Before publication, Add intro material: Executive summary, table of contents, steering committee, acknowledgments, partners, list of maps and tables.

Charts and tables in Chapter 1: Reference Map; HUC 10 regional map; LMW subwatersheds map Numerical standards table; Ecoregions map

Chapter 1: Background and Introductory Information

Include: reference map

The Little Manistee River Watershed encompasses about 227 square miles (576 square kilometers), primarily in the North Central Hardwoods ecoregion of Michigan’s Lower Peninsula. Water resources include the Little Manistee River and several tributaries, along with numerous small lakes.

The river and tributaries are all classed as coldwater streams by the Michigan Department of Natural Resources. Monitoring, by volunteers and by the Michigan Department of Environmental Quality, indicates surface water quality is good to excellent at most locations. The Little Manistee River Weir, in operation since 1968, is the primary source of Steelhead trout broodstock throughout Michigan (Tonello, 2008) and also serves as an egg-taking station for Chinook salmon hatchery operations.

The mainstream of the Little Manistee River stretches for approximately 60 miles, from its headwaters in Ellsworth Township of Lake County, to the watershed’s exit point at Manistee Lake in Manistee County. A dam at the village of Luther impounds a millpond of about eight acres. From there to the mouth – about 55 miles – the river is free-flowing.

More than 90 percent of the land cover in the watershed is in a natural state, primarily as forest that has regrown since the end of the Michigan logging era more than a century ago. Soils are mostly deep sands, which support forest growth but are less amenable to agriculture. Approximately 5 percent of the land area is in farm or pasture land covers.

Slightly more than half of the watershed is in public ownership within the Huron-Manistee National Forest or the Michigan state forest system.

About 30 groundwater-fed lakes are scattered across the watershed. Some lakes in the state and national forest ownership are completely undeveloped, while other water bodies – including Harper and Cool lakes – are ringed with seasonal cottages.

Population centers in the watershed include the unincorporated community of Irons and the village of Luther, both in Lake County, and a portion of the village of Stronach, at the river mouth in Manistee County. The overall area is sparsely populated, with a high percentage of dwellings used on a seasonal basis.

Recreational pursuits include fishing, hunting, hiking, off-road vehicle use, canoeing and kayaking, observing wildlife, and general touring. The Little Manistee River Weir is open to the public and is a popular site for visitors during spring and fall egg-taking operations.

Planning in this watershed is challenged by its location on the service-area boundaries of several administrative, governmental and environmental districts. The Watershed extends into Lake, Mason and Manistee counties, along with a small corner of Wexford County. Regional planning agencies, invasive species networks, conservation districts and regional land conservancies follow county lines. None of those agencies has a service area which covers the entire watershed. The Conservation Resource Alliance, a non-profit river care organization based in Traverse City, does have a service area that encompasses all of the Little Manistee and adjacent watersheds.

Potential stressors to water quality include: sediment, excess nutrients, thermal pollution, invasive species, bacterial pathogens and to a lesser extent, runoff from impervious surfaces, agricultural runoff and oil and gas products. These potential sources of environmental stress must be monitored and in some cases managed or reduced in order to protect the water.

Most of the surface waters in this watershed meet and exceed state and federal clean-water standards. Primary goals of the plan are to preserve – and potentially improve – that situation through land-use education, mitigation of known problems such as erosion sites, and a long-term program of monitoring water quality indicators for rapid response to any emerging threats.

**Creating the Watershed Plan:**

The Little Manistee River Watershed Plan is a locally based effort led by the Little Manistee Watershed Conservation Council and a number of partners.

The LMWCC raised funds through local sources to develop the plan. The Alliance for Economic Success, in Manistee served as fiscal agent, while Networks Northwest, in its capacity as the Northwest Michigan regional planning agency, was contracted to produce the plan.

Staff consultants for the project, working through Networks Northwest, are Scott Gest and Ed Hoogterp. ~~Need names of Steering Committee members.~~

The Watershed Steering Committee met regularly with staff during the planning period. All Steering Committee meetings were held within the watershed, and were open to the public. In addition, staff provided periodic reports to lake associations and governmental bodies within the watershed.

This document includes the product of input from multiple sources.

The Michigan Department of Environmental Quality oversaw many technical details, and provided invaluable advice. The Conservation Resource Alliance contributed information from its inventories of road-stream crossings and Little Manistee River streambank conditions. The Northwest Michigan Invasive Species Network developed and provided maps of terrestrial invasives in Manistee County. Michigan Department of Natural Resources compiled fishery status reports and other wildlife information. The U.S. Forest Service provided information on its projects and plans. Volunteers contributed water quality data that had been collected over several years. And Watershed Steering Committee members gave of their time and expertise to propose, critique, and revise elements of the final plan.

