Portage River Watershed Management Plan

Kalamazoo and St. Joseph Counties, Michigan

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Prepared by:

Kalamazoo Conservation District
1911 W. Centre Ave.
Portage, MI 49024
(269) 327-1258 x 4

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1. Project Overview and Introduction

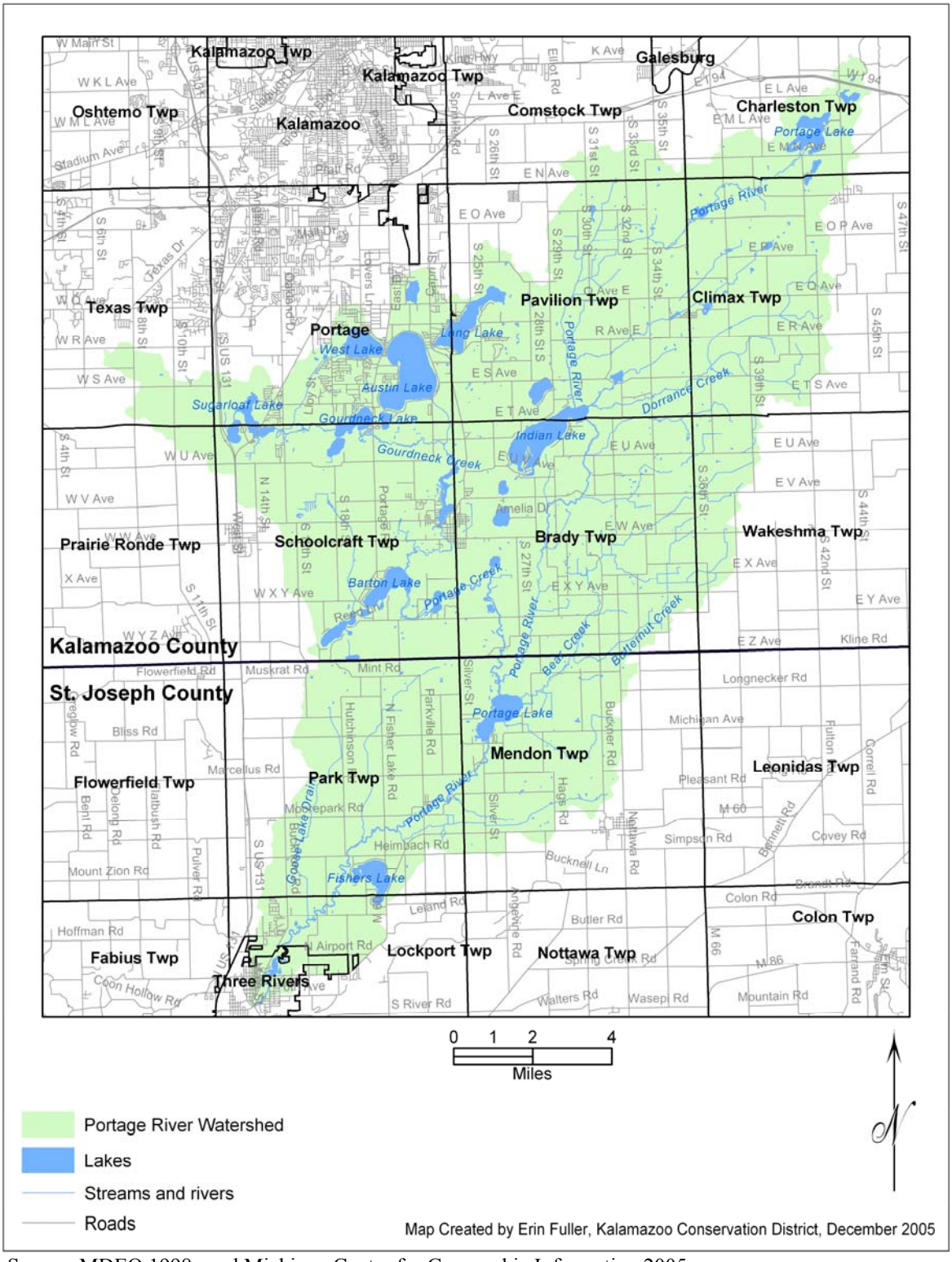
A watershed is defined as all of the land area that drains into a common low point, such as a lake or river. Rainwater and snowmelt run over the land and carry pollutants into those lakes and rivers. This form of pollution is nonpoint source pollution, since it originates from a variety of sources. Watershed management takes a holistic approach to natural resource protection, focusing on all the activities within the watershed boundaries that can impact water quality. This requires working across township, county, and sometimes state and international boundaries. The watershed management planning process also relies heavily on input from stakeholders within the watershed.

This watershed management planning process was initiated as part of the Michigan Municipal Separate Storm Sewer System (MS4) storm water permitting process. In Phase II of the National Pollutant Discharge Elimination System (NPDES) storm water program, municipalities with separate storm water sewer systems (MS4s) in urbanized areas (as defined by the Census Bureau) are required to obtain a storm water discharge permit. Permittees in this process include Kalamazoo County, Kalamazoo County Drain Commission, Kalamazoo County Road Commission, Brady Township, Comstock Township, Pavilion Township, Schoolcraft Township, Texas Township, the Village of Vicksburg, and the City of Portage.

2. Watershed Description

2.1 Geographic Scope

The Portage River Watershed encompasses approximately 125,539 acres, or 196 square miles in Kalamazoo and St. Joseph Counties in southwestern Michigan (Figure 1). In Kalamazoo County, the watershed covers portions of Charleston, Texas, Pavilion, Climax, Prairie Ronde, Schoolcraft, Brady and Wakeshma Townships. In St. Joseph County, it includes portions of Park, Mendon, and Lockport Townships. The watershed also encompasses portions of the City of Portage, the City of Three Rivers, and the Village of Vicksburg. The Portage River Watershed is a subwatershed of the St. Joseph River Watershed (Figure 2) which drains 4,685 square miles of southern Michigan and northern Indiana and enters Lake Michigan in the City of St. Joseph. The Portage River flows into the St. Joseph River in the City of Three Rivers



Source: MDEQ 1998a and Michigan Center for Geographic Information 2005

Figure 1: Portage River Watershed

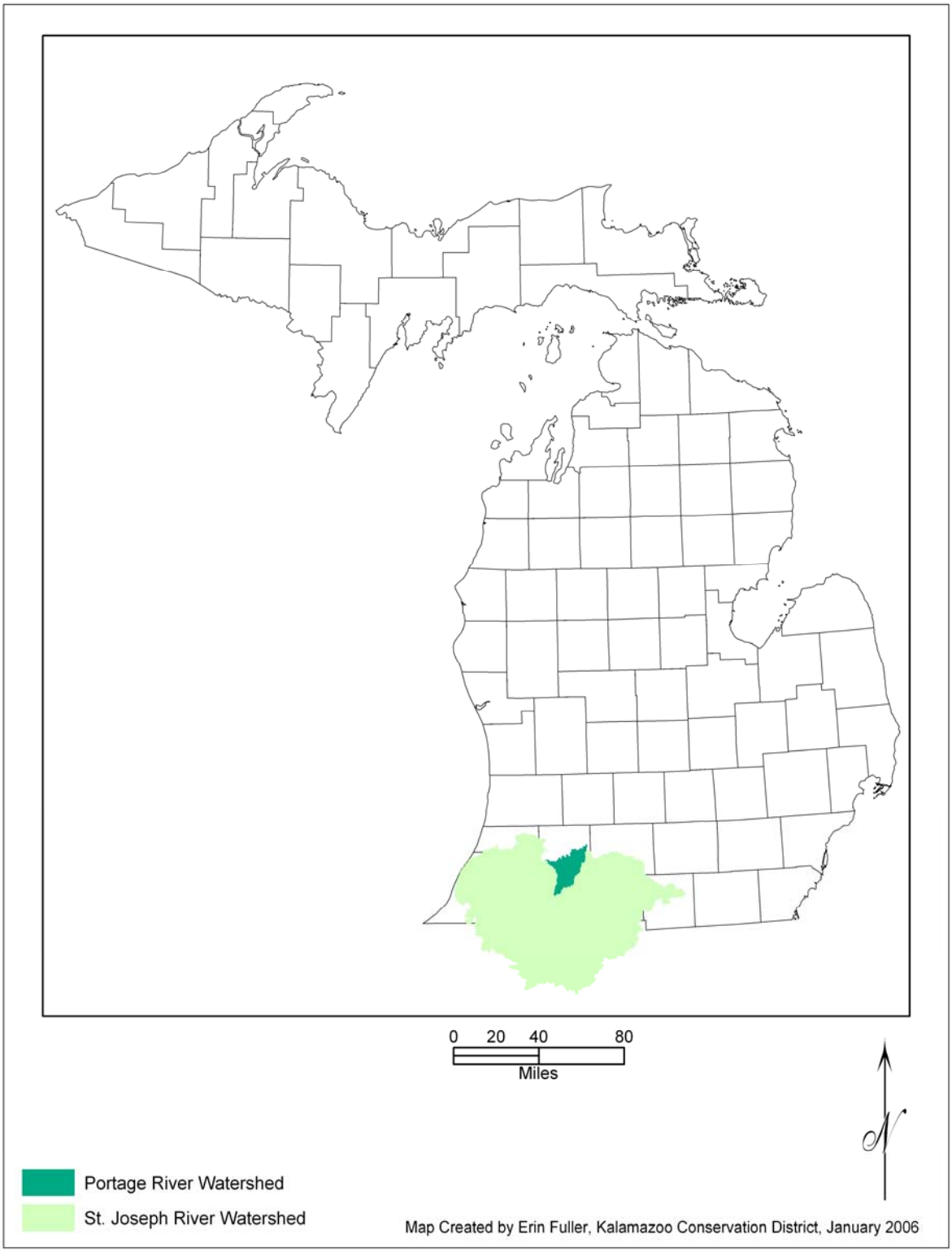


Figure 2: St. Joseph River Watershed

2.2 Soils and Topography

The principal soil associations in the watershed are Oshtemo-Kalamazoo-Houghton (nearly level to rolling, well drained loamy soils; on outwash plains and moraines) and Schoolcraft-Kalamazoo-Elston (nearly level and undulating, well drained soils that have a loamy or a loamy and sandy subsoil; formed in glacial outwash) (USDA 1994, Cowan 1983 and Austin 1979) (Table 1 and Figure 3).

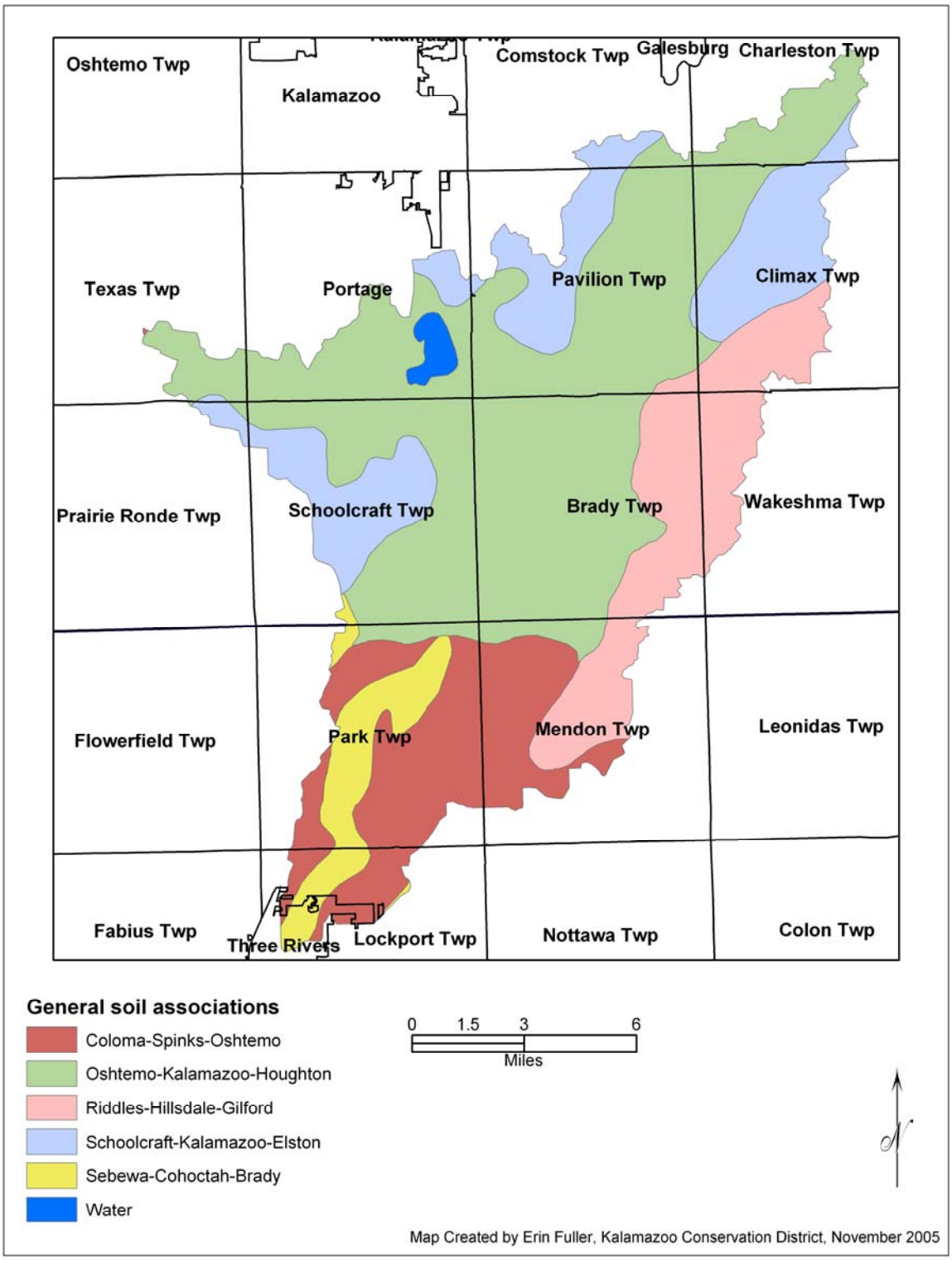
Table 1: General soil associations in the Portage River Watershed

General Soil Associations	Acres
Oshtemo-Kalamazoo-Houghton (MI045)	60,470
Schoolcraft-Kalamazoo-Elston (MI047)	20,899
Coloma-Spinks-Oshtemo (MI011)	18,597
Riddles-Hillsdale-Gilford (MI034)	17,971
Sebewa-Cohoctah-Brady (MI085)	6,593

Source: USDA 1994

The most prevalent soil series (in terms of area) in the watershed are Riddles loam, Spinks loamy sand, and Plainfield loamy sand. Riddles loam is a well drained soil found on loamy uplands. Spinks loamy sand is a well drained soil found on sandy uplands. Plainfield loamy sand is an excessively drained soil on uplands and small ridges (Austin 1979).

