

Morse Reservoir/Cicero Creek Watershed Management Plan

Boone, Clinton, Hamilton, and Tipton Counties, Indiana

February 2011

Prepared by:
V3 COMPANIES

Prepared for:
UPPER WHITE RIVER WATERSHED ALLIANCE MORSE WATERWAYS ASSOCIATION



Executive Summary

The Upper White River Watershed Alliance and the Morse Waterways Association has received funding from the Department of Natural Resources, Division of Fish and Wildlife Lake and River Enhancement Program for a Watershed Management Plan (WMP) for the Morse Reservoir and the 10-digit HUC 0512020106 Cicero Creek watershed in Hamilton, Boone, Tipton and Clinton Counties, Indiana. Cicero Creek has its origins in southeast Clinton County and flows northeast through Tipton County before turning south and flowing through central Hamilton County. The watershed also encompasses portions of Boone County. The Morse Reservoir/Cicero Creek Watershed consists of approximately 144,343 acres of mixed land use of which approximately 1,500 acres is Morse Reservoir.

Morse Waterways Association (MWA) was founded in May 2005 to serve the Morse Reservoir community by promoting safety and the environment. As a means for achieving the goals of promoting safety and the environment, the Association is operating in partnership with the Upper White River Watershed Alliance (UWRWA), and in alignment with local and state agencies/organizations goals in the development of this Watershed Management Plan. A Steering Committee of stakeholders within the watershed was organized to work with MWA and UWRWA to develop and implement the Watershed Management Plan.

The Morse Reservoir/Cicero Creek Watershed Management Plan (WMP) is intended as a guide for the protection and enhancement of the environment and quality of the watershed while balancing the different uses and demands of the community on this natural resource. This plan will address items such as:

- education and outreach;
- increasing preservation, restoration and protection of this vital system;
- increasing cooperation, coordination and collaboration among all stakeholders in the watershed; and
- maintaining a solid organization to look to the welfare of this important natural resource.

The WMP follows the Indiana Department of Environmental Management (IDEM) requirements for watershed management plans, including sections on: watershed inventory, identifying problems, identifying causes, sources and load reductions, setting goals and identifying critical areas, choosing measures and BMPs to apply, creating an action register and schedule, and tracking effectiveness.

Watershed Inventory

The watershed inventory is a comprehensive inventory that quantifies, describes, and summarizes all available watershed data. This inventory is used to determine the current conditions of the watershed and identify the link between the stakeholder concerns and those watershed conditions. Part one of the watershed inventory focuses on the data at a watershed-wide scale and includes broad topics not easily summarized at the subwatershed scale. Part two of the watershed inventory provides detailed water quality data gathered at

the subwatershed scale. And part three of the watershed inventory summarizes and explains the relationships of the data gathered in parts one and two.

Identify Problems and Causes

Problem statements were developed during the planning process in an effort to link watershed concerns with existing and historical water quality data. Four major concern categories were identified during this process.

1. Stakeholders in the Morse Reservoir/Cicero Creek Watershed are not knowledgeable about their daily impact on the watershed and its water quality.
2. Agriculture and typical urban area practices (i.e. lawn care, pet waste disposal, erosion control during construction...etc.) within the watershed contributes a significant amount of pollutants, thereby contributing to the frequent exceedances of water quality targets and growth of algae within the reservoir.
3. *E. coli* levels in the watershed regularly exceed the state standard, based on current and historical water quality data results, and often exceed safety standards for recreational use in streams.
4. Soil erosion and sedimentation within the watershed is degrading the water quality/quantity and limiting the aesthetics, wildlife habitat, and aquatic health of the streams and reservoir within the watershed.

Watershed Goals

Based on the identified concerns and possible sources, goal statements were developed for each problem statement. Implementation of policies and programs to meet these goal statements will improve watershed management in the Morse Reservoir/Cicero Creek Watershed.

The goal statements indicate the ultimate goal for a specific project. In some cases this goal may not be obtainable in the short term; therefore there a list of short term and long term objectives were included with each goal.

