information and education activities will use a variety of approaches including installing demonstration sites, building partnerships, sponsoring seminars, and distributing education materials.

Table 21: Information & Education Strategy

Pollutant	*Source/Cause*	*Target Audience*	*Messages*	*Delivery Mechanism*	*Potential Evaluation*
Sediment	Lakeshore erosion	Homeowners, riparian property owners	Protect your investment and water quality for children and grandchildren.	Use model biotechnical erosion control site to demonstrate restoration, newsletters, and brochures	Photographic and survey to homeowners with erosion
	Streambank erosion	Anglers	Improve fishing, use the stairways.	Attach hand-out to fishing license. Presentations to sporting groups.	Interviews
	Livestock in streams	Agricultural landowners	Save money & improve fishing.	Conservation District and NRCS to meet with contacts and provide assistance.	Photographic and interviews
	Road/stream crossings	Road Commissions	Protect/improve fishing.	Meet with road commissions to discuss standard designs that reduce pollution and are cost effective. Train road crews through the "Better Back Roads" program.	Photographic and interviews
	Lakeshore development-construction	Contractors, Realtors, Local Government Officials, Homeowners	Increase economic return.	Give presentation at contractors workshop on BMPs, work with local governments to standardize setback distances, and using print media educate riparians about the importance of setbacks.	Focus group/evaluation forms
Nutrients	Lawn maintenance	Landscaping and lawn care companies, homeowners, riparian property owners	Marketing for lawn care companies, save money, and enhance property appearance and values.	Sponsor seminars for landscaping companies to learn more about water quality friendly yard maintenance. Sponsor workshops and use print media to reach riparians.	Survey/evaluation forms
	Septic systems	Riparian property owners	Keep the water safe for swimming, reduce aquatic plant growth.	Meet one-on-one with property owners that may have potential septic system problems. Provide assistance to address problems.	Interview
	Manure application management	Agricultural landowners with livestock	Save money and improve crop yield.	Conservation District and NRCS to meet with contacts and provide assistance.	Photographic and interview
Toxins --oil, heavy metals, grease, pesticides, etc.	Urban stormwater	Homeowners	We are all lakefront property owners (via drains).	Media campaign with local newspapers, radio, and tv. Mail residents information on reducing nonpoint source pollution.	Survey

Table 21: Information & Education Strategy					
Pollutant	***Source/Cause***	***Target Audience***	***Messages***	***Delivery Mechanism***	***Potential Evaluation***
	Lawn maintenance	Homeowners, riparian property owners	Don't harm fisheries and lake/river aquatic life.	Sponsor seminars for landscaping companies to learn more about water quality friendly yard maintenance. Sponsor workshops and use print media to reach riparians.	Focus group and survey
	Car care	Urban residents/riparian residents	Don't harm fisheries and lake/river aquatic life.	Through sporting groups educate about disposal of car maintenance materials and car washing.	Evaluation forms
	Agricultural fields	Agricultural landowners	Protect water quality and save money.	Conservation District and NRCS to meet with contacts and provide assistance.	Photographic and interview
Bacteria	Stormwater	Pet owners	Keep the water safe for swimming.	Implement media campaign about proper disposal of pet waste.	Survey
	Manure application practices	Agricultural landowners	Protect water quality and save money.	Conservation District and NRCS to meet with contacts and provide assistance.	Photographic and interview

4. Evaluation Strategy

Implementing the recommended actions will require an evaluation to determine the progress and effectiveness of the proposed activities. Because there is a large variety of tasks, a variety of evaluation methods will be necessary.

Documenting changes with photographs will be used to evaluate the effectiveness and improvements for any components of the project that modify physical features (road/stream crossings, lakeshore erosion, stormwater management improvements, streambank erosion, recreational access sites, creel surveys, etc.)

Because protecting the quality of the resources is a focus of this project, information and education components are very important. A variety of techniques will be used. A written evaluation form will be used for workshops, seminars, or other events where people are gathered for a specific event. For riparian homeowners (both lake and river), interviews and surveys will be conducted after a certain number of the actions have been implemented to see what tools were most effective (personal visits, news articles, booklets, presentations).

Evaluating the effectiveness of programs directed towards improving land use management will require a different approach. Focus groups would be most effective in learning how helpful the ordinances, programs, materials, maps, and other tools created helped with changing policy and protecting water resources. Surveys may also be used to assess the progress as the land use tasks are being implemented. Photographic evidence, particularly documenting the design of new construction, will be used to evaluate the progress of specific tasks.

Some limited water quality monitoring of biological life in the tributaries may be done to document existing diversity and health as a baseline for future monitoring. This type of monitoring will be most valuable in evaluating the effectiveness of many of our actions on protecting the small tributaries within the watershed. A creel survey for the Upper Black River would also be useful for evaluating improvements that effect fisheries habitat.