Glaciers shaped the landscape of Michigan, and the landforms in this watershed are no exception. Most of the landscape of the watershed consists of outwash plains and till plains. Till plains are undulating and generally have medium textured soils. Outwash plains are primarily level, and generally have a high percentage of sand or gravel underlying the soil (Austin 1979).



Source: USDA 1994

Figure 3: Portage River Watershed soil associations

2.3 Ecosystem and Climate

The Portage River Watershed lies within the Southern Michigan/Northern Indiana Till Plains ecoregion. Ecoregions are delineated by their climates, soils, vegetation, land slope and land use. Rivers within this ecoregion tend to be of good quality in their headwaters, are typically slow-flowing, and are sometimes bordered by extensive wetlands. Drainage ditches and channelized rivers are common in this ecoregion where land is too wet for agriculture or building (Wolf and Wuycheck 2004).

The average winter temperature in this area is approximately 26.6° F. Average summer temperature is approximately 70.8° F. Total annual precipitation is approximately 34.2 inches. Average annual snowfall varies between Kalamazoo and St. Joseph Counties; Kalamazoo County averages 71.4 inches of snowfall per year, and St. Joseph County averages 45.6 inches. The prevailing wind direction for this area is southwesterly (Austin 1979 and Cowan 1983).

2.4 Land Use and Land Cover

Prior to European settlement, the primary landcover types in the Portage River Watershed were mixed oak savanna, oak-hickory forest, and beech-sugar maple forest (Table 2 and Figure 4). Much of the forest was logged in the latter half of the 1800s, clearing the way for agricultural use of the land.

Table 2: Portage River Watershed 1800s land cover

Land Cover Type	Acres	% of total
Mixed oak savanna	48,029.5	38.3%
Oak-hickory forest	18,727.7	14.9%
Beech-Sugar maple forest	16,734.6	13.3%
Shrub swamp/ Emergent marsh	10,559.4	8.4%
Black oak barren	6,571.3	5.2%
Mixed conifer swamp	6,262.0	5.0%
Grassland	6,098.9	4.9%
Lake/ River	5,803.6	4.6%
Mixed hardwood swamp	5,663.8	4.5%
Wet prairie	556.1	0.4%
Black ash swamp	531.8	0.4%

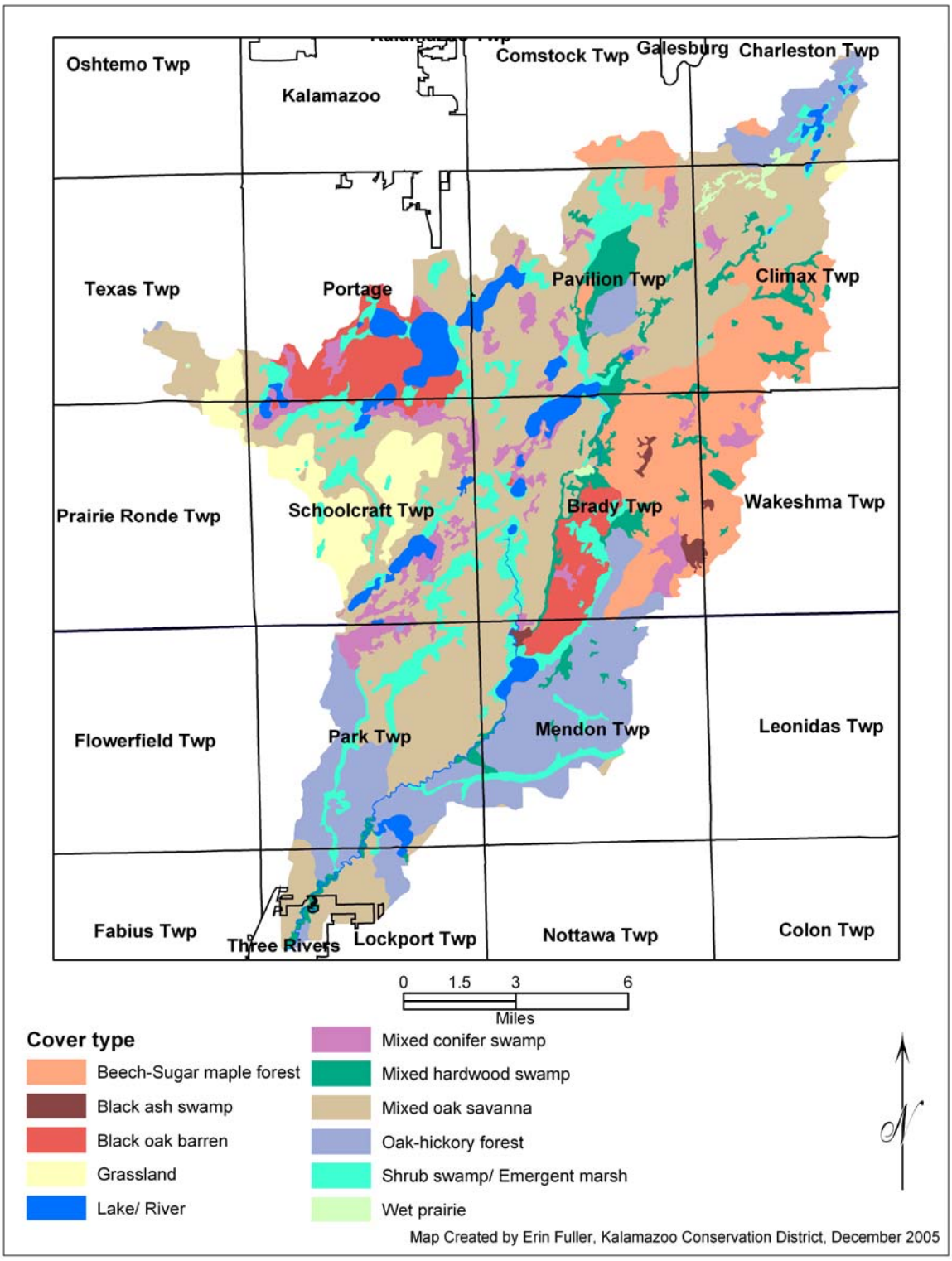
Source: Michigan Resource Information System 1978

More current land use/land cover data shows agriculture (row crops) as the dominant land use in the watershed. Deciduous forest and pasture/hay are also significant land uses in the watershed (Table 3 and Figure 5).

Table 3: 1992 Land use

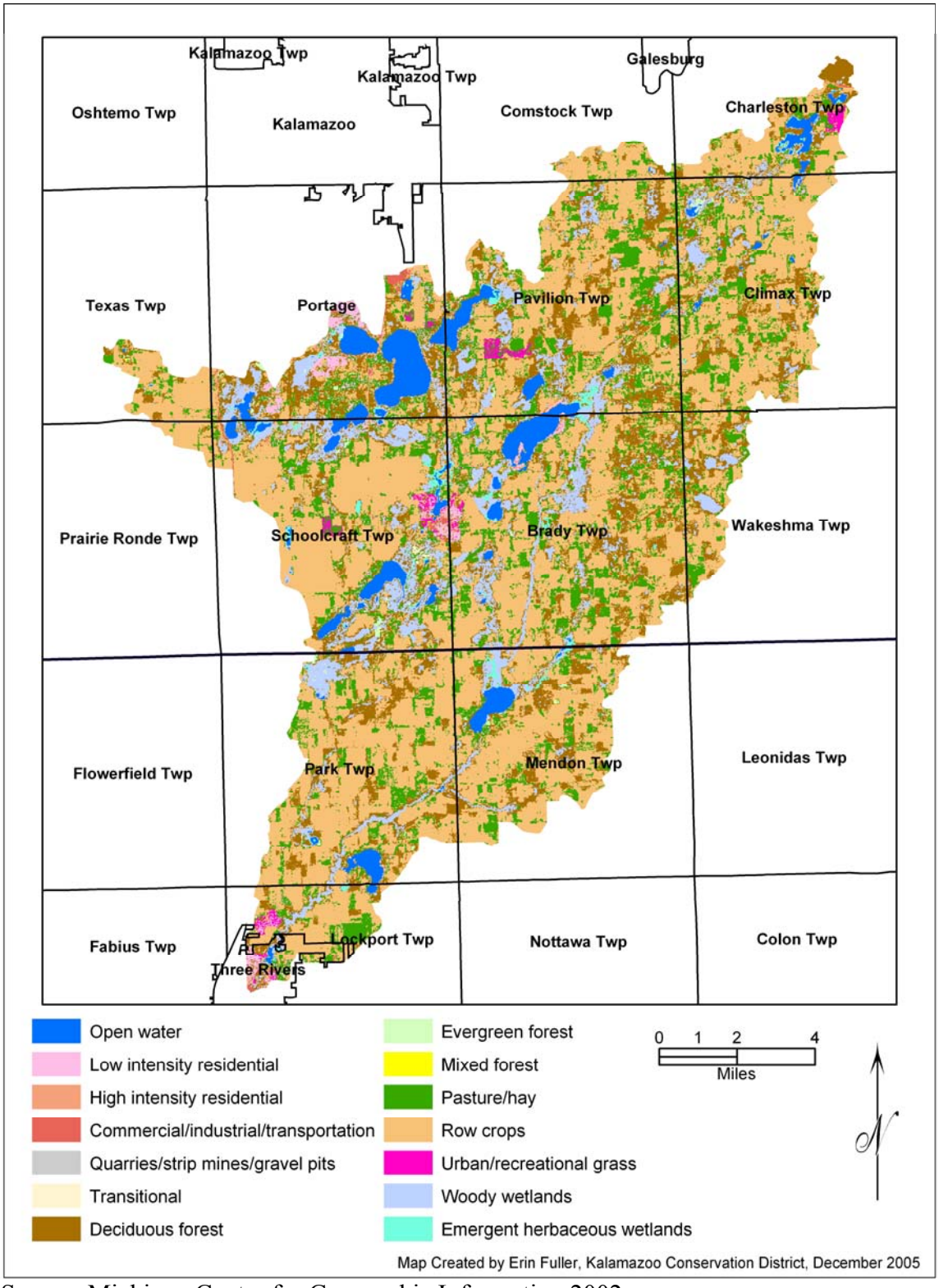
Land use	Acres	% of total
Row crops	64,703.4	51.5%
Deciduous forest	20,668.7	16.5%
Pasture/hay	18,885.3	15.0%
Woody wetlands	10,708.0	8.5%
Open water	5,900.2	4.7%
Low intensity residential	1,925.1	1.5%
Emergent herbaceous wetlands	837.0	0.7%
Urban/recreational grasses	671.4	0.5%
Evergreen forest	581.3	0.5%
Commercial/industrial/transportation	432.5	0.3%
High intensity residential	139.0	0.1%
Transitional	48.5	0.0%
Mixed forest	33.7	0.0%
Quarries/strip mines/gravel pits	2.4	0.0%

Source: Michigan Center for Geographic Information 2002



Source: Michigan Resource Information System 1978

Figure 4: Presettlement vegetation



Source: Michigan Center for Geographic Information 2002

Figure 5: 1992 Land use

2.5 Hydrology

The Portage River Watershed is a subwatershed of the St. Joseph River Watershed. It contains the Hydrologic Unit Codes (HUCs) shown in Table 4.

Table 4: Hydrologic Unit Codes in the Portage River Watershed

14-digit HUC
04050001060010
04050001060020
04050001060030
04050001060040
04050001060050
04050001060060
04050001060070
04050001060080
04050001060090
04050001060100

Source: MDEQ 1998a

The watershed contains many lakes and wetlands, predominantly in the headwaters areas in Kalamazoo County (Walterhouse 2003). The watershed contains approximately 33 named lakes and numerous (over 500) small, unnamed lakes and ponds. The three largest lakes in the watershed are Austin Lake (approximately 1,100 acres), Indian Lake (approximately 790 acres) and Long Lake (approximately 500 acres). These and many of the other lakes in the watershed are connected by surface water to the Portage River system through streams and drains.