1. Develop and implement an education and outreach program within the watershed.
2. Reduce the nutrient loads so that there are no exceedances of EPA's suggested targets for Nitrate + Nitrite of 1.6 mg/L and Total Phosphorus of 0.076mg/L.
3. Reduce *E. Coli* concentrations to meet the state standard of 235 CFU/100mL.
4. Reduce sediment loads to meet the IDEM statewide draft TMDL target of 30 mg/L for TSS.

Critical Areas

Critical areas are defined as areas where project implementation can remediate current water quality impairments or reduce the impact of future water quality impairments. The critical areas within the Morse Reservoir/Cicero Creek watershed were identified based on the Watershed Inventory, the identified problems and the goals of the Watershed Management Plan. Critical areas were split into two categories: Subwatershed Critical Areas and Specific Source Critical areas.

High Priority Subwatersheds

Little Cicero Creek
Tobin Ditch
Teter Branch
Morse Reservoir/Cicero Creek

Medium Priority Subwatersheds

Cox Ditch
Prairie Creek
Hinkle Creek

Low Priority Subwatersheds

Buck Creek
Dixon Creek
Weasel Creek

Specific Source Critical Areas

Livestock Access
Absent or Insufficient Stream Buffers
Excessive Streambank Erosion
Agricultural Areas Practicing Conventional Till

Best Management Practices

To choose an appropriate BMP, it is essential to determine in advance the objectives to be met by the BMP and to calculate the cost and related effectiveness of alternative BMPs. Once a BMP has been selected, expertise is needed to insure that the BMP is properly installed, monitored, and maintained over time.

BMPs identified for implementation within the Morse Reservoir/Cicero Creek Watershed were divided into two categories: Agricultural/Rural and Urban, with cost estimates and pollutant removal rates provided for each BMP.

Action Register and Schedule

The success of a watershed management plan can be measured by how readily it is used by its intended audience and how well it is implemented. The Morse Reservoir/Cicero Creek WMP is very ambitious and continued implementation of the plan will require and even greater degree of cooperation and coordination among partners and funding for projects. The action register is a tool used to easily identify each objective, milestone, estimated cost, and possible partners for easier implementation of the plan.

Table of Contents

SECTION 1 – WATERSHED COMMUNITY INITIATIVE	5
INTENTIONS OF THE WATERSHED MANAGEMENT PLAN	5
COMMUNITY INVOLVEMENT	6
<i>Morse Waterways Association</i>	6
<i>Upper White River Watershed Alliance</i>	6
STEERING COMMITTEE	6
<i>Mission/Vision Statement</i>	6
<i>Steering Committee Planning Process</i>	7
Plan Development	7
Public Meetings.....	8
SECTION 2 – WATERSHED INVENTORY	11
PART ONE OF THE WATERSHED INVENTORY	11
<i>Relevant Relationships</i>	11
<i>Location, Characteristics and Size</i>	11
<i>Geology/Topography</i>	13
<i>Hydrology</i>	13
Climate	13
Morse Reservoir	14
Wetlands.....	14
Threatened or Endangered Species.....	17
Nuisance Wildlife and Exotic Invasive Species.....	18
Regulatory Floodplain.....	19
Regulated Drains	21
Wellhead Protection Areas	23
<i>Soil Characteristics</i>	23
Highly Erodible Land (HEL)	25
Hydric Soils.....	27
Septic Tank Suitability.....	27
<i>Landuse</i>	29
<i>Notable Natural Resources and Recreational Facilities</i>	32
<i>Other Planning Efforts</i>	33
PART TWO OF THE WATERSHED INVENTORY	34
<i>Available Data and Studies</i>	36
Little Cicero Creek Watershed Management Plan.....	36
Bacon/Prairie Ditch Watershed Management Plan.....	36
Buck Creek/Campbell Ditch Watershed Management Plan	36
IDEM 303(d) List.....	36
IDEM Water Quality Sampling.....	37
Central Indiana Water Resources Partnership (CIWRP) Studies	43
V3 Reservoir Shoreline Investigation	45
V3 Biological Sampling.....	45
Windshield Survey.....	48
Nonpoint Source Pollution Modeling.....	51
NPDES Permitted Facilities & Confined Feeding Operations	52
Indiana Clean Lakes Program	54
IDEM <i>Cylindrospermopsis raciborskii</i> Report.....	54
IDEM Mid-water Planktonic Invertebrate Report.....	55
US Filter/Indianapolis Water (Veolia Water).....	55
<i>Subwatershed Summary</i>	55
<i>Prairie Creek Subwatershed</i>	57
<i>Cox Ditch Subwatershed</i>	60

<i>Dixon Creek Subwatershed</i>	62
<i>Buck Creek Subwatershed</i>	65
<i>Tobin Ditch Subwatershed</i>	68
<i>Weasel Creek Subwatershed</i>	71
<i>Teter Branch Subwatershed</i>	74
<i>Little Cicero Creek Subwatershed</i>	77
<i>Hinkle Creek Subwatershed</i>	80
<i>Morse Reservoir/Cicero Creek Subwatershed</i>	83
PART THREE OF THE WATERSHED INVENTORY.....	88
<i>Watershed Inventory Summary and Ranking</i>	88
Water Quality Information.....	88
Habitat/Biological Information.....	90
Landuse Information	91
Current Water Quality Impairment	93
Land Use and Industrial Impairments and Concerns	94
Overall Subwatershed Ranking.....	95
<i>Analysis of Stakeholder Concerns</i>	96
SECTION 3 – IDENTIFY PROBLEMS	100
GROUP CONCERNS	100
PROBLEM STATEMENTS	101
<i>Public Participation/Education and Outreach</i>	101
<i>Stream & Reservoir Nutrient Levels</i>	101
<i>E. coli Levels</i>	102
<i>Erosion and Sedimentation within the Watershed & Reservoir</i>	102
SECTION 4 – IDENTIFY CAUSES, SOURCES AND LOAD REDUCTIONS.....	103
POTENTIAL CAUSES & SOURCES	103
POLLUTANT LOADING.....	105
<i>Current Loading Calculation Methodology</i>	105
<i>Target Loads</i>	105
<i>Load Reductions</i>	106
SECTION 5 – SET GOALS AND IDENTIFY CRITICAL AREAS	110
GOAL STATEMENTS.....	110
<i>Public Participation/Education and Outreach</i>	110
<i>Stream & Reservoir Nutrient Levels</i>	110
<i>E. coli Levels</i>	111
<i>Erosion and Sedimentation within the Watershed & Reservoir</i>	112
INDICATORS	113
CRITICAL AREAS	115
<i>High Priority Subwatersheds</i>	115
Little Cicero Creek Subwatershed.....	115
Tobin Ditch Subwatershed.....	117
Teter Branch Subwatershed.....	119
Morse Reservoir/Cicero Creek Subwatershed.....	121
<i>Medium Priority Subwatersheds</i>	122
Cox Ditch.....	123
Prairie Creek.....	124
Hinkle Creek.....	125
<i>Lower Priority Subwatersheds</i>	126
<i>Specific Source Critical Areas</i>	126
Livestock Access	127
Absent or Insufficient Stream Buffers.....	127

Excessive Streambank Erosion	127
Agricultural Areas Practicing Conventional Till.....	132
SECTION 6 – CHOOSE MEASURES/BMPS TO APPLY	133
BMPS	133
<i>Agricultural/Rural BMPS</i>	133
<i>Urban BMPS</i>	139
<i>Preventative Measures</i>	142
BEST MANAGEMENT PRACTICES LOAD REDUCTIONS	146
SUBWATERSHED BEST MANAGEMENT PRACTICE SELECTION	148
INCENTIVES/COST SHARE OPPORTUNITIES	156
SECTION 7 – ACTION REGISTER AND SCHEDULE	160
ACTION REGISTER.....	160
<i>Public Participation/Education and Outreach</i>	161
<i>Stream & Reservoir Nutrient Levels</i>	163
<i>E. coli Levels</i>	165
<i>Erosion and Sedimentation within the Watershed & Reservoir</i>	167
SECTION 8 – TRACKING EFFECTIVENESS.....	169
EVALUATING PLAN PERFORMANCE.....	169
TRACKING STRATEGY.....	169
SECTION 9 – APPENDICES	173
APPENDIX A – ACRONYMS AND ABBREVIATIONS	
APPENDIX B – REFERENCES	
APPENDIX C – STAKEHOLDER GROUPS AND RELATED ORGANIZATIONS	
APPENDIX D – STEERING COMMITTEE MEETING AGENDAS, SIGN-IN SHEETS AND MINUTES	
APPENDIX E – PUBLIC MEETING AGENDAS AND SIGN-IN SHEETS	
APPENDIX F – IDEM DATA	
APPENDIX G – CIWRP DATA	
APPENDIX H – MACROINVERTEBRATE DATA	
APPENDIX I – WINDSHIELD SURVEY DATA	
APPENDIX J – NPDES/CFO COMPLIANCE	
APPENDIX K – RESERVOIR SHORELINE INVESTIGATION	
APPENDIX L – NONPOINT SOURCE MODELING	
APPENDIX M – EDUCATION AND OUTREACH MENU	
APPENDIX N – RESERVOIR AERIAL IMAGES	
APPENDIX O - HIGHLY ERODIBLE LAND DOCUMENTATION	

Section 1 – Watershed Community Initiative

Intentions of the Watershed Management Plan

The Upper White River Watershed Alliance and the Morse Waterways Association has received funding from the Department of Natural Resources, Division of Fish and Wildlife Lake and River Enhancement Program for a Watershed Management Plan (WMP) for the Morse Reservoir and the 10-digit HUC 0512020106 Cicero Creek watershed in Hamilton, Boone, Tipton and Clinton Counties, Indiana.

The Morse Reservoir/Cicero Creek Watershed Management Plan (WMP) is intended as a guide for the protection and enhancement of the environment and quality of the watershed while balancing the different uses and demands of the community on this natural resource. This plan will address items such as:

- education and outreach;
- increasing preservation, restoration and protection of this vital system;
- increasing cooperation, coordination and collaboration among all stakeholders in the watershed; and
- maintaining a solid organization to look to the welfare of this important natural resource.

The WMP follows the Indiana Department of Environmental Management (IDEM) requirements for watershed management plans, including sections on: watershed inventory, problem cause and stressor identification, stressor source identification, critical watershed areas, setting goals and indicator selection for performance assessment, selecting measures for improvement, calculating load reductions, implementation of planned measures, monitoring indicators, and plan evaluation and adaptation.

Public input is essential for the sustainability and success of the watershed improvement effort. Stakeholder input was sought and included during all aspects of the planning process. This local input was essential for developing a plan that would have broad appeal throughout the watershed and continued support. A steering committee was developed to address the diverse needs in the watershed.

As mentioned previously, the Morse Reservoir/Cicero Creek WMP is intended to be comprehensive, identifying problem areas and suggesting improvement measures for both water quality and quantity concerns. The watershed is large and diverse, and thus has a variety of issues and concerns that need to be addressed. To address some of these issues, the Steering Committee will work with local stakeholder groups to pursue Best Management Practices (BMPs) that will result in the improvement of water quality within the watershed. Because of the size of the task at hand, this plan will also be used as a platform upon which to pursue additional grants and other funding for implementation of the many different improvement measures recommended in the plan.

Community Involvement

Morse Waterways Association

Morse Waterways Association (MWA) was founded in May 2005 to serve the Morse Reservoir community by promoting safety and the environment.

The Morse Waterways Association is a non-profit organization. The Association sponsors several projects throughout the year including an annual safety awareness day and an annual reservoir clean-up day. Its membership consists of many types of stakeholders seeking to ensure that the reservoir will remain a healthy water resource within the Central Indiana region.

Additionally, as a drinking water reservoir for the surrounding communities, the Morse Reservoir must supply a viable source of fresh water for human consumption. Therefore water quality impairments have a direct impact on the health of the community and the cost of treating this water.

As a means for achieving the goals of promoting safety and the environment, the Association is operating in partnership with the Upper White River Watershed Alliance, and in alignment with local and state agencies/organizations goals in the development of this Watershed Management Plan.

Upper White River Watershed Alliance

The Upper White River Watershed Alliance (UWRWA) was formed in 1999 through a local municipal initiative. Not long thereafter, a substantial fish kill occurred as a result of a pollution incident along the White River near Anderson, Indiana. Public and municipal concern regarding overall water quality in the river continues to rise. Current urban development pressures, concern for the quality of area water supplies, and other use impairments drive the Alliance's activities.

Morse Reservoir and the Cicero Creek Watersheds lie within the Upper White River watershed boundary, and therefore the information within this WMP is important to incorporate into the ongoing work for the Upper White River. The watershed coordinators and other members of the UWRWA have participated in the Morse Reservoir/Cicero Creek Steering Committee and helped facilitate communication between each group. The website for the Steering Committee is hosted by the UWRWA so that communication at a single point could occur. The improvements recommended by this WMP and implemented within the watershed will ultimately provide benefit to the Upper White River. Additionally, these communities have very similar demographics and a coordinated education and outreach program between the Upper White and Morse Reservoir/Cicero Creek will help get a broader message across to the people that live within these watersheds.

Steering Committee

Mission/Vision Statement

The Morse Waterways Association mission is to promote safety and the environment within the Morse Reservoir Watershed.

The Upper White River Watershed Alliance's vision is to become the principal regional watershed leader by creating resources, education programs and partnerships, that promote, protect, and enhance the biological, chemical, and physical integrity of the White River ecosystem.

The stakeholders of the Morse Reservoir/Cicero Creek Watershed have many important partners in conservation including:

- Morse Waterways Association (MWA),
- Upper White River Watershed Alliance (UWRWA),
- Indiana University Purdue University Indianapolis (IUPUI) - Center for Earth and Environmental Science (CEES),
- Indiana Department of Natural Resources (IDNR) ,
- Indiana Department of Environmental Management (IDEM),
- White River Watchers,
- Veolia Water Indianapolis, LLC.,
- Hamilton County SWCD,
- Tipton County Surveyor
- City of Noblesville
- Town of Cicero

A complete list of stakeholder groups and related organizations is available in Appendix C of this document.

Representatives from the stakeholder groups listed above comprise the Morse Reservoir/Cicero Creek Watershed Steering Committee. The steering committee's purpose is to review the concerns from the public meetings guide the development of the management plan, and provide additional data as requested. They meet monthly or bi-monthly to accomplish these goals. The Steering Committee meeting agendas, sign-in sheets and minutes are available in Appendix D.

Steering Committee Planning Process

As stated previously, public input is essential for the sustainability and success of the watershed improvement effort. A steering committee was formed to review the concerns from the public meetings and guide the development of the management plan.

Plan Development

The steering committee was directly involved in all aspects of the development of the plan, including input at public meetings, steering committee meetings, and completion of the windshield surveys. The following steps were used in the development of the plan for the Morse Reservoir/Cicero Creek Watershed.

- Outreach to stakeholders
- Develop watershed management partnership with relevant stakeholders and staff a planning committee
- Solicit public input on watershed problems and opportunities
- Formulate project goals and objectives for watershed plan
- Identify and collect existing studies and other watershed data
- Synthesize and summarize existing watershed data

- Collect new data where needed
- Complete assessment of watershed conditions
- Identify best management practices and policies appropriate for the watershed
- Develop an action plan recommending watershed improvement projects and policies
- Identify potential funding sources for watershed improvements
- Obtain public official and general public input from review of draft watershed plan
- Develop implementation schedule and complete final watershed management plan

Public Meetings

A Public Meeting was held on April 30, 2009 at the Red Bridge Community Center to address the concerns of stakeholders in the Morse Reservoir Watershed. Twenty nine people were in attendance which included members of the steering committee, industrial and commercial businesses representatives, governmental entities, and home owners along Morse Reservoir.

A second Public Meeting was held on October 8, 2009 at the Tipton County 4-H Fairgrounds Education Center to address the concerns of stakeholders in the Morse Reservoir Watershed. Sixteen people were in attendance which included members of the steering committee, agricultural land owners and representatives from governmental agencies.

At the public meetings, stakeholders were informed of the purpose of a Watershed Management Plan, informed on the planning process, updated on the Steering Committee progress, and given the opportunity to evaluate the priority resource concerns for the Morse Reservoir/Cicero Creek Watershed.

The priority resource concerns that were identified during the public meeting are listed below. Specific concerns were taken from the stakeholders and later listed in categories to aid understanding of the issues. The information will be used to prioritize watershed issues and aid in the planning and implementation process. Once stakeholders finished identifying issues and concerns they were given the opportunity to rank their top three issues. A value of 3 represented their highest priority issue. Ranking is provided in parenthesis in the format of: (total value / number of votes).

Pollution Issues:

- Silt inputs from Watershed into Morse Reservoir (35/15)
- Stormwater after rain event (7/4)
- Erosion along Big Cicero Creek (5/2)
- Water clarity (5/2)
- Polluted runoff – non-point source pollution (4/2)
- Failing septic systems impact water quality (5/3)
- Streambank deterioration caused by severe erosion. (2/1)
- *E. coli* in Little Cicero (1/1)
- Landfill leaking (1/1)
- Leaking of oil and gas while using the reservoir for recreational purposes
- Phosphorus – Internal nutrient loading
- Brown water
- Debris in curbs and grates
- Grass clippings/Litter in water

Agricultural Issues:

- Conflict between water quality and production agriculture (11/6)
- Nutrient Management (11/4)
- Subsurface Drainage (3/1)
- Ditch Maintenance (1/1)
- Farming in Tipton County increase sediment and nutrients to watershed (1/1)
- Atrazine
- Buffer Areas
- Manure management
- Livestock access to surface water within the watershed

Development/Urban Issues:

- Combined sewer overflows – Tipton County (4/2)
- Cost of streambank maintenance (2/1)
- Water level (1/1)
- Water quality pre- and post development (1/1)
- Silt from construction sites (1/1)
- Runoff from construction sites (1/1)
- Building zoning restriction
- Erosion control at construction sites
- Residential fertilizer use
- Need for dredging
- Construction Clearing

Wildlife/Habitat Issues:

- Streambank Erosion (29/9)
- Habitat Degradation (5/3)
- Streambank stabilization (3/1)
- Canada Geese waste impact on water quality (2/1)
- Big Cicero habitat degradation (2/1)
- Increase in Canada Geese population

Water Use Concerns:

- Safety of using Morse Reservoir recreationally (10/4)
- Flooding (5/2)
- Wastewater Package Plants (1/1)
- Fish consumption advisories/safety
- Effectiveness of Indianapolis drinking water treatment
- Odor/taste of water
- Water treatment plant operation/Lime in water
- How to prioritize numerous watershed concerns for maximum improvement
- Need for water storage reservoir by Anderson

Watershed Education and Outreach:

- Education and outreach of watershed issues (16/7)
- Cooperation/Communication between counties (3/2)
- Changing public perception of stormwater as a bi-product
- Stewardship quality/too few interested parties within watershed

Blue – Green Algae Issues and Concerns:

- Public concern over blue – green algae (11/5)
- Skin irritation/Toxin (5/3)
- Safety of using water for irrigation due to presence of blue-green algae
- Effectiveness of algae treatments

The Public Meeting agendas and sign-in sheets are available in Appendix E.