A social indicators survey was conducted in parallel with the planning process to assess community attitudes and provide guidance for development of the plan’s education and information element.

Following the initial plan development period, a draft of the document was presented to the public at two advertised meetings. The draft was amended based on input from those meetings.

The federal Clean Water Act, adopted by Congress and signed into law in 1975, envisions watershed planning as a vital tool in controlling and reducing “nonpoint source” pollution of surface waters.

The Michigan Department of Environmental Quality (MDEQ) defines nonpoint source (NPS) pollution as “pollution caused when rain, snowmelt, or wind carry pollutants off the land and into lakes, streams, wetlands, and other water bodies.”

At the time the Clean Water Act was adopted, the majority of known pollution came from so-called point sources such as municipal wastewater plants and industrial discharges. Through regulation, compliance and technical advances, point source pollution has been reduced to the extent that today most pollution enters the water from nonpoint sources.

Michigan's Nonpoint Source Program, a section of the MDEQ, assists local units of government, non-profit entities, and numerous other state, federal, and local partners to reduce nonpoint source pollution statewide.

Local governments, tribes, individuals and stakeholder groups were invited to participate in the project by serving on the Watershed Management Plan Steering Committee.

**Hydrologic Unit Codes**

Watersheds and subwatersheds throughout the United States are identified through a unique set of numerical “Hydrologic Unit Codes” or HUCs.

Under this system, the Manistee River Watershed in Northwest Lower Michigan is identified by the 8-digit HUC: 04060103. The Manistee River system is divided into seven subwatersheds, including Bear Creek, the Pine River, the Little Manistee River and four segments of the Big Manistee River.

Each of those watersheds is identified by a 10 digit HUC – 0406010306 for the Little Manistee

Finally, the Little Manistee is subdivided into six 12-digit units, each with the 10-digit code plus two additional digits, as follows: (see accompanying map)

-- 01, Twin Creek

-- 02, Lincoln Creek – Little Manistee River

-- 03, Stronach Creek

-- 04, Elbow Lake – Little Manistee River

-- 05, Tank Creek – Little Manistee River

-- 06, Little Manistee River

This document focuses on the Little Manistee and its six subwatersheds.

**Water Quality Standards and the “Integrated Report”**

Michigan has determined that surface waters must be of sufficient quality to support certain “designated uses” such as navigation, agricultural and industrial uses, and body contact recreation. Waters that do not support those uses are considered “impaired.” To receive state approval, the Watershed Management Plan must include provisions to ensure that water quality will be protected or improved to allow the public to engage in these uses. In addition, the WMP may also include provisions to support locally desired uses – for example, recreational enjoyment and/or economic benefits.

In the Little Manistee River Watershed, the only known impairments are fish-consumption limits caused by mercury and PCB pollution. Those limits apply to all Michigan waters and are not directly addressed in this plan. The status of the “designated uses” and “desired uses and conditions” for the watershed are discussed in Chapter 4 of this document.

Michigan’s water quality standards, and the overall status of pollution control efforts within the state, are detailed in the Department of Environmental Quality publication: “*Water Quality and Pollution Control in Michigan 2016 Sections 303(d) 305 (b) and 314 Integrated Report.*”

The document, generally known as the “Integrated Report,” is published every second year. Where appropriate, this Watershed Management Plan relies on the 2016 Integrated Report as a source for information on standards and the known status of our waters relative to those standards.

“At a minimum,” the report states, “all surface waters of the state are designated and protected for all of the following designated uses: agriculture, navigation, industrial water supply, warmwater fishery, other indigenous aquatic life and wildlife, partial body contact recreation, and fish consumption … In addition, all surface waters of the state are designated and protected for total body contact recreation from May 1 to October 1 ... Specific rivers and inland lakes as well as all Great Lakes and specific Great Lakes connecting waters are designated and protected for coldwater fisheries.”

According to the Integrated Report, Michigan’s standards “establish minimum water quality requirements by which the waters of the state are to be managed, and provide the primary framework that guides the MDEQ’s water quality monitoring/assessment and water protection activities.”

For purposes of this Watershed Management Plan, fish consumption will be treated as an issue requiring public education and continued monitoring. However there is a recognition that the causes of this impairment are external to the Little Manistee River Watershed and must be addressed on a state and regional basis, not through elements of this plan. Insert chart of numerical standards

**EPA Nine Elements**

The intent of the Steering Committee is to develop a plan that protects the quality of the watershed, responds to the desires of the local community, and meets requirements of the Michigan Department of Environmental Quality and United States Environmental Protection Agency for approved watershed management plans under Section 319 of the Clean Water Act.