Based on studies by the Michigan Department of Environmental Quality (MDEQ), lakes in southern lower Michigan tend to have moderate to high nutrient levels as compared with lakes in northern Michigan. This is likely due to higher soil fertility and population density in southern Michigan. The trophic status of lakes is determined through water clarity (Secchi disk transparency), total phosphorus concentrations, and chlorophyll *a* concentrations. Eutrophic lakes are those with high nutrient levels, mesotrophic lakes have moderate nutrient levels, and oligotrophic lakes have low nutrient levels. The lakes in this watershed that have been assessed by the MDEQ have been determined to be either mesotrophic (Austin Lake, Fisher's Lake, Gourdneck Lake, Hogsett Lake, Indian Lake, Long Lake, Portage Lake [Charleston Twp., Kalamazoo County], Sugarloaf Lake, and West Lake) or eutrophic (Barton Lake, Portage Lake [Mendon Twp., St. Joseph County], and West Lake (Wolf and Wuycheck 2004).

2.6 Natural areas

The Portage River Watershed contains several significant natural areas. Approximately 1,663 acres of the Gourdneck State Game Area (in Kalamazoo County), and the entirety of the Spring Creek State Game Area (80 acres in St. Joseph County) lie within the watershed.

Three Kalamazoo County parks lie within the watershed. These include Prairie View Park (208 acres), Scotts Mill Park (108 acres) and Cold Brook Park (276 acres).

The City of Portage also owns several natural areas in the watershed. These include the West Lake Nature Preserve (110 acres of bog habitat) and the Bishop's Bog Preserve (152 acres of bog habitat containing several rare plant species).

The Southwest Michigan Land Conservancy protects several properties in the watershed. These include the Hidden Marsh Preserve (38 acres) and the Lacey Preserve (5 acres). In addition, this organization holds one conservation easement (172 acres) in the watershed.

A portion of the Portage River from Portage Lake (in St. Joseph County) to the City of Three Rivers is designated as a Michigan Heritage Water Trail (http://www.wmich.edu/glcms/watertrails/). This trail is approximately 16 miles in length, contains designated access sites and is posted with signs highlighting historical events and natural features of the river.

3. Water Quality in the Portage River Watershed

The Clean Water Act requires each state to produce a biennial report on water quality. The Department of Environmental Quality produces this report for the State of Michigan. This report contains a list (commonly referred to as the 303(d) list) that categorizes water bodies in terms of their meeting designated uses. Table 5 summarizes this list for the Portage River Watershed. Many rivers in the southern lower Michigan have recovered substantially from past pollution, though some river miles (especially those in urban areas) remain reduced in quality (Wolf and Wuycheck 2004).

Table 5: Summary of the 2004 303 (d) list for the Portage River Watershed

Water body	County	Category*	Location	Problem
Bear Creek	St. Joseph/ Kalamazoo	2	Portage Lake confluence upstream to headwaters incl. Butternut Creek	
Gourdneck Creek	Kalamazoo	2	Barton Lake confluence upstream to Gourdneck Lake outlet	
Portage Creek	St. Joseph/ Kalamazoo	2	Portage River confluence upstream (excluding multiple lakes)	
Portage River	St. Joseph/ Kalamazoo	2	St. Joseph River confluence upstream to Indian Lake (excluding Portage Lake)	
Fisher's Lake	St. Joseph	3	T5S, R11W, Sec. 34	
Portage Lake	St. Joseph	3	Mendon Twp.	
Dorrance Creek	Kalamazoo	4c	Indian Lake confluence upstream to headwaters and all tributaries	
Garman Foster Drain	St. Joseph	4c	Portage River confluence upstream	
Goose Lake Drain	St. Joseph	4c	Portage River confluence upstream	
Portage River	Kalamazoo	4c	Indian Lake confluence upstream to Portage Lake (including tributaries)	
Austin Lake	Kalamazoo	5	City of Portage	Fish tissue-Mercury
Barton Lake	Kalamazoo	5	SW of Vicksburg	Fish Consumption Advisory (PCBs); Fish tissue-Mercury

Source: Wolf and Wuycheck 2004

*Category 2: Some uses are met but there is insufficient data to determine if remaining uses are met
Category 3: Insufficient data to determine whether any uses are met
Category 4c: Water quality standards nonattained (highly modified water body)
Category 5: Water is impaired or threatened and a Total Maximum Daily Load is needed (TMDL)

3.1 Previous studies

Current information concerning water quality, stream habitat and aquatic biota in the Portage River Watershed is lacking (Walterhouse 2003). However, a variety of projects over the years provide some information about water quality. These are summarized below.

Kalamazoo County Surface Water Monitoring Program: The Kalamazoo County Health and Community Services Department monitors surface water quality at locations throughout the county. Forty-seven of these sites fall in the Portage River Watershed, and include both lakes and streams. The sampling procedures used do not comply with Michigan's Water Quality Standards requirements, but the results can be used to assess general water quality. Many of the sites sampled have had high levels of E. coli at least once since sampling began in 2001. Bacterial sources are found in both rural and urban drainages. Higher bacteria counts are evident at most surface water monitoring locations within 24 hours of a rain event (Kalamazoo County Human Services Department 2004).

Beach Water Monitoring: Four sites in the Portage River Watershed are monitored weekly during the summer by the Kalamazoo County Health Department. These sites are Prairie View County Park (Hogsett Lake), Ramona Park (Long Lake), Cold Brook County Park (Blue Lake) and Sunset Lake Park (Sunset Lake). Both Ramona Park and Cold Brook County Park have had advisories issued due to *E. coli* counts exceeding Michigan water quality standards. Ramona Park beach was closed for one day in 2002 and one day in 2004, and the Cold Brook beach was closed for 9 days in 2001 and 4 days in 2002 (MDEQ 2005). Though difficult to trace, wildlife (especially Canada geese) are suspected to be the main source of *E. coli* bacteria at these parks (J. Reicherts, personal communication, December 16, 2005). The beach at Hogsett Lake did approach the cutoff for *E. coli* in the summer of 2005 for one day, but never exceeded the levels, and no advisories were issued (MDEQ 2005).

MDEQ Biosurvey (Walterhouse 2003): The MDEQ performed a biological survey of portions of this watershed in the summer of 2000. Water quality throughout this watershed was generally rated as good. The lower Portage River (downstream of Indian Lake) and Portage Creek have not been channelized, and stream habitat is suitable for diverse macroinvertebrate communities. Most of the river and its tributaries upstream of Indian Lake have been channelized or are managed to move stormwater off the landscape. Impacts to the macroinvertebrate community and aquatic habitat were attributed to channelization, row cropping, and alteration of riparian buffers by riparian landowners. Figure 6 shows the rankings for the macroinvertebrate community that were derived in this study.

Water chemistry sampling from seven sites in this watershed indicate that nutrient levels at all sites were in compliance with Michigan water quality standards, and were less than mean values at reference sites within the same ecoregion. Despite heavy rainfall during the sampling period, stream water levels and water clarity remained stable, likely due to the buffering capacity of the lakes and wetlands in this watershed (Walterhouse 2003).

St. Joseph River Watershed: The Portage River Watershed is a subbasin of the St. Joseph River Watershed. A plan has been developed for the St. Joseph River Watershed (DeGraves 2005), and some information from that plan is applicable to the Portage River Watershed. This watershed management plan identifies agriculture as having the most significant impact on surface waters in the St. Joseph River basin. In this WMP, the Portage River basin was not identified as having any impaired or threatened designated uses. The Portage River Watershed is among the top of the major watersheds in the St. Joseph river basin in terms of remaining wetlands.

As part of the St. Joseph River planning process, modeling was done to estimate wet weather total phosphorus loading per acre for each subwatershed. The Portage River Watershed averaged 0.1891 lbs/acre of phosphorus. A model was also created to estimate wet weather total suspended solid loading per acre. The Portage River Watershed averaged 83.2 lbs/acre of total suspended solids (DeGraves 2005).

Michigan Tributaries of the St. Joseph River Basin Report: A 1985 survey of the Michigan tributaries of the St. Joseph River (USDA 1985) contained some information about the Portage River. For the St. Joseph River basin, this report cited the need for the promotion and adoption of conservation tillage and conservation cropping systems to reduce erosion in the watershed. The Portage River was identified as a priority watershed for these land treatments. Primary resource concerns in the Portage River Watershed included cropland soil erosion and sedimentation, impaired drainage, and water quality degradation due to improper animal waste disposal.

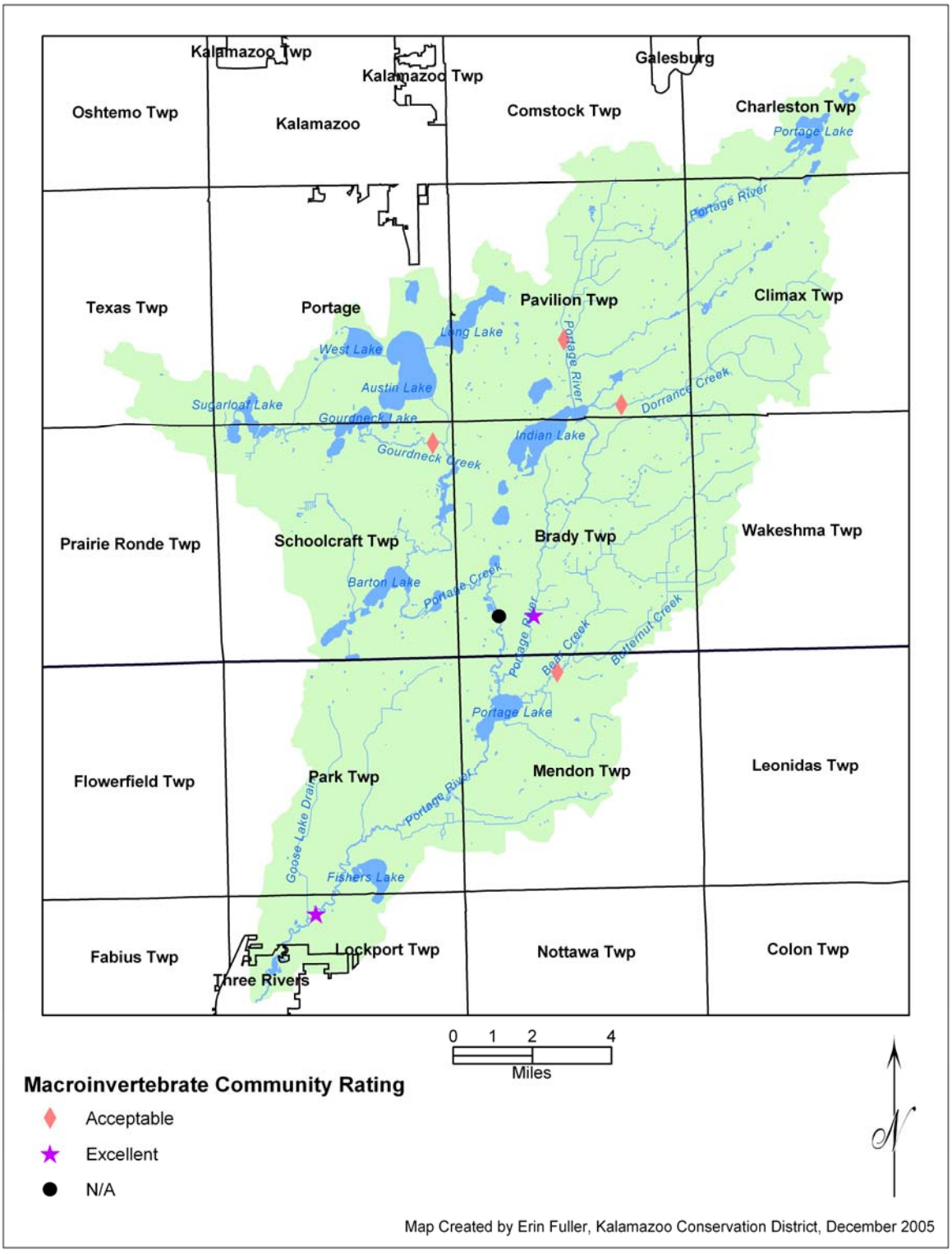
Austin and West Lakes: A variety of studies have been performed on Austin and West Lakes in the City of Portage. These lakes are surrounded primarily by residential development. A channel connecting Austin Lake to Gourdneck Creek (at the southeast end of the lake) has in the past been designated as a trout stream by the Michigan Department of Natural Resources (Snell 1975), though it no longer holds this designation. Weeds and algae have been considered a problem in these lakes (Payne et al. 1985). At one point, Eurasian Water Milfoil was estimated to occupy 40% of the lake area in Austin Lake (Snell 1975). Carp have also been considered a problem. In the early 1960s Michigan Department of Natural Resources chemically treated Austin West, and Long Lakes to eradicate all fish species, then restocked the lake with bass and pike (Snell 1975). Carp have since reinfested the lake, however (Payne et al 1985).

One study estimated pollution in Austin Lake to be attributed to overland and street runoff (15%), leaching septic systems and tile fields (30%), agricultural runoff (20%), overuse of lawn fertilizers (30%), and animal pollution (5%) (Snell 1975). Chemical analysis of sediments from Austin Lake showed significant contamination by chromium, copper, lead and zinc, with many of these samples characterized as heavily polluted (Western Michigan University 1978).

A more recent study of West Lake (Kieser & Associates 1999) determined that phosphorus concentrations are similar to a 1986 study on the lake. Over those years, some stormwater drains had been disconnected. The remaining stormwater outfalls to

West Lake still apparently contribute pollutants such as phosphorus and *E. coli*. This report recommended disconnecting storm drains that discharge directly into the lake, and instead installing leaching basins to promote infiltration.