The project will also utilize the "Seeking Signs of Success" to assist with evaluation tasks throughout the project for all components, physical improvements, information and education tasks, and land use/local government activities.

The Advisory Council will be asked to assist with an annual evaluation of any implementation activities. Every three to five years the Council will be asked to look over the entire list of recommended actions and rankings to assess if changes are necessary in the strategy.

5. Revised Water Quality Summary

The Black Lake Watershed has four designated uses that are threatened: 1) navigation; 2) aquatic life/wildlife; 3) partial or total body contact; and 4) cold water fishery.

Project Goals: The mission of the Black Lake Watershed Stewardship Initiative is to protect and enhance the water quality of Black Lake and its tributaries by reducing current and future polluted runoff. Specific goals related to the designated uses are as follows:

1) Maintain navigation in the rivers and lake by reducing any sediment inputs.

2) Protect the diversity of aquatic habitats within the Black Lake Watershed by reducing the contribution of sediment, nutrient, and toxic pollutants.

3) Maintain the excellent recreational opportunities in the rivers and lake by reducing bacteria, sediment, and nutrient contributions.

4) Reduce sediment and nutrient loads which threaten to harm habitat conditions for the cold water fishery in the Upper Black River and its tributaries.

Navigation
Navigation is threatened in the Upper Black River, Rainy River, and areas of Black Lake from increasing sediment deposition. Known sources of sediment pollution include lakeshore and streambank erosion, road/stream crossings, urban stormwater, livestock in streams, and new construction. Suspected sources of sediment not confirmed as part of the project include logging activities, particularly on private lands, and oil and gas development and production activities.

Lakeshore and streambank erosion is often a result of the removal of shoreline vegetation from residential development. Angler access points and canoeing access are another source of erosion on the Upper Black River. Improperly sized culverts and lack of runoff diversions are the main reason for erosion and sedimentation associated with road/stream crossings.

Livestock access to streams for a watering source can destroy the bank and cause erosion and sedimentation. New construction in the shoreline area can also contribute sediment, particularly if inadequate erosion controls are used. Inconsistent standards and enforcement of zoning ordinances for setbacks and vegetative buffer strips adds to the potential pollution problems from new construction. Not maintaining buffer strips during logging is also suspected of contributing to erosion and sedimentation.

Habitat Protection for Aquatic Life/Wildlife

Aquatic habitat is threatened throughout the Black Lake Watershed from sediment, nutrients, and toxic chemicals, such as oils, grease, heavy metals, and pesticides. Sediment impacts aquatic habitat by covering spawning areas, clouding the water making feeding difficult, clogging gills, and harming eggs and aquatic insect larvae. Nutrients harm wildlife by encouraging excessive aquatic plant growth that can deplete oxygen supplies when it decomposes. Toxic chemicals harm aquatic life by weakening immune systems and making organisms more susceptible to disease. They can also harm reproduction and if concentrations of the toxic materials are high enough they can kill aquatic life.

Sources of sediment pollution are the same as mentioned above under threats to navigation. Known sources of nutrient pollution include lakeshore and streambank erosion, road/stream crossings, septic systems, livestock in streams, stormwater discharges in urban areas, manure application and management, and lawn care on residential properties. Suspected sources of nutrient pollution include golf courses and new construction. Oils, grease, and heavy metals are known to be contributed from stormwater discharges in urban areas and road/stream crossings. Pesticides may be contributed from agricultural fields and lawns.

Nutrients often attach to sediment particles. When erosion from lakeshores, streambanks, and road/stream crossings occurs it contributes not only sediment pollution but also nutrient pollution. Residential properties are known to contribute nutrients from septic systems and lawn fertilizers, which can encourage nuisance plant and algae growth. Golf courses are a suspected source of nutrient pollution from fertilizers and potential runoff from pesticide applications.

Recreation (Partial and Total Body Contact)

Nutrient pollution can stimulate nuisance levels of aquatic plant and algae growth which disrupt recreational activities and make swimming and boating undesirable. In addition,

high bacteria counts can make it unsafe for swimming. In some locations of Black Lake riparians have recently complained about nuisance levels of native aquatic plants. Reducing nutrient inputs is vital to maintain the diversity and quality of recreational opportunities in the Lake. Improving management of urban runoff is important for maintaining the health and safety of the swimming beaches.

Sources and causes of nutrients have been described previously. Suspected sources of bacteria include–stormwater discharges in Onaway, manure application and storage, pet waste, wildlife waste, and livestock access to streams. Shoreline septic systems could be a source of bacteria in certain locations, but this was not documented. Excessive application of manure, runoff from manure piles, or livestock access to streams are other known causes of bacteria pollution from agricultural sites.