In order to achieve EPA approval, the plan must, at a minimum, include these “Nine Elements:”

a. Identify causes and sources of pollution

b. Estimate pollutant loading into the watershed and the expected load reductions

c. Describe management measures that will achieve load reductions and targeted critical areas

d. Estimate amounts of technical and financial assistance and the relevant authorities needed to implement the plan

e. Develop an information/education component

f. Develop a project schedule

g. Describe interim, measurable milestones

h. Identify indicators to measure progress

i. Develop a monitoring component

According to the EPA, “The elements are labeled (a) through (i) to reflect how they are presented in the 319 guidelines. The first three elements (a through c) are considered during the characterization and goal-setting phases to address the primary sources of pollution in the watershed and to determine the management strategies needed in specific areas to reduce the pollution to meet water quality goals. The remaining six elements (d through i) are used to develop a specific plan of action with measureable targets and milestones, as well as the necessary financial and technical resources needed to restore the waterbody.”

For this WMP, elements (a) and (b) are addressed in Chapters 3 and 4. Management measures related to element (c) are described in the Critical Areas and Priority Issues sections of Chapter 4.

A multi-page graphic describing Implementation Tasks, in Chapter 5, details the schedules, milestones, costs, monitoring, and progress measurements required in elements (d), (f), (g), (h) and (i). The monitoring and evaluation program is further discussed in Chapter 6.

Chapter 7 describes the Information/Education component (element e).

Because the majority of the Watershed meets and exceeds standards for the designated and desired uses (described in Chapter 4), the WMP adopts a non-degradation standard – requiring that the present high water quality is maintained.

**Social Indicators Survey**

(Survey is available online; graphics and information to come)

Past and Ongoing Water Quality Efforts

Local and regional stakeholders have worked actively to improve aquatic habitat and reduce sediment loadings in the Little Manistee River for more than 20 years.

Those efforts were especially important in in mitigating the impact of catastrophic failures of the Luther Millpond Dam, near the river’s headwaters, in 1986 and 1992.

The Little Manistee Watershed Conservation Council was formed in 1996 as a partnership of government and private stakeholder groups to provide the leadership for streambank and habitat improvement in the watershed.

The Council has led the effort to restore in-stream habitat through installation of woody debris.

Conservation Resource Alliance, working through a partnership of river advocates, has completed inventories of road stream crossings and streambank erosion sites. CRA administers a Website, Northernmichiganstreams.org, with the complete inventory of sites on the Little Manistee.

Local Road Commissions, working with CRA, reduced sedimentation by improving or replacing several road crossings.

Property owners on Syers Lake have partnered with the LMWCC and CRA to remove an earthen dam from private property and restore streamflow, connectivity and spawning habitat on Syers Creek.

LMWCC has performed annual monitoring of water quality parameters (E. coli, phosphorus, temperature, dissolved oxygen, etc.) at more than 20 sites in the watershed.

**2000 Little Manistee River Watershed Plan**

The Conservation Resource Alliance worked with The LMWCC and other groups in 2000 to develop the first Watershed Management Plan for the Little Manistee River.

This well-researched document was submitted and approved by the Michigan Department of Environmental Quality under the guidelines of the Clean Michigan Initiative. It was not submitted for review by the United States Environmental Protection Agency.

The 2000 WMP focused on concerns with sediment, excess nutrients, thermal issues and E. coli in the river and tributaries – issues that continue to threaten the water quality in the watershed. The 2000 WMP is used as one of many resources in creating the present document.

**Michigan Ecoregions**

Michigan’s rivers are grouped into five distinct ecoregions, based upon the character of the land through which they flow. The Little Manistee River Watershed is in the North Central Hardwood Forests ecoregion, and the Northern Lakes and Forest ecoregion.

According to the Integrated Report:

“Each of the five ecoregions in Michigan consists of areas that exhibit relatively similar geological landform characteristics (Omernik and Gallant, 1988). Factors used to delineate ecoregions include climate, soils, vegetation, land slope, and land use. This framework provides information on the environmental characteristics that tend to occur within each ecoregion. In order by size (largest to smallest area), the five ecoregions in Michigan are Southern Michigan/Northern Indiana Till Plains, Northern Lakes and Forests, North Central Hardwood Forests, Huron-Erie Lake Plains, and Eastern Corn Belt Plains.

Rivers in the Northern Lakes and Forests and North Central Hardwood Forests ecoregions tend to support coldwater fish within at least a portion of their systems. These rivers commonly have relatively small watersheds, high relief topography, substantial groundwater inputs, and are naturally low in productivity. … In the North Central Hardwood Forests ecoregion, river flow is highly variable. Flow is entirely intermittent in some portions of the ecoregion and entirely perennial in other areas. These rivers typically drain soils with much poorer nutrient content than in bordering ecoregions to the south.”

(Insert Ecoregions Map)

**Goals and Objectives**

After reviewing initial data, the Watershed Steering Committee approved the following set of goals and objectives. These provided basic guidance as the plan was developed.

As the planning proceeded, a menu of specific tasks was developed as a way of furthering these project goals and objectives. The WMP implementation tasks are detailed in an extended table as part of Chapter 5. Each task includes a reference to indicate which objective or objectives it is intended to address.

In general, the plan goals recognize that natural resources are inextricably linked to the economy and the quality of life within the watershed. The goals and objectives are structured to reflect the view that protection of water quality is a necessary element in promoting both the environment and human welfare within the region.

**Goal 1: Develop an educational component to inform and engage the public in long-term water-quality protection efforts.**

a. Develop a public education program to help create understanding of the short and long term threats to the river environment, including the potential impacts of land use and development.

b. Utilize print, broadcast, person-to-person and electronic communication to disseminate a clear, concise message about the public’s role in protecting water quality in the Little Manistee River Watershed.

c. Work through conservation districts and the Little Manistee River Watershed Council to coordinate and promote educational efforts of non-profits and government agencies.

d. Support sustainable funding for conservation districts and invasive species control agencies.

e. Support and promote boater, angler and paddlecraft safety and stewardship practices.

f. Engage local residents, landowners and government representatives in discussion of potential water-quality benefits of local zoning or natural river designation.

**Goal 2: Ensure use of Best Management Practices to preserve and enhance the outstanding cold water resources in the Little Manistee River Watershed**

a. Protect groundwater flows, which are essential to maintenance of coldwater streams.

b. Ensure that best management practices are followed at all existing dams and/or impoundments to minimize thermal changes.

c. Maintain forested canopy in stream corridors to provide shade.

d. Protect and restore critical resources, including groundwater recharge and discharge areas, headwater streams, wetlands and wildlife corridors.

e. Protect and restore natural hydrologic connectivity where appropriate.

**Goal 3: Preserve and improve water quality and the aquatic environment to meet or exceed all applicable state and federal standards and locally desired conditions**

a. Monitor public access areas for E. coli contamination; institute mitigation as appropriate.

b. Monitor waterways for current conditions and changes in biological, physical or chemical parameters (e.g. clarity, phosphorus, dissolved oxygen, conductivity, temperature…)

c. Support BMP’s to minimize stormwater and runoff impacts on surface waters.

d. Monitor external conditions beyond local control – including climate change, invasive species entering the Great Lakes, and atmospheric deposition of mercury -- to enhance local resilience and develop appropriate long-term responses.

e. Reduce sediment, nutrient and chemical inputs from all sources, including transportation infrastructure, agriculture and recreational activity.

f. Monitor aquatic and terrestrial invasive species for early detection and treatment.

**Goal 4: Protect the natural character of the watershed, while maintaining the economic and lifestyle benefits that accompany a high-quality natural environment**

a. Support scientific management of fishery, wildlife and public lands and waters for recreational and environmental benefits.

b. Maintain and improve public access to recreational land and waters, with site designs to protect water quality, provide for public safety and minimize introduction of invasive species.

c. Promote efforts to use BMP’s to minimize environmental impacts of non-motorized trails, low-impact motorized (snowmobile and ORV) trails, and protect natural areas.

d. Maintain navigation for appropriate boating recreation

e. Promote efforts to minimize environmental impacts of recreational infrastructure such as campgrounds and access sites.

f. Protect significant viewsheds and natural areas throughout the Watershed

**Goal 5: Support efforts of governmental and citizen organizations to implement programs for protection and enjoyment of the watershed’s natural features.**

a. Promote watershed protection practices, such as permanent land protection on critical sites, low-impact development techniques and periodic inspection of on-site wastewater systems.

b. Develop tools for governmental agencies, land conservancies and other stakeholders to work cooperatively across artificial boundary lines for protection of water quality and natural resources

c. Unite Watershed stakeholders to leverage funds, pool resources and skills, broaden outreach, and implement recommendations of the Watershed Management Plan.

d. Protect valuable lands that are critical to water quality, fisheries, and wildlife.

e. Enable a permanent Watershed Council to serve as a communication hub for the counties, land conservancies and other agencies whose service areas cover separate sectors of the watershed.