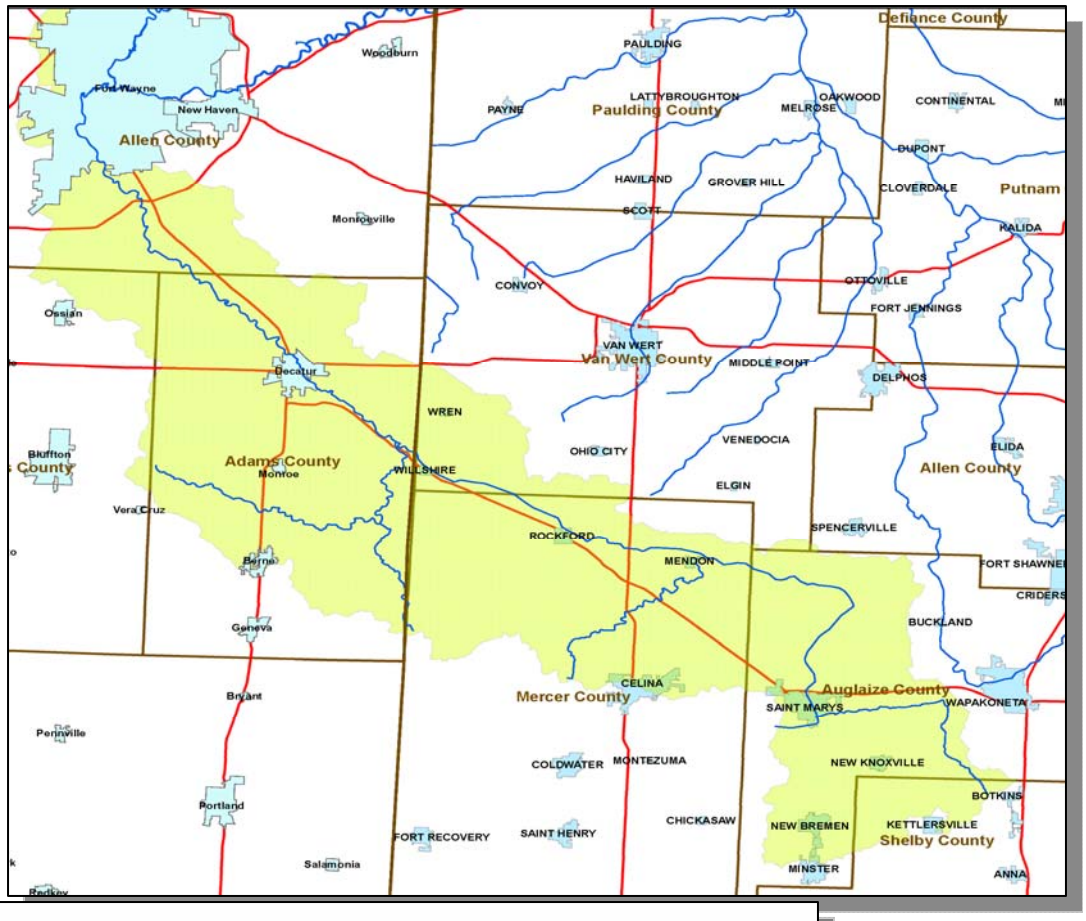