Cold Water Fishery
The Upper Black River and its tributaries support a healthy cold water fishery. Sediment, nutrient, and toxic pollution (oils, grease, heavy metal, and pesticides) can all be harmful to a cold water fishery. Sediment was identified as the most harmful pollutant to the cold water fishery. In addition to destroying habitat and harming fish, the sediment adds to the overall bed load of the river. This extra sediment (often sand) bed load makes the river or streams wider and shallower creating conditions suitable for increased water temperatures (thermal pollution). Road/stream crossings and streambank erosion are the most significant sources of sediment pollution. High populations of beaver and their dams have been identified as a source of thermal pollution to the Upper Black River. Thermal pollution can raise the temperature of the stream, depleting oxygen levels, and stressing the brook trout and other aquatic life in the river.

6. Public Participation

The public was provided many opportunities to participate in the planning process. At the beginning of the project, press releases were sent to regional media announcing the grant award and inviting citizens to be involved. An advisory committee (see list of project partners in the front) with broad representation was formed and each of its meetings was open to the public (meetings were held: 9/14/00, 10/26/00, 12/7/00, 3/5/01, 7/26/01, 11/7/01, 2/8/02, and 5/14/02). On May 23, 2002, a public forum was held in Onaway (see flyer on the following page) and press releases and public service announcements were sent to regional media to inform the public. The forum included a discussion of the inventory results and the proposed recommendations. The public had the opportunity to provide comments at the forum, or submit them in writing via a self-mailer form. Many of the comments provided were incorporated into the final Management Plan.

INSERT PUBLIC FORUM ANNOUNCEMENT

Appendix A

Advisory Council Members

Black Lake Watershed Stewardship Initiative
ADVISORY COUNCIL

(list updated 5/01/02)

Brenda Archambo
Sturgeon for Tomorrow
1604 North Black River Road
Cheboygan, MI 49721
fax:
e-mail: archambo@freeway.net

Peggy Bannatyne
Cheboygan Conservation District
825 Huron, Suite 2
Cheboygan, MI 49721
phone: 231-627-3383
e-mail:
peggybannatyne@usda.nrcs.gov

Brian Benjamin
Huron Pines RC&D
501 Norway
Grayling, MI 49738
phone: 989-348-9319
fax: 989-348-7945
e-mail: huron@freeway.net

Kim Bleech
Montmorency County Road
Commission
11445 M-32
Atlanta MI, 49709

Bob Bonner
1465 S Black River Road
Onaway, MI 49765
e-mail: rbonner@northland.lib.mi.us

Dave Borgeson
MDNR-Fisheries
P.O. Box 667
Gaylord, MI 49735
e-mail: borgesdl@state.mi.us

Fran Brink
10056 Spile Dam Road
Millersburg, MI 49759

Jim and JoAnn Chaskey
P.O. Box 433
Onaway, MI 49765
phone: 989-733-2102

Ann Chastain
MSU Extension
P.O. Box 70
Cheboygan, MI 49721

Frank Christie
Franklin Hydro, Inc.
P.O. Box 1525
Midland, MI 48642
e-mail: chris-eng@worldnet.att.net

Tom Edison
Center for Wildland Conservation
P.O. Box 789
Atlanta, MI 49709

Heather Enterline
USFWS
Federal Building Room 204
145 Water Street
Alpena, MI 49707
e-mail: heather_enterline@fws.gov

Lisha Ferguson
NEMCOG
P.O. Box 457
Gaylord, MI 49735
e-mail: lferguson@nemcog.org

Mark Fielder
UAW Family Education Center
2000 Maxon Road
Onaway, MI 49765

Kieran Fleming
Little Traverse Conservancy
3264 Powell Rd
Harbor Springs, MI 49740
phone: 231-347-0991
fax: 231-347-1276
e-mail: kcfleming@landtrust.org

Jim Flewelling
Black Lake Sportsman Club

19283 White Pine Highway
Onaway, MI 49765

Dayle Garlock
MDNR
13501 M-33
Atlanta, MI 49709-9605

Mike Heaton
Onaway State Park
3622 M-211 North
Onaway, MI 49765

MaryAnn Heidemann
Presque Isle County Comm. Development
658 S Bradley Highway
Rogers City, MI 49779

Dick Hopkins
678 Taylor Road
Onaway, MI 49765
e-mail: sawnsew@voyager.net

Don Inman
11740 West 634 Hwy.
Millersburg, MI 49759
e-mail: ecologic@freeway.net

Hank Jankoviak
Cheboygan County Soil Erosion Officer
P.O. Box 70
Cheboygan, MI 49721