Groundwater: At least two sites in the watershed are considered to be land use restricted sites. This designation applies when the property has groundwater use restricted by deed due to existing levels of groundwater contamination that cannot be economically cleaned up. The watershed also has at least 11 leaking underground storage tanks (LUSTs), and 9 sites of environmental contamination (Kalamazoo County Human Services Department 2001).



Source: Walterhouse 2003

Figure 6: Macroinvertebrate community rating

3.2 Watershed Inventory

The watershed was inventoried by visiting road-stream crossings and taking photographs and notes at these locations. As the inventory was performed in the winter, sites were only visited when there was no snow on the ground. Overall, the main corridor of the river is quite well buffered with forests and wetlands (see Figure 7 and Figure 8). A few sites were located in which residential landowners were mowing to the edge of the river, and slight bank erosion was evident (see Figure 9). However, streambanks along the majority of the river appear to be quite stable. The river does not appear to be incising (or downcutting), which can lead to unstable banks. Some portions of the river have been straightened, but the river does not appear to be destabilizing in these areas (Figure 10).

A portion of the river was kayaked (in the spring of 2006) from Portage Lake in Mendon Township downstream 4.5 miles to Fisher Lake Rd. in Park Township. This section is part of a designated Michigan Heritage Water Trail. The river throughout this section was well buffered with forests and wetlands, with very little evidence of bank erosion or sedimentation. The substrate was sand and gravel, and the water clarity was high.

Figure 7: Portage River at 29th Street (Brady Township)

Figure 8: Portage River at U Avenue (Brady Township)

Figure 9: Portage River at Q Avenue (Pavilion Township)

Figure 10: Portage River at S Avenue (Pavilion Township)

3.3 Aerial Photograph Review

Aerial photographs of the main corridor of the Portage River were reviewed to locate areas lacking in riparian buffers and other potential problem areas. Though much of the main corridor of the river has a wide buffer (composed of wetlands and forests), approximately 3,900 meters (or about 2.4 miles) lacks a substantial buffer. The areas that lack a riparian buffer are composed of approximately 42% residential landuse and 58% agricultural landuse.

3.4 Impervious Surface Analysis

Impervious surfaces are those surfaces such as roads, parking lots and rooftops that do not allow infiltration of rainwater and snowmelt. As impervious surface areas increase in a watershed, so does runoff. Runoff water is usually warmer than groundwater and can carry a variety of pollutants into streams, such as sediment, fertilizers, pesticides, or oil. Recent research also suggests that potentially carcinogenic compounds may leach from asphalt based and coal tar based sealants that are used on paved areas (Perkins 2004). In addition, streams surrounded by a high percentage of impervious surfaces will have a "flashy" hydrological regime in which the stream receives floods after rain events and snowmelt, but is deprived of water during the dry season due to decreased infiltration (Wycoff et al. 2003). Studies have shown that as the land cover of a watershed becomes 8-10% impervious surface, water quality is negatively impacted. Above 10% impervious cover in a watershed, water quality typically begins to degrade (Wyckoff et al. 2003). High flows from storms scour the banks, causing erosion and loss of vegetation. A typical suburban development with homes on 1/3 acre lots is approximately 35% impervious (Perkins 2004).

An online land use analysis tool was used to estimate impervious surface cover in the watershed (Choi and Engel 2004). This model uses land use/land cover data and estimates the amount of impervious cover associated with that land use (see Table 6). Using this model, 2.09% of the Portage River Watershed is composed of impervious surface. This is below the level at which water quality begins to degrade. However, within the watershed impervious surface coverage varies widely, and urbanized areas may have impervious surface coverage of greater than 10%.

Table 6: Impervious cover percentage based on land use category

Land use category	Impervious cover percentage
Water/Wetland	0.0%
Agriculture, Pasture/grass, Forest	1.9%
Low density residential	15.4%
High density residential	36.4%
Industrial	53.4%
Commercial	72.2%

Source: Choi and Engel 2004

3.5 Designated Uses

A designated use is a recognized use of water established by state and federal water quality programs. All surface waters of the state of Michigan are designated and protected for the uses listed in Table 7. This table also indicates whether the use is currently met, threatened, or impaired in the Portage River Watershed.

Table 7: Designated uses in the Portage River Watershed

Designated use	General description	Met, threatened or impaired?
Agriculture	Supply for irrigation and livestock watering	Met
Industrial water supply	Supply for industrial processes	Met
Public water supply	Public drinking water source	Not applicable
Navigation*	Shipping, travel or transport	Threatened
Warmwater fishery**	Supports reproduction of warmwater fish	Threatened
Other indigenous aquatic life and wildlife	Supports reproduction of indigenous animals, plants and insects	Threatened
Partial body contact recreation	Water quality standards are maintained for skiing, canoeing and wading	Threatened
Total body contact recreation	Water quality standards are maintained for swimming between May 1 and October 31	Threatened

* The Michigan Supreme Court has ruled portions of the Portage River as navigable, including the Portage River from Parkville in (T5S, R10W, Section 24) through Portage Lake in St. Joseph County and up Bear Creek a short distance (to T5S, R10W, Section 8) (Wesley and Duffy 1999).
** Some water bodies in Michigan are also regulated as cold water fisheries but none of these exist in this watershed.

3.6 Desired Uses and Stakeholder Concerns

Desired uses represent those uses of the watershed that may not be protected by law, but are of interest to local stakeholders. Desired uses (Table 8) and stakeholder concerns were derived from a review of existing materials, interviews with stakeholders, and other forms of stakeholder input such as informal surveys and conversations.

Table 8: Desired uses

Desired use	Source
Environmental education	Fishbeck, Thompson, Carr and Huber, Inc. 2001
Maintain commercial discharges	Fishbeck, Thompson, Carr and Huber, Inc. 2001
Protect wetlands	Fishbeck, Thompson, Carr and Huber, Inc. 2001, stakeholder interviews
Protect riparian corridors/floodplains	Stakeholder interviews
Protect wildlife corridors and breeding areas	Stakeholder interviews
Expanding existing protected open space	Stakeholder interviews
Explore natural rivers designation	Stakeholder input
Improve fishery	Stakeholder input
Expand recreational uses	Stakeholder input
Maintain water supply for agricultural and industrial uses	Stakeholder input
Protect wildlife habitat	Stakeholder input

Stakeholder concerns include goose waste runoff, *E. coli*, stormwater outfalls connected directly to lakes, too much natural debris in stream, streambank erosion, road-stream crossing erosion, unauthorized public access leading to trespassing and bank erosion, vandalism on private property where the river is accessible to the public, trash dumping, stormwater discharges, plat development and lack of collaboration between units of government.

Responses on a survey distributed to attendees at the April 2006 public meeting indicate that attendees rate water quality in the Portage River Watershed as fair or good. The top three pollution problems noted by attendees were faulty sewer and septic systems, livestock waste, and soil erosion and sedimentation from cropland.

3.7 Threats and Pollutants

Pollutants in the watershed were determined through a review of existing information about the watershed and interviews with stakeholders. Table 9 shows the designated uses in the watershed that are threatened, and the pollutants that are causing the threat. Pollutants are ranked in order of importance.

Table 9: Pollutants threatening designated uses

Designated use	Pollutant causing threat	Ranking
Navigation (threatened)	Sediment	1
	Hydrology	2
	Nutrients	3
Warmwater fishery (threatened)	Sediment	1
	Temperature	2
	Chemical pollutants	3
	Bacteria/pathogens*	4
	Nutrients	5
	Hydrology	6
Other indigenous aquatic life and wildlife (threatened)	Sediment	1
	Hydrology	2
	Temperature	3
	Chemical pollutants	4
	Nutrients	5
	Bacteria/pathogens	6
Partial body contact recreation (threatened)	Bacteria/pathogens	1
	Nutrients	2
Total body contact recreation (threatened)	Bacteria/pathogens	1
	Nutrients	2

* Largemouth bass virus

3.8 Sources and Causes of Pollution and Water Quality Impairments

Nonpoint source pollution is caused when rain, snowmelt, wind or gravity carries pollutants from the land surface and into nearby water bodies. Roads, parking lots, driveways, lawns, farms, storm sewers, and businesses can all potentially contribute to nonpoint source pollution.

Common forms of nonpoint source pollution include sediment, nutrients, temperature, bacteria/pathogens, chemical pollutants, and trash or debris.

Table 10 shows the pollutants that have been identified in the watershed, and their typical sources and causes.

Table 10: Pollutants, sources, and causes

Pollutant/Problem*	Sources*	Causes*
1. Sediment (K)	1. Streambank erosion (K)	1. Change in hydrology (channelization/ditching, e.g.) (S)
		2. Removal of streambank vegetation (S)
		3. Natural debris deflecting water into banks (K)
		4. Improper road-stream crossing design (S)
		5. Human access (K)
		6. Livestock access (S)
	2. Stormwater runoff (S)	1. Change in land use (increase in impervious surface causing higher volumes of runoff) (S)
		2. Lack of education or awareness (S)
		3. Poor storm water management practices (S)
		4. Lack of riparian buffers (S)
	3. Road-stream crossings (S)	1. Improper road-stream crossing design (S)
		2. Gravel road grading (S)
	4. Construction site runoff (S)	1. Lack of or improperly installed erosion control measures (S)
2. Nutrients (K)	1. Stormwater runoff (S)	1. Change in land use (increase in impervious surface causing higher volumes of runoff) (S)
		2. Lack of education or awareness (S)
		3. Poor storm water management practices (S)
		4. Lack of riparian buffers (S)
	2. Wildlife (geese) (K)	1. Lack of riparian buffers (S)
		2. Unrestricted access (S)
	3. Septic systems (S)	1. Poorly maintained, designed, or sited septic systems (S)
		2. Lack of education or awareness (S)
	4. Fertilizer use (S)	1. Improper application (S)
		2. Lack of education or awareness (S)
		3. Lack of riparian buffers (S)
	5. Livestock (S)	1. Unrestricted access (S)
		2. Livestock waste runoff (S)

Table 10, continued

Pollutant/Problem*	Sources*	Causes*
3. Bacteria/pathogens (K)	1. Wildlife (geese) (K)	1. Lack of riparian buffers (S)
		2. Unrestricted access (S)
	2. Septic systems (S)	1. Poorly maintained, designed, or sited septic systems (S)
		2. Lack of education or awareness (S)
	3. Stormwater runoff (S)	1. Change in land use (increase in impervious surface causing higher volumes of runoff) (S)
		2. Lack of education or awareness (S)
		3. Poor storm water management practices (S)
		4. Lack of riparian buffers (S)
	4. Livestock (S)	1. Unrestricted access (S)
		2. Livestock waste runoff (S)
4. Hydrology (low flow/low lake levels) (S)	1. Reduction of base flow (S)	1. Drought (S)
	2. Low groundwater levels (S)	1. Increased impervious surfaces (S)
	3.Water use (S)	1. Withdrawals (S)
5. Temperature (S)	1. Lack of riparian buffers (S)	1. Lack of education or awareness (S)
		2. Insufficient land use planning (S)
	2. Stormwater runoff (S)	1. Change in land use (increase in impervious surface causing higher volumes of runoff) (S)
		2. Lack of education or awareness (S)
		3. Poor storm water management practices (S)
		4. Lack of riparian buffers (S)
6. Chemical pollutants (oils, metals, pesticides, etc.) (S)	Stormwater runoff (S)	1. Change in land use (increase in impervious surface causing higher volumes of runoff) (S)
		2. Lack of education or awareness (S)
		3. Poor storm water management practices (S)
		4. Lack of riparian buffers (S)

** K = Known and S = Suspected*

4. Critical Areas

Critical areas are those portions of the watershed that have the most ability to influence water quality, either positively or negatively. These areas may be considered critical because they must be preserved so they can continue to have a positive impact on water quality (such as vegetated riparian zones or wetlands). Other critical areas are those with

potential to have a negative impact on water quality (such as high-density population areas). Critical areas were prioritized in the following manner:

- Critical Area 1 consists of a 30-meter (≈100 foot) corridor directly adjacent to the river corridor. This zone has a total area of approximately 8,107 acres.

- Critical Area 2 is a band of land 400-meters (≈¼ mile) wide beyond critical area 1. The area of this zone is approximately 81,687 acres.

- Critical Area 3 consists of the remaining land area of the watershed, approximately 35,745 acres.

Critical area 1 encompasses the portion of the watershed with the greatest potential for negative impact to water quality. Many of the greatest threats to our water quality are related to land-use practices directly adjacent to our water bodies. 30 meters (≈100 feet) was used as the width of this zone because that is a recommended width for riparian buffers to protect water quality (Fischer and Fischenich 2000). Critical area 2, while not having as great a potential impact on water quality as Critical area 1, is still close enough to surface water that water quality can be affected by activities in that area. A map of these critical areas is shown in Figure 11.

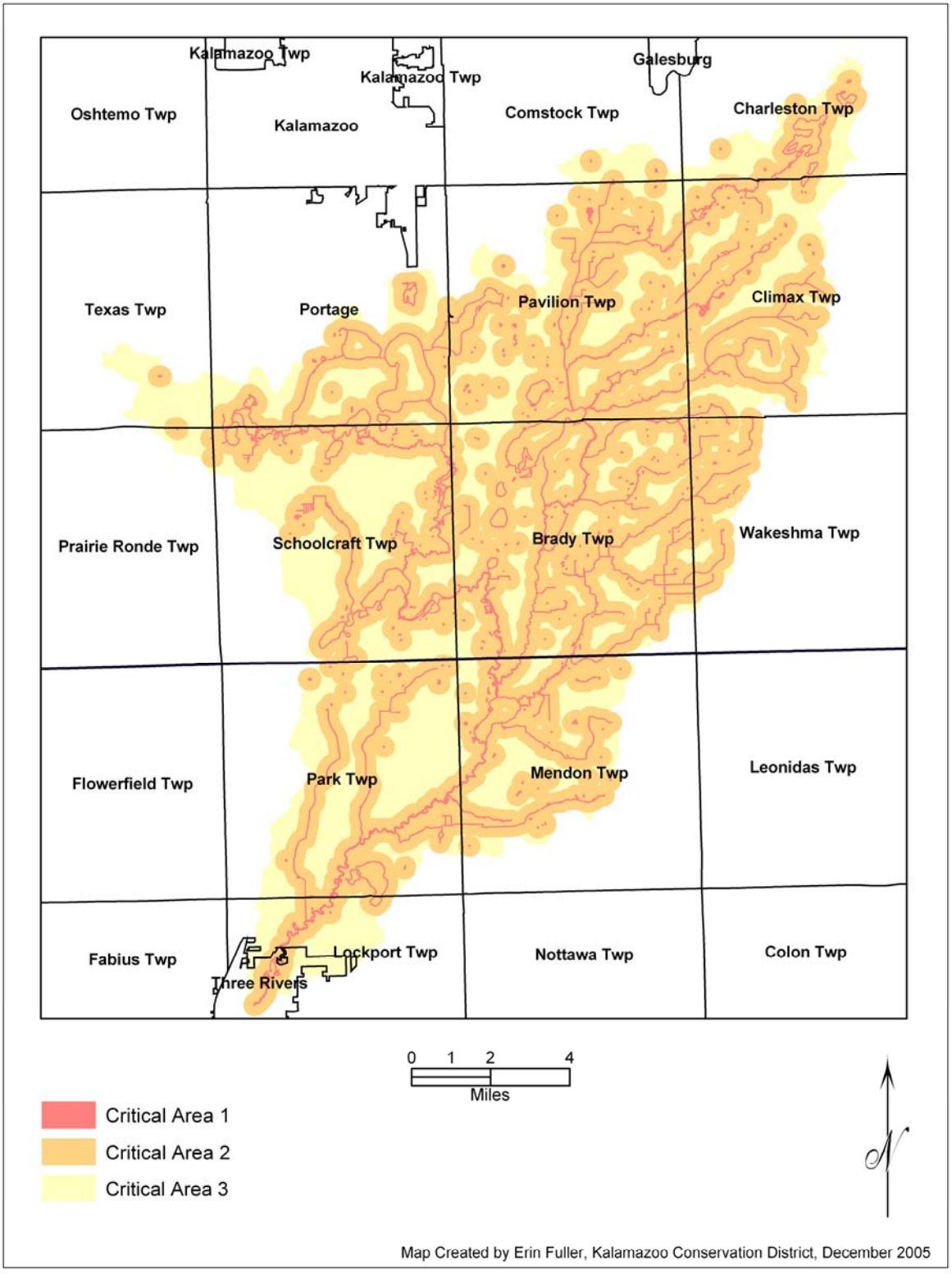


Figure 11: Critical areas

5. Goals, Objectives and Actions

A variety of goals and objectives for the Portage River Watershed were identified through steering committee meetings, stakeholder input, and a review of other watershed management plans in the area. These goals are meant to address the threatened designated uses in the watershed (navigation, warmwater fishery, other indigenous aquatic life and wildlife, partial body contact recreation and total body contact recreation). These goals and objectives are shown in Table 11.

Table 11: Goals and objectives

Goal	Objective
1. Improve and protect designated uses by reducing the amount of **sediment** entering the system	1A. Stabilize priority streambank erosion sites through the installation of corrective measures
	1B. Establish a road/stream crossing improvement program to correct identified problems
	1C. Work with landowners to limit or control direct livestock access to the river
	1D. Reduce construction site erosion
	1E. Prevent/reduce erosion from farm fields
	1F. Prevent/reduce sediment entering the river from storm drains
2. Improve and protect designated uses by reducing the amount of **nutrients** entering the system	2A. Reduce/prevent nutrients from agricultural practices from reaching surface water
	2B. Reduce/prevent nutrients from park and park-like areas from entering surface water
	2C. Reduce/prevent nutrient inputs from residential yards from entering the river
	2D. Prevent nutrients from failing septic systems from entering surface water

Table 11, continued

Goal	Objective
3. Improve and protect water quality by preventing or reducing the amount of **pesticides** entering surface water	3A. Reduce pesticides used in residential applications from reaching surface water
	3B. Reduce pesticides used in golf course applications that enter surface water
	3C. Reduce pesticides used in an agricultural setting that enter surface water
4. Improve or maintain current **hydrology** in order to protect water quality	4A. Perform flood plain management to prevent damaging effects of floods and preserve and enhance natural values and provide optimal use of land and water resources within the floodplain
	4B. Prevent land use changes that increase stream temperature
	4C. Reduce volume of water entering the system directly from storm drains
	4D. Preserve open space, protect identified sensitive areas and decrease impervious surfaces in order to limit runoff and land cover changes associated with increased development
5. Prevent **E. coli/ bacteria** from entering the system	5A. Reduce/prevent E Coli/bacteria from Park and park-like areas from entering surface water
	5B. Reduce/prevent E. Coli/bacteria from failing septic systems from entering surface water
	5C. Work with landowners to limit or control direct livestock access to the river
6. Reduce the amount of **oils, grease, etc**. reaching surface water	6A. Prevent oils, grease, etc. from urban areas from reaching surface water

Each objective has action items to be accomplished, and several of the actions suggested for each objective will work to address more than one goal. The actions are shown in Table 12. Specific commitments that have been made by the storm water permittees are shown in Appendix A. Further language clarifying these commitments is shown in Appendix B. Note that some actions have been committed to by none (or few) of the permittees, but have been left in this plan to indicate a need to address issues in the future.

Table 12: Objectives and actions

Objective	Actions	Time line*	Priority	Location	Coordinating agencies	Pollutants reduced or prevented	Evaluation	Costs
1A. Stabilize priority streambank erosion sites through the installation of corrective measures	Action 1. Encourage the use of structural Best Management Practices (BMPs) on streambanks to reduce the amount of sediment from entering the river**	L	Low	Critical area 1	Cities & villages, townships (twps.), conservation districts (CDs), Resource Conservation and Development (RC&D)	Sediment	Before & after photos	Staff time
	Action 2. Target riparian landowners with information regarding shoreline protection such as: streambank stabilization, critical area treatment, conservation easements, and Natural Resources Conservation Service programs***	S	High	Critical area 1	Twps., cities & villages, Natural Resources Conservation Service (NRCS), Michigan State University Extension (MSUE)	Sediment, Temperature	Track & report # of contacts made	Staff time, educational materials
1B. Establish a road/stream crossing improvement program to correct identified problems	Action 3. Improve monitoring of road-stream crossing integrity	S-L	Medium	Critical area 1	Counties, cities & villages	Sediment	Visual survey, before & after photos	Staff time
	Action 4. Prioritize and stabilize erosion at road/stream crossings	S-L	Medium	Critical area 1	Counties, cities & villages	Sediment	Before & after photos, document # of sites improved	Staff time
	Action 5. Provide education for road operation and governmental jurisdictions highlighting streambank stabilization techniques, sizing and placement of culverts	S	Medium	Critical area 1	Counties	Sediment	Track & report # of contacts made, before & after knowledge survey	Staff time, educational materials
1C. Work with landowners to limit or control direct livestock access to the river	Action 6. Encourage the implementation of structural BMPs at identified livestock access points**	L	Medium	Critical area 1	CDs, NRCS	Sediment, Nutrients, Bacteria/pathogens	Visual survey, document # of sites improved	Staff time

Objective	Actions	Time line	Priority	Location	Coordinating agencies	Pollutants reduced or prevented	Evaluation	Costs
1D. Reduce construction site erosion	Action 7. Offer or coordinate training for contractors in soil erosion control BMPs**	S	Medium	Critical area 1	Counties	Sediment	Track # of attendees, before & after knowledge survey	Staff time, educational materials
1E. Prevent/reduce erosion from farm fields	Action 8. Encourage participation in Natural Resources Conservation Service and Conservation District programs***	S	High	Critical areas 1, 2, 3	Twps., CDs, NRCS	Sediment, Nutrients	Track & report distribution of educational materials	Staff time
	Action 9. Promote tours demonstrating agricultural BMPs**	S-L	Low	Critical areas 1, 2, 3	Twps., CDs	Sediment, Nutrients	Before & after knowledge surveys, track # of attendees	Staff time
1F. Prevent/reduce sediment entering the river from storm drains	Action 10. Enact housekeeping BMPs that reduce sediment (street sweeping, e.g.)**	S	Medium	Critical areas 1, 2, 3	Counties, cities & villages, twps.	Sediment, Nutrients	Track & report BMPs enacted**	Staff time
	Action 11. Promote and coordinate storm water education programs in urban areas	S	High	Critical areas 1, 2, 3	Counties, cities & villages, twps.	All	Track and report # of contacts made	Staff time, educational materials
2A. Reduce/prevent nutrients from agricultural practices from reaching surface water	[Action 8]							
	[Action 9]							
2B. Reduce/prevent nutrients from park and park-like areas from entering surface water	Action 12. Work with landowners to reduce fertilizer, pet waste and goose waste runoff	S	High	Critical areas 1, 2, 3	Cities & villages, twps.	Nutrients, Bacteria/pathogens	Track & report # of contacts made	Staff time, educational materials
	Action 13. Work with golf courses to enroll in Michigan Turfgrass Environmental Stewardship Program	S-L	Low	Critical areas 1, 2, 3	Twps., MSUE	Nutrients, Chemical pollutants	Track # of golf courses contacted and enrolled	Staff time
2C. Reduce/prevent nutrient inputs from residential yards from entering the river	Action 14. Educate riparian property owners on buffer zones	S	High	Critical areas 1, 2	Counties, cities & villages, twps., MSUE	All	Track & report # of contacts made	Staff time, educational materials
	Action 15. Educate the public on neighborhood impacts on surface water (direct access via storm drains)	S	Medium	Critical areas 2, 3	Counties, cities & villages, twps., MSUE	All	Track & report # of contacts made	Staff time, educational materials

Objective	Actions	Time line	Priority	Location	Coordinating agencies	Pollutants reduced or prevented	Evaluation	Costs
2D. Prevent nutrients from failing septic systems from entering surface water	Action 16. Educate landowners with septic systems on how to maintain them	L	High	Critical areas 1, 2	Cities & villages, counties, Kalamazoo County Health & Community Services (KCHCS)	Nutrients, Bacteria/pathogens	Track & report # of contacts made	Staff time, educational materials
	Action 17. Review existing septic system management	L	Medium	Critical areas 1, 2, 3	KCHCS	Nutrients, Bacteria/pathogens	Report findings	Staff time
3A. Reduce pesticides used in residential applications from reaching surface water	Action 18. Promote household hazardous waste collection in the watershed	S	High	Critical areas 1, 2, 3	Counties, cities & villages, twps.	Chemical pollutants	Track & report distribution of educational materials	Staff time, educational materials
	Action 19. Promote integrated pest management and the safe use of pesticides	S-L	Low	Critical areas 1, 2, 3	Twps., CDs, NRCS	Chemical pollutants	Track & report distribution of educational materials	Staff time, educational materials
3B. Reduce pesticides used in golf course applications that enter surface water	[Action 13]							
3C. Reduce pesticides used in an agricultural setting that enter surface water	Action 20. Promote programs to agricultural producers in the watershed such as Farm*A*Syst and the Michigan Agricultural Environmental Assurance Program (MAEAP)	S-L	High	Critical areas 1, 2, 3	Twps., Conservation Districts, NRCS, MSUE	Chemical pollutants, Nutrients, Sediments, Bacteria/pathogens	Track & report # of contacts made, track # of participants	Staff time
4A. Perform flood plain management to prevent damaging effects of floods and preserve and enhance natural values and provide optimal use of land and water resources within the floodplain	Action 21. Reduce and delay runoff from parking lots and residential development through programs that promote installation of BMPs in urban areas**	S-L	Medium	Critical areas 1, 2, 3	Twps., cities & villages	All	Track & report # of BMPs installed**	Staff time
	Action 22. Review floodplain impacts in site plan review process	S	Medium	Critical area 1	Counties, cities & villages, twps.	Hydrology	Report findings	Staff time
4B. Prevent land use changes that increase stream temperature	[Action 2]							
	[Action 14]							
	[Action 15]							

Objective	Actions	Time line	Priority	Location	Coordinating agencies	Pollutants reduced or prevented	Evaluation	Costs
4C. Reduce volume of water entering the system directly from storm drains	Action 23. Encourage on-site retention, detention, and infiltration	S	Medium	Critical areas 1, 2	Counties, cities & villages, twps.	All	Track & report results	Staff time, educational materials
	[Action 11]							
4D. Preserve open space, protect identified sensitive areas and decrease impervious surfaces in order to limit runoff and land cover changes associated with increased development	Action 24. Review or improve stormwater management practices and/or ordinances	S-L	Medium	Critical areas 1, 2, 3	Counties, cities & villages, twps.	All	Report findings	Staff time
	Action 25. Encourage municipalities to develop Natural Resources Inventories and perform land use policy evaluations	S-L	Low	Critical areas 1, 2, 3	Cities & villages, twps., RC&D, NRCS, CDs	All	Track & report # of municipalities participating	Staff time
	Action 26. Promote land protection programs for sensitive areas	L	Low	Critical areas 1, 2	Twps., cities & villages	All	Track acreage enrolled in protection programs	Staff time, educational materials
	Action 27. Work with municipalities to implement Low Impact Development (LID) techniques	S-L	Medium	Critical areas 1, 2	Counties, cities & villages, twps.	All	Track & report LID techniques adopted	Staff time, educational materials
	Action 28. Encourage wetland restoration and preservation through education	S-L	High	Critical areas 1, 2, 3	Counties, twps., CDs, NRCS	All	Track # of contacts made	Staff time, educational materials
	Action 29. Promote a Purchase of Development Rights program or similar programs in each township****	L	Low	Critical areas 1, 2, 3	Twps., CDs, MSUE, Farm Bureau	All	Track & report programs adopted	Staff time, educational materials
5A. Reduce/prevent E Coli/bacteria from Park and park-like areas from entering surface water	[Action 12]							
5B. Reduce/prevent E. Coli/bacteria from failing septic systems from entering surface water	[Action 16]							
	[Action 17]							
5C. Work with landowners to limit or control direct livestock access to the river	[Action 6]							
6A. Prevent oils, grease, etc. from urban areas from reaching surface water	[Action 11]							
	[Action 18]							
	[Action 21]							

* S = Short-term (within 5 years), L = Long-term (after 5 years)

** Best Management Practices are described in a document entitled *Guidebook of Best Management Practices for Michigan Watersheds* (MDEQ 1998b)

*** NRCS programs that can provide technical and cost-share assistance to landowners in the watershed include: Conservation Reserve Program, Continuous Conservation Reserve Program, Wetland Reserve Program, Environmental Quality Incentive Program, and the Wildlife Habitat Incentive Program.

**** Potential open space protection programs include Farmland Development Rights Agreements (PA 116) and local open space easements.

6. Recommendations for Implementation

Ultimately, this watershed management planning process should help people better understand their impact on water quality. This watershed is rich in lakes and wetland habitat, and every effort should be made to protect and preserve these habitats. The problems that exist in this watershed are primarily not ones that can be fixed with "band-aid" Best Management Practices (BMPs), so BMPs are not a focus of this plan. Emphasis should instead be given to preventing future problems through tools such as education and land use planning.

6.1 Information and Education

Many water quality concerns are traceable to a lack of understanding about nonpoint source pollutions, and can best be addressed through long-term information and education programs. Thus many of the actions proposed in this plan rely on coordination and collaboration on existing or future water quality education initiatives.

7. Evaluation

7.1 Evaluation of Planning Phase

The planning phase of this watershed management process has been extremely abbreviated. For this reason, stakeholder input has been reduced. However, since watershed management planning is an iterative process, more stakeholder input will be gathered and included in future iterations of this plan.

Stakeholders included in the Michigan Municipal Separate Storm Sewer System (MS4) Permit Revised Public Participation Process Plan (November 2004) were contacted via letter and invited to participate in the watershed planning process. Attendees at watershed Steering Committee meetings included representatives from Brady, Pavilion, and Schoolcraft Townships, City of Portage, Kalamazoo County, Kalamazoo County Road Commission, Kalamazoo County Drain Commission, Michigan State University Extension, Kalamazoo County Health and Community Services Environmental Health Bureau, Friends of the St. Joe River, Michigan Department of Transportation, Portage Environmental Board, West Lake Improvement Association, Gourdneck Lake Association, Prein & Newhof, Kalamazoo Conservation District, Vicksburg Community Schools, and the Michigan Department of Environmental Quality.

In addition, several stakeholders have been interviewed individually to gather information about the watershed. Interviewees have included representatives of the St. Joseph Conservation District, the Southwest Michigan Land Conservancy, the Kalamazoo County Health and Community Services Environmental Health Bureau, Pavilion Township and Schoolcraft Township. More stakeholders will be interviewed in the future.

A public meeting was held in April 2006 to present a draft of this plan to the public. Feedback gathered at the meeting has been added to this plan. Over 25 people attended the meeting, including residents, farmers, and representatives from Brady Township, Connecting Lakes Preservation Coalition, Friends of Scotts Mill Park, Indian Lake Association, Kalamazoo Chamber of Commerce, Kalamazoo Conservation District, Kalamazoo County Health and

Community Services, Kalamazoo County Road Commission, Michigan Department of Environmental Quality, Pavilion Township, Vicksburg Community Schools, and the Village of Vicksburg.

7.2 Evaluation of Implementation Phase

As this plan is implemented, a variety of benefits to water quality can be expected. Tangible evidence of water quality improvements include: reduced algae blooms in inland lakes, improved fishery, reduced beach advisories for *E. coli*, and reduced counts of bacterial colonies reported by the Kalamazoo County Health and Community Services Environmental Health Bureau in their Surface Water Quality Monitoring Program.

Evaluation methods for on-site improvements may include photographic documentation and visual surveys. The progress of the Information and Education (I & E) campaign can be gauged through knowledge surveys, follow-up surveys (to determine if a change in practice has occurred), tracking production and distribution of I & E materials, and tracking attendance at meetings, workshops, and training sessions. Risk reductions implemented through the Michigan Groundwater Stewardship Program can be tracked, as can the number of farms verified through the Michigan Agriculture Environmental Assurance Program.

Additional evaluation of water quality improvements can be made through the periodic surface water quality monitoring performed by the Michigan Department of Environmental Quality in accordance with its reporting requirements under Section 303 (d) and 305 (b) of the federal Water Pollution Control Act. This information will be supplemented with specific sub-basin monitoring requirements that may be established for a particular water resource, in accordance with an EPA approved plan for Total Maximum Daily Load (TMDL) as provided for in the federal Act. Comprehensive water quality monitoring and assessment programs are completed through the following programs:

- MDEQ/SWAS water quality monitoring
- MDEQ/SWAS fish communities evaluation
- MDEQ/SWAS macroinvertebrate communities evaluation
- MDEQ/SWAS habitat evaluation of embeddedness and bottom deposition
- USGS/MDEQ stream flow monitoring and gageing

In particular, the pollutants that should be most carefully monitored in this watershed are sediment, nutrients, and *E. coli.* Target areas for these should include areas of concern that may arise from the Kalamazoo County Health and Community Services Environmental Health Bureau Surface Water Quality Monitoring Program and Michigan Department of Environmental Quality water quality monitoring.

7.3 Pollutants Reduced

It is hoped that with the implementation of this management plan, all of the pollutants affecting the Portage River Watershed will be reduced at least to some extent. The pollutants that have the greatest impact on water quality in the watershed (sediment and nutrients) will have the greatest reductions.

Many of the pollutant reductions are difficult, if not impossible, to measure. For example, improvements brought about by changes in land use are difficult to quantify, but will have a long-term impact on water quality. Other measures (such as wetland protection) do not necessarily reduce pollutants, but prevent water quality degradation in the future.

8. Sustainability

A watershed management plan is designed to be a flexible document. This plan should be regularly reviewed and updated to ensure that the plan will continue to be useful as conditions in the watershed change.

A major concern of any watershed stakeholder is that of the economics of watershed protection. However, a variety of studies have shown that despite the investment of time and resources required in watershed protection efforts, there can be an overall net gain in terms of improved water quality, increased recreational outlets, higher quality of life, and even an increase in property values (Schueler 2000). In addition, a variety of grant programs are available to provide at least some of the funding necessary to undertake the proposed actions.

It should be noted that many municipalities lack the staff, resources, and expertise to fully commit to all of the actions outlined in this plan. Thus, partnerships between municipalities and with outside organization will be crucial to the effective implementation of this plan.

8.1 Procedures for Plan Revision

Triggers for revising this watershed management plan include:

1) Significant changes in existing water quality as discovered by monitoring efforts described in section 7.2
2) Completion of actions described in Appendix A of this document
3) Discovery of significant new information relevant to this plan
4) Identification of new actions that permittees may use to achieve the goals of the plan

The plan shall be reviewed and updated every two years. Alternatively, a written notification may be submitted to the Michigan Department of Environmental Quality with a short explanation if no revisions are necessary. The first review and revision will occur by December 31, 2007.

8.2 Other Projects and Programs

A variety of agencies have the potential to contribute to the effective implementation of this watershed management plan. These include the Natural Resources Conservation Service, the Michigan Department of Natural Resources, the St. Joseph Conservation District, the Kalamazoo Conservation District, Michigan State University Extension, and the Kalamazoo County Health and Community Services Environmental Health Bureau.

The St. Joseph River Watershed (which includes the Portage River Watershed) is a designated Conservation Security Program (CSP) area with agricultural landowners receiving financial incentives for superior conservation and stewardship practices. The St. Joseph River Watershed was one of 22 watersheds in the United States to be included by the USDA in its first year, 2004. Only producers who employ sound land stewardship practices are eligible to participate. The

voluntary, incentive-based program rewards producers for their accomplishments over a period of time from 5 to 10 years, thus contributing to sustainable agriculture in the watershed. Highest payments are received by producers meeting all water and soil resource concerns on their entire operation.

The Michigan Groundwater Stewardship Program and the Michigan Agriculture Environmental Assurance Program (MAEAP) assess farmstead systems and help agricultural producers address groundwater and surface water risks they may have on their operation. Through the Conservation Districts, landowners receive free confidential evaluations and technical assistance to implement risk reductions.

The St. Joseph River Watershed, of which the Portage River Watershed is a subwatershed, is the subject of a recent watershed management plan (DeGraves 2005). Presumably, some actions will be taken to implement that plan, which will have implications for the Portage River Watershed. Collaboration between these two watershed projects should be encouraged.

Kalamazoo County operates a Household Hazardous Waste collection site for disposal of waste such as oil-based paints, pesticides, herbicides, motor oil, mercury and more. The Michigan State University Extension office in St. Joseph County also operates Household Hazardous Waste collections by appointment. Watershed residents should be educated about these opportunities.

Several communities in the watershed are participating in Michigan's Wellhead Protection Program, including the City of Portage, the City of Three Rivers, and the Village of Vicksburg. Though this program is designed to protect groundwater, many of the activities undertaken to protect that resource will also help protect surface water resources. In addition, Texas Township has been designated as a Groundwater Guardian by The Groundwater Foundation. This program supports and recognizes the achievements of communities in their efforts to enhance groundwater awareness and protection activities.

The surface water monitoring program conducted by the Kalamazoo County Health and Community Services Department will continue to assess water quality in the watershed, as well as identify and track water quality trends. This is an excellent community resource, and may be used to assess the effectiveness of the implementation of this watershed management plan.

There are a wide variety of grant programs that may also be tapped by local communities and organizations to support water quality protection efforts. This watershed management plan will provide background and support for potential grant application efforts. Specific grants that may be used to help implement the watershed management plan are listed in Appendix C.

8.3 Long Term Project Goals

Certainly the overarching goal of this watershed management plan in to improve and protect water quality in the Portage River Watershed. This is best approached holistically, rather than relying on short-term or temporary solutions. Thus, the emphasis of this plan is on education and institutionalizing watershed protection efforts. Additionally, many of the objectives in this plan can be achieved through coordination and cooperation with ongoing programs in the watershed.

This plan should assist municipalities and other groups interested in protecting the Portage River Watershed in leveraging funding for local projects.

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10. Glossary of Acronyms

BMP – Best Management Practice
CD – Conservation District
KCHCS – Kalamazoo County Health and Community Services
LID – Low Impact Development
MAEAP – Michigan Agriculture Environmental Assurance Program
MDEQ – Michigan Department of Environmental Quality
MDNR – Michigan Department of Natural Resources
MSUE – Michigan State University Extension
NRCS – Natural Resources Conservation Service
RC&D – Resource Conservation & Development (a program administered by the Natural Resources Conservation Service)

Appendix A: Permittee Commitments

Permittee Commitments

Key: O = Ongoing commitment
S = Short term (within 5 years)
L = Long term (after 5 years)
WL = Wish list
CS = County standards applied
NA = Not applicable

Action	Kalamazoo County	Kalamazoo Co. Drain Commission	Kalamazoo Co. Road Commission	Brady Twp.	Comstock Twp.	Pavilion Twp.	Schoolcraft Twp.	Texas Twp.	Village of Vicksburg	City of Portage
Action 1. Encourage the use of structural Best Management Practices (BMPs) on streambanks to reduce the amount of sediment from entering the river	NA	O	NA	O	NA	NA	O	L	O	O
Action 2. Target riparian landowners with information regarding shoreline protection such as: streambank stabilization, critical area treatment, conservation easements, and Natural Resources Conservation Service programs	NA	S	NA	O	S	O	S	S	S	S
Action 3. Improve monitoring of road-stream crossing integrity	NA	NA	S	CS	CS	NA	NA	CS	O	O*
Action 4. Prioritize and stabilize erosion at road/stream crossings	NA	CS	S	O	CS	NA	NA	CS	O	L
Action 5. Provide education for road operation and governmental jurisdictions highlighting streambank stabilization techniques, sizing and placement of culverts	NA	O	S	CS	NA	NA	NA	NA	O	NA
Action 6. Encourage the implementation of structural BMPs at identified livestock access points**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Action 7. Offer training to contractors in soil erosion control BMPs	O	S	S	CS	NA	NA	NA	NA	CS	NA
Action 8. Encourage participation in Natural Resources Conservation Service and Conservation District programs	O	NA	NA	CS	O	O	O	O	L	NA
Action 9. Promote tours demonstrating agricultural BMPs	O	NA	NA	O	WL	L	WL	O	NA	NA
Action 10. Enact housekeeping BMPs that reduce sediment (street sweeping, e.g.)	O	NA	O	O	O	O	O	O	O	O
Action 11. Promote and coordinate storm water education programs in urban areas	S	O	S	O	S	S	O	O	S	O
Action 12. Work with landowners to reduce fertilizer, pet waste, and goose waste runoff	O	NA	NA	O	S	S	S	S	S	L***
Action 13. Work with golf courses to enroll in Michigan Turfgrass Environmental Stewardship Program	WL	NA	NA	NA	L	L	S	NA	S	NA
Action 14. Educate riparian property owners on buffer zones	NA	S	S	O	S	S	S	S	S	O

Action	Kalamazoo County	Kalamazoo Co. Drain Commission	Kalamazoo Co. Road Commission	Brady Twp.	Comstock Twp.	Pavilion Twp.	Schoolcraft Twp.	Texas Twp.	Village of Vicksburg	City of Portage
Action 15. Educate the public on neighborhood impacts on surface water (direct access via storm drains)	O	O	S	NA	S	S	S	O	S	O
Action 16. Educate landowners with septic systems on how to maintain them	O	CS	NA	CS	CS	CS	NA	CS	S	S
Action 17. Review existing septic system management	O	NA	NA	CS	CS	CS	CS	CS	CS	CS
Action 18. Promote household hazardous waste collection in the watershed	O	NA	S	O	O	O	O	O	O	O
Action 19. Promote integrated pest management and the safe use of pesticides	O	NA	NA	S	S	S	S	S	S	S****
Action 20. Promote programs to agricultural producers in the watershed such as Farm*A*Syst and the Michigan Agricultural Environmental Assurance Program (MAEAP)	O	NA	NA	WL	NA	S	NA	NA	NA	NA
Action 21. Reduce and delay runoff from parking lots and residential development through programs that promote installation of BMPs in urban areas	O	NA	WL	S	L	S	S	S	O	O
Action 22. Review floodplain impacts in site plan review process*****	NA	L	S	S	O	NA	NA	NA	O	O
Action 23. Encourage on-site retention, detention, and infiltration	O	O	O	S	O	CS	O	O	O	O
Action 24. Review or improve stormwater management practices and/or ordinances	O	S	L	L	O	S	O	O	S	NA
Action 25. Encourage municipalities to develop Natural Resources Inventories and perform land use policy evaluations	S	WL	NA	O	WL	WL	S	WL	O	O
Action 26. Promote land protection programs for sensitive areas	NA	WL	WL	L	O	L	O	WL	L	L
Action 27. Work with municipalities to implement Low Impact Development (LID) techniques	NA	NA	L	O	O	S	S	S	O	NA
Action 28. Encourage wetland restoration and preservation through education	NA	O	L	L	L	S	O	NA	O	NA
Action 29. Promote a Purchase of Development Rights program or similar programs in each township	NA	NA	NA	L	NA	L	L	NA	WL	NA

Permittee Commitments

* The City of Portage is committed to maintaining the road itself, but not culverts or bridges (see Appendix D for further explanation).

** Though some actions have not been committed to by any of the permittees in this plan, they have been left in the list of actions to indicate a potential need to develop partnerships with coordinating agencies that may help complete these tasks. See Table 12 for a list of coordinating agencies.

*** The City of Portage is committed to this action with the exception of reducing goose waste runoff.

**** The City of Portage is committed to this action with the exception of promoting integrated pest management.

***** The Village of Vicksburg, and Brady, Pavilion, Schoolcraft and Texas Townships have no mapped 100-year floodplains (though a new FEMA mapping initiative may remedy this). See individual Storm Water Pollution Prevention Initiative documents for further explanation.

Appendix B: Action Clarifications

Portage River WMP: Action Clarifications

Objective	Actions	Clarification
1A. Stabilize priority streambank erosion sites through the installation of corrective measures	Action 1. Encourage the use of structural Best Management Practices (BMPs) on streambanks to reduce the amount of sediment from entering the river*	Best Management Practices are structural, vegetative or managerial measures used to prevent, control or treat pollution of surface or ground water. BMPs for streambank stabilization are described in the "Managerial Practices" section of the Michigan Department of Environmental Quality's *Guidebook of Best Management Practices for Michigan Watersheds* (available at http://www.deq.state.mi.us/documents/deq-swq-nps-WholeGuidebook.pdf). Potential BMPs include riprap (a permanent cover of rock used to stabilize streambanks) and soil bioengineering (using vegetation to stabilize a site).
	Action 2. Target riparian landowners with information regarding shoreline protection such as: streambank stabilization, critical area treatment, conservation easements, and Natural Resources Conservation Service programs**	Existing educational materials can be distributed to riparian landowners via direct mail, door-to-door visits, websites, or newsletter/newspaper articles.
1B. Establish a road/stream crossing improvement program to correct identified problems	Action 3. Improve monitoring of road-stream crossing integrity	Road-stream crossings are points at which roads cross streams, requiring a bridge or culvert. Improper design of bridges or culverts can cause streambank erosion. For example, undersized culverts can increase the velocity of the water flowing through them, leading to erosion on the downstream side and impeding fish passage. Improved monitoring will help identify problem sites.
	Action 4. Prioritize and stabilize erosion at road/stream crossings	Road-stream crossings will be prioritized to identify the sites with the highest amounts of erosion. This will allow road jurisdictions to allocate resources to the sites contributing the most sediment to the system.
	Action 5. Provide education for road operation and governmental jurisdictions highlighting streambank stabilization techniques, sizing and placement of culverts	Training can be provided to road jurisdictions on how to properly design culverts and bridges to eliminate any pollution concerns.
1C. Work with landowners to limit or control direct livestock access to the river	Action 6. Encourage the implementation of structural BMPs at identified livestock access points*	Direct livestock access to streams can create streambank erosion, and is a potential source of nutrients and bacteria. NRCS can provide cost-share assistance to livestock producers to install structures to control livestock access points (such as fencing)
1D. Reduce construction site erosion	Action 7. Offer or coordinate training for contractors in soil erosion control BMPs*	Soil erosion control BMPs on construction sites consist of techniques to remove sediment from stormwater before it leaves the site (such as dewatering, filters, and sediment basins). BMPs for sediment control are described in the "Sedimentation Control Structures" section of the Michigan Department of Environmental Quality's *Guidebook of Best Management Practices for Michigan Watersheds* (available at http://www.deq.state.mi.us/documents/deq-swq-nps-WholeGuidebook.pdf).
1E. Prevent/reduce erosion from farm fields	Action 8. Encourage participation in Natural Resources Conservation Service and Conservation District programs**	These agencies offer a variety of programs (most targeted towards agricultural producers) to improve environmental stewardship. These programs offer cost share and/or technical assistance to producers, and include the Environmental Quality Incentives Program (EQIP), Conservation Reserve Program (CRP), Wetlands Reserve Program (WRP), Wildlife Habitat Incentives Program (WHIP), Michigan Agriculture Environmental Assurance Program (MAEAP), and Farm*A*Syst.
	Action 9. Promote tours demonstrating agricultural BMPs*	Organizations such as Conservation Districts, Michigan State University Extension, and Farm Bureau offer tours, workshops and field days highlighting agricultural BMPs (such as buffer/filter strips).

Portage River WMP: Action Clarifications

Objective	Actions	Clarification
1F. Prevent/reduce sediment entering the river from storm drains	Action 10. Enact housekeeping BMPs that reduce sediment (street sweeping, e.g.)*	Housekeeping BMPs are described in the Michigan Department of Environmental Quality's *Guidebook of Best Management Practices for Michigan Watersheds* (available at http://www.deq.state.mi.us/documents/deq-swq-nps-WholeGuidebook.pdf). Regular street sweeping can remove 50%-90% of pollutants (such as sediment, nutrients, de-icing chemicals, and vehicular pollutants) that could enter stormwater.
	Action 11. Promote and coordinate storm water education programs in urban areas	Potential educational programs include marking storm drains and distributing educational brochures and door hangers.
2A. Reduce/prevent nutrients from agricultural practices from reaching surface water	[Action 8]	
	[Action 9]	
2B. Reduce/prevent nutrients from park and park-like areas from entering surface water	Action 12. Work with landowners to reduce fertilizer, pet waste and goose waste runoff	Landowners can be educated on these topics through signage, newsletter/newspaper articles, direct mailings, and workshops.
	Action 13. Work with golf courses to enroll in Michigan Turfgrass Environmental Stewardship Program	This program (www.mtesp.org) aims to reduce potential impacts of golf course turf management, improve pollution prevention, and improve the overall environmental stewardship of golf courses.
2C. Reduce/prevent nutrient inputs from residential yards from entering the river	Action 14. Educate riparian property owners on buffer zones	Riparian buffers (strips of grasses, shrubs, and or trees) filter polluted runoff before it reaches a waterway. Property owners can be educated through workshops, brochures, newsletter/newspaper articles and other educational materials on the benefits of riparian buffers.
	Action 15. Educate the public on neighborhood impacts on surface water (direct access via storm drains)	Non-riparian landowners can be educated on how their actions can impact surface water quality through brochures and other education materials. Topics may include vehicle maintenance, stormwater runoff, pet waste pickup, etc.
2D. Prevent nutrients from failing septic systems from entering surface water	Action 16. Educate landowners with septic systems on how to maintain them	Brochures and other educational materials can be targeted to landowners with septic systems. Educational materials regarding septic system maintenance already exist (e.g.: Environmental Protection Agency. 2002. A Homeowner's Guide to Septic Systems. EPA-832B-02-005)
	Action 17. Review existing septic system management	Municipalities can review ordinances and county standards on how septic systems are maintained to determine if existing controls are adequate
3A. Reduce pesticides used in residential applications from reaching surface water	Action 18. Promote household hazardous waste collection in the watershed	Existing household hazardous waste collections (through Kalamazoo County and Michigan State University Extension of St. Joseph County) can be promoted throughout the watershed via websites, newsletter/newspaper articles, etc.
	Action 19. Promote integrated pest management (IPM) and the safe use of pesticides	Existing IPM and pesticide management programs (such as through MSUE, Conservation Districts, Farm Bureau, and NRCS) can be promoted throughout the watershed.
3B. Reduce pesticides used in golf course applications that enter surface water	[Action 13]	

Portage River WMP: Action Clarifications

Objective	Actions	Clarification
3C. Reduce pesticides used in an agricultural setting that enter surface water	Action 20. Promote programs to agricultural producers in the watershed such as Farm*A*Syst and the Michigan Agricultural Environmental Assurance Program	These programs can be promoted to agricultural producers in the watershed through press releases, newsletter/newspaper articles, direct mailings, etc.
4A. Perform flood plain management to prevent damaging effects of floods and preserve and enhance natural values and provide optimal use of land and water resources within the floodplain	Action 21. Reduce and delay runoff from parking lots and residential development through programs that promote installation of BMPs in urban areas*	Municipalities can review stormwater management policies to ensure that appropriate stormwater BMPs are installed in new developments. Some areas could be targeted to retrofit existing parking lots or developments with BMPs to reduce stormwater impacts.
	Action 22. Review floodplain impacts in site plan review process	The impacts of development within a floodplain should be reviewed during the site plan review process
4B. Prevent land use changes that increase stream temperature	[Action 2]	
	[Action 14]	
	[Action 15]	
4C. Reduce volume of water entering the system directly from storm drains	Action 23. Encourage on-site retention, detention, and infiltration	Developers can be encouraged to retain stormwater onsite through retention, detention and infiltration. BMPs to address this are described in the "Runoff Storage" section of the Michigan Department of Environmental Quality's *Guidebook of Best Management Practices for Michigan Watersheds*
	[Action 11]	
4D. Preserve open space, protect identified sensitive areas and decrease impervious surfaces in order to limit runoff and land cover changes associated with increased development	Action 24. Review or improve stormwater management practices and/or ordinances	Existing stormwater ordinances and practices should reviewed and improved as needed (education on stormwater practices is available at the Stormwater Manager's Resource Center: www.stormwatercenter.net)
	Action 25. Encourage municipalities to develop Natural Resources Inventories (NRI) and perform land use policy evaluations	NRIs and land use policy evaluations will help municipalities identify and devise methods of protecting areas that are valuable to water quality (see, for example, McKenna Associates, Inc. 2001 NRI for Pavilion Township).
	Action 26. Promote land protection programs for sensitive areas	Protection for sensitive areas can be pursued through private non-profit land trusts (The Nature Conservancy, Southwest Michigan Land Conservancy), municipalities, or other non-profit organizations.
	Action 27. Work with municipalities to implement Low Impact Development (LID) techniques	LID design techniques are based on controlling stormwater at its source and maintaining a natural hydrologic regime on a developed site (on-site stormwater treatment is encouraged over directing stormwater off-site). Techniques include permeable pavement to promote rainwater infiltration, vegetated roofs ("green roofs") to decrease roof runoff, bioretention, and more (for more information, see http://www.epa.gov/owow/nps/lid/).
	Action 28. Encourage wetland restoration and preservation through education	Wetlands provide a variety of benefits to water quality, from filtering pollutants to mitigating flood effects. Any protection of existing wetlands or the re-creation of lost wetlands will benefit water quality in the watershed. Watershed residents can be educated on this topic through newsletter/newspaper articles, websites, or direct mailings.
	Action 29. Promote a Purchase of Development Rights program or similar programs in each township***	Purchase of Development Rights (PDR), Farmland Development Rights Agreements (PA 116), and local open space agreements are designed to maintain open space (including agricultural land uses). Land enrolled in these programs can be used to provide areas that promote infiltration of rainwater, reducing stormwater runoff. These programs can be promoted through newsletter/newspaper articles websites, and direct mailings.

Portage River WMP: Action Clarifications

Objective	Actions	Clarification
5A. Reduce/prevent E Coli/bacteria from Park and park-like areas from entering surface water	[Action 12]	
5B. Reduce/prevent E. Coli/bacteria from failing septic systems from entering surface water	[Action 16]	
	[Action 17]	
5C. Work with landowners to limit or control direct livestock access to the river	[Action 6]	
6A. Prevent oils, grease, etc. from urban areas from reaching surface water	[Action 11]	
	[Action 18]	
	[Action 21]	

* Best Management Practices are described in a document entitled *Guidebook of Best Management Practices for Michigan Watersheds* (MDEQ 1998b)

** NRCS programs that can provide technical and cost-share assistance to landowners in the watershed include: Conservation Reserve Program, Continuous Conservation Reserve Program, Wetland Reserve Program, Environmental Quality Incentive Program, and the Wildlife Habitat Incentive Program.

*** Potential open space protection programs include Farmland Development Rights Agreements (PA 116) and local open space easements

Appendix C: Grants

This is not an exhaustive list of grant opportunities, but it should provide some guidance on grants that may help implement this watershed management plan. This list was current as of the first quarter of 2006, and though some of these grant opportunities will have expired, the same grants may be available in subsequent years.

Grant name	**BEACH (Beaches Environmental Assessment and Coastal Health) Act Grants**
Granting agency/organization	Environmental Protection Agency
Who may apply	States, territories, tribes, local governments
Grant amounts	Total available (FY06): $9,853,100 (in Michigan: $278, 450)
For more information	http://www.epa.gov/waterscience/beaches/grants
Description	Supports program development and implementation of microbiological monitoring of coastal recreation waters (including the Great Lakes).
Application Deadline	April 11, 2006
Local match requirement	None

Grant name	**Grants for conducting, conferences, workshops, and/or meetings**
Granting agency/organization	Environmental Protection Agency
Who may apply	States, tribes, public and private universities and colleges, hospitals, laboratories, local governments, other public or private nonprofit institutions
Grant amounts	Total available: $750,000 (anticipate awarding approximately 25 grants)
For more information	http://www.epa.gov/ord/grants_funding/pdfs/BAA_conferences_011806.pdf
Description	Planning, arranging, administering, and conducting of conferences in the areas of protecting human health and safeguarding the natural environment; advancing the scientific and technical research that promotes environmental protection; exploring current and emerging issues of importance to environmental protection; and/or encouraging collaboration among the nation's best scientists and engineers
Application Deadline	No later than 3 months before the conference/meeting is to be held, no later than January 18, 2007
Local match requirement	None

Grant name	Great Lakes Ecosystem Health
Granting agency/organization	Great Lakes Protection Fund
Who may apply	Anyone. Most funded projects are partnerships.
Grant amounts	
For more information	www.glpf.org/application/index.html
Description	Projects that enhance the health of the Great Lakes ecosystem and that will return the greatest ecosystem benefits.
Application Deadline	Pre-proposals accepted at any time
Local match requirement	None

Grant name	Nonpoint Source Request for Proposals (Clean Michigan Initiative [CMI] and Section 319 grants)
Granting agency/organization	MDEQ
Who may apply	Local units of government, non-profit entities
Grant amounts	Total available (FY06): $5.7 million ($2.6 million from section 319 and $3.1 from CMI)
For more information	www.deq.state.mi.us/documents/deq-ess-nps-fy06-rfp.doc
Description	Watershed management plan development; projects implementing elements of approved watershed management plans which control nonpoint sources of pollution; projects implementing water quality elements contained in plans developed under a WS-based municipal storm water permit (Voluntary Storm Water Permit0
Application Deadline	March 9, 2006
Local match requirement	Planning: 10%; Implementation 25%

Grant name	Michigan Volunteer River, Stream and Creek Cleanup Grants
Granting agency/organization	Great Lakes Commission, Michigan Department of Environmental Quality
Who may apply	Local units of government
Grant amounts	Total available (FY 07): $33,758
For more information	http://www.glc.org/streamclean/app07
Description	Help implement cleanup of trash and debris within or along the banks of rivers, streams and creeks. Local units of government may partner with non-profits.
Application Deadline	January 29,2007
Local match requirement	25%

Grant name	Aquatic Invasive Species (AIS) Information and Education Small Grants Program
Granting agency/organization	Michigan Department of Environmental Quality, Great Lakes Protection Fund
Who may apply	Nonprofits, schools, tribes, local units of government
Grant amounts	Total available (FY06): $22,000; Grants will range from $1,500 to $3,000
For more information	http://www.michigan.gov/deqmiglprotectionfund
Description	Provides financial assistance to local initiatives to prevent and control aquatic invasive species in Michigan waters. Examples include boater education programs, training and monitoring programs, or early detection and rapid response activities.
Application Deadline	January 20, 2006
Local match requirement	None

Grant name	Michigan Natural Resources Trust Fund (MNRTF)
Granting agency/organization	MNRTF
Who may apply	DNR, local units of government, legally constituted recreation authorities, school districts (under certain circumstances)
Grant amounts	Development grants: $15,000 to $500,000; Land acquisition grants: no minimum or maximum (total available in FY06: $20-$25 million)
For more information	www.michigan.gov/dnr-grants
Description	Land acquisition and the development of public outdoor recreation areas, with a focus on protecting natural resources and natural resource based recreation.
Application Deadline	April 1, 2006 (acquisition grants will also be accepted until August 1, 2006)
Local match requirement	25%

Grant name	Volunteer Stream Monitoring Grants
Granting agency/organization	Michigan Clean Water Corps (MiCorps) / Great Lakes Commission
Who may apply	Local units of government and non-profit entities
Grant amounts	Total available in FY07: $50,000
For more information	http://www.micorps.net/app/gap07
Description	For water quality monitoring in wadable streams and rivers. The grants may be used to fund a local monitoring coordinator and/or purchase water quality monitoring supplies.
Application Deadline	December 4, 2006
Local match requirement	25%

Grant name	Volunteer Stream Monitoring Start-up Grants
Granting agency/organization	Michigan Clean Water Corps (MiCorps) / Great Lakes Commission
Who may apply	Local units of government and non-profit entities
Grant amounts	Up to $10,000 will be available for start-up grants, with multiple grants expected in the $1,000 to $3,000 range
For more information	http://www.micorps.net/app/startup07
Description	These start-up funds will serve two purposes: 1) provide funding and support to assist start-up groups in designing a monitoring strategy for their community; and 2) help groups develop a full proposal for the 2008 Volunteer Stream Monitoring Grant Program (VSMGP).
Application Deadline	December 4, 2006
Local match requirement	25%

Grant name	Partnerships for Change
Granting agency/organization	Land Information Access Association (also Michigan Townships Association, Michigan Association of Planning and Michigan State University Extension)
Who may apply	Multi-jurisdictional partnerships(at least one city/village plus one township)
Grant amounts	
For more information	www.partnershipsforchange.cc/rfp.asp
Description	Foster new and expanded cooperation between cities, townships and villages in developing and carrying out local land use policies that contribute to the preservation of cultural and natural resources.
Application Deadline	April 1, 2006
Local match requirement	20%

Grant name	Land and Water Conservation Fund
Granting agency/organization	MDNR, National Park Service
Who may apply	State, local governments, schools, tribes
Grant amounts	Grant amounts ranged from $30,000 to $500,000 in FY05
For more information	www.michigan.gov/dnr-grants
Description	
Application Deadline	No announcement for FY06
Local match requirement	50%

Grant name	Emerging Issues – Water Quality Monitoring
Granting agency/organization	MDEQ
Who may apply	Local units of government, nonprofit entities
Grant amounts	Total available in FY06: $200,000
For more information	http://www.deq.state.mi.us/documents/deq-water-gleas-fy06waterqualimongrants.pdf
Description	Meant to fund water quality monitoring activities to identify new chemicals/issues that may be impacting water quality in Michigan surface waters.
Application Deadline	January 31, 2006
Local match requirement	25%

Grant name	Local Water Quality Monitoring Grants
Granting agency/organization	MDEQ
Who may apply	Local units of government, nonprofit entities
Grant amounts	Total available in FY06: $200,000
For more information	http://www.deq.state.mi.us/documents/deq-water-gleas-fy06waterqualimongrants.pdf
Description	Meant to fund water quality monitoring activities either in priority geographic areas or on local issues of concern.
Application Deadline	January 31, 2006
Local match requirement	25%

Grant name	Inland Lake Beach Monitoring Grants
Granting agency/organization	MDEQ
Who may apply	Local units of government, nonprofit entities
Grant amounts	Total in FY06: $100,000
For more information	http://www.deq.state.mi.us/documents/deq-water-gleas-fy06waterqualimongrants.pdf
Description	Funds proposals that determine levels of E. coli in public swimming areas at beaches located on inland lakes and rivers.
Application Deadline	January 31, 2006
Local match requirement	25%

Grant name	Great Lakes Basin Program for Soil Erosion and Sediment Control
Granting agency/organization	Great Lakes Commission
Who may apply	Nonfederal units of government, academia, nonprofits
Grant amounts	Total in FY06: $2 million; 20 small-scale grants (up to $40,000), 8 large scale grants (up to $75,000) and 2 watershed scale grants (up to $125,000)
For more information	http://glc.org/basin/funding.html
Description	Funds demonstration projects and information/education projects for reducing erosion and improving sediment control.
Application Deadline	March 15, 2006
Local match requirement	25%

Grant name	Coastal Counties Restoration Initiative
Granting agency/organization	National Association of Counties (NACo), National Fish and Wildlife Foundation, NOAA Fisheries
Who may apply	NACo member counties, or public or nonprofit private agencies, institutions, and organizations, educational institutions, and any form of local government working in partnership with a NACo member county are eligible for funding.
Grant amounts	$25,000-$100,000
For more information	http://www.nfwf.org/programs/ccri.cfm
Description	Provides financial assistance to innovative, high quality county-led or supported initiatives that foster community-based wetland, riparian, and coastal habitat restoration projects through project planning and hands-on conservation.
Application Deadline	February 24, 2006
Local match requirement	At least 1:1, with 2:1 or greater strongly encouraged

Grant name	North American Wetlands Conservation Act Small Grants
Granting agency/organization	Department of the Interior, U. S. Fish and Wildlife Service
Who may apply	
Grant amounts	Total program funding: $2 million. Grants will range from $0 to $75,000
For more information	http://www.fws.gov/birdhabitat/NAWCA/USsmallgrants.html
Description	acquisition, establishment, enhancement and restoration of wetlands and wetland-associated uplands
Application Deadline	Dec 01, 2006
Local match requirement	50%

Grant name	Five Star Restoration Program
Granting agency/organization	Environmental Protection Agency
Who may apply	Schools and universities, local governments, businesses, conservation organizations, etc.
Grant amounts	Between $5,000 and $20,000
For more information	http://www.epa.gov/owow/wetlands/restore/5star/#apply
Description	Community based wetland, riparian, and coastal habitat projects that build diverse partnerships and foster local natural resources stewardship.
Application Deadline	March 9, 2007
Local match requirement	No specific requirement; competitive projects usually have 1:1 or more

Grant name	General Matching Grants Program
Granting agency/organization	National Fish and Wildlife Foundation
Who may apply	Federal, tribal, state and local governments; educational institutions; and non-profit conservation organizations
Grant amounts	$25,000 to $250,000
For more information	http://www.nfwf.org/guidelines.cfm
Description	Funds projects that promote fish and wildlife conservation.
Application Deadline	Pre-proposals due April 1 and September 1 of each year. Full proposals sue June 1 and November 1 of each year.
Local match requirement	At least 2:1

Grant name	Great Lakes Watershed Restoration Grant Program
Granting agency/organization	National Fish and Wildlife Foundation
Who may apply	Nonprofit organizations, tribes, state and local governments
Grant amounts	$950,000 in grants of $35,000 to $100,000
For more information	www.nfwf.org/programs/greatlakes/
Description	
Application Deadline	November 15, 2006
Local match requirement	1:1

Grant name	FishAmerica Foundation
Granting agency/organization	FishAmerica Foundation
Who may apply	Non-profits, local and state agencies, educational institutions and other governmental entities
Grant amounts	$5000 to $50,000
For more information	www.fishamerica.org
Description	Restore fisheries habitat across coastal America and the Great Lakes. Projects must result in on-the-ground habitat restoration of marine, estuarine and riparian habitats clearly significant to fisheries resources
Application Deadline	February 5, 2007
Local match requirement	At least 1:1

Other potential funding sources:

- NRCS Resource Conservation and Development (RC&D) programs
- People and Land (www.peopleandland.org) (land use education, leadership development, planning model identification, and policy development in Michigan)

Other resources:
http://cfpub.epa.gov/fedfund/
www.deq.state.mi.us/documents/deq-fbsd-grantsloanscatfinal05-17-04.doc
www.grants.gov
www.glhabitat.org/grants.html
www.epa.gov/glnpo/fund/glf.html

Appendix D: Identifying Disagreement

Action 3 in this Watershed Management Plan (see Appendix A): Representatives of the City of Portage have stated that the City has no jurisdiction over culverts and bridges in the Portage River Watershed because all of the road-stream crossings in the city limits are county drains. The City of Portage feels that these culverts and bridges are the jurisdiction of the Drain Commissioner. The Drain Commissioner has stated that these culverts and bridges are the jurisdiction of the owner of the roadway.