Joe Jarecki
Pigeon River County State Forest
9966 Twin Lakes Road
Vanderbilt, MI 49795

Kathy Jensen
Cheboygan County Road Commission
729 North Main
Cheboygan, MI 49721

Mike Kavanaugh
District #4 Health Department
825 S. Huron
Cheboygan, MI 49721

John Kraft
MDEQ-SWQD
2100 West M-32
Gaylord, MI 49735
phone: 989-731-4920
e-mail: kraftj@state.mi.us

Frank Krist
District #4 Health Department
151 East Huron
Rogers City, MI 49779
e-mail: krist@george.lhi.net

Mike Moreau
Cheboygan Conservation District
P.O. Box 342
Onaway, MI 49765
phone: 989-733-6050
e-mail:
mmoreau@mionaway.fsc.usda.gov

Ken Parson
Alpena Conservation District
1900 M-32 West
Alpena, MI 49707
phone: 989-356-3596, ext. 110
e-mail: kenny-parsons@mi.nacdnet.org

Ty Ratliff
Little Traverse Conservancy
3264 Powell Rd
Harbor Springs, MI 49740
phone: 231-347-0991
fax: 231-347-1276
e-mail: tyratliff@landtrust.org

Mike Roper
Otsego County Road Commission
P.O. Box 537
Gaylord, MI 49734

Eric Rose
Presque Isle Road Commission
657 S Bradley Highway
Rogers City, MI 49779
phone: 989-734-2216
fax: 989-734-2349

Paul Rose
Montmorency County Conservation Club
13501 M-33
Atlanta, MI 49709

Richard Shoquist
P.O. Box 537
Onaway, MI 49765
phone: 989-733-2127

Bill Shull
849 S. Black River Rd.
Onaway, MI 49765
phone: 989-733-8467

James Skaggs
6826 Little Canada Road
Cheboygan, MI 49721
phone: 231-625-2085

Bud Slingerlend
Upper Black River Watershed Rest. Comm.
P.O. Box 436
Atlanta, MI 49709-0436
phone: 989-785-3453
e-mail: buds@i2k.net

Perry Smeltzer
USDA-NRCS
P.O. Box 733
Onaway, MI 49765
e-mail: perrysmeltzer@mi.usda.gov

Dave Smith
Headwaters Conservancy
c/o Huron Pines RC&D
501 Norway
Grayling, MI 49738

Mark Stormzand
Weyerhauser
9880 Richardson Road
Cheboygan, MI 49721
e-mail: stormy@freeway.net

Carol Warren
Presque Isle Conservation District
240 West Erie St.
Rogers City, MI 49779-1629

Mary Whitmore
SEE-North
222 Park Avenue
Petoskey, MI 49770
phone: 231-348-9700
e-mail: mary@seenorth.org

Representatives From:

Black River Ranch
RFD 2
Onaway, MI 49765

Black River Marina
8091 Viau
Cheboygan, MI 49721

Canada Creek Ranch
23001 Storm Lake Trail
Atlanta, MI 49709

City of Onaway
P.O. Box 761
Onaway MI 49765

Montmorency Conservation District
Courthouse, P.O. Box 789
Atlanta, MI 49709-0789

Otsego Conservation District
800 Livingston Blvd., Suite 4A
Gaylord, MI 49735-8321

Appendix B

Systems of

Best Management Practices

Table 22: Best Management Practices		
Source	***BMP Manual***	***Potential Systems of BMPs***
Road/Stream Crossings	Guidebook of BMPs, Better Back Roads	Extend, enlarge culverts, install runoff diversions, direct runoff, install box culverts and bridges

Streambank Lakeshore	Guidebook of BMPs Understanding, Controlling, and Living with Shoreline Erosion	Biotechnical erosion control, critical area plantings, rock riprap, tree revetments
Stormwater	Stormwater Mgt., I/E, Guidebook, Center for Watershed Protection Materials	Waters gardens, runoff diversions, infiltration basins
Recreation	Guidebook of BMPs, Understanding, Controlling, and Living with Shoreline Erosion, Stormwater Management	Runoff diversions, walkways/stairways, parking lot barriers, canoe landings, biotechnical erosion control, rock riprap, tree revetments

Lawn/Shoreline Care	I/E	
Agriculture-Livestock	Guidebook of BMPs, Michigan Agriculture BMPs	Fencing, alternative watering devices, vegetative buffer strips
Agriculture-Manure	Guidebook of BMPs, Michigan Agriculture BMPs	Nutrient management, animal waste storage, manure application plan
Septic	I/E	Installation of septic effluent filters, coordinated neighborhood tank pumping

Golf Courses	I/E Golf Course BMP	Soil testing, fertilizer and pesticide management, vegetative buffer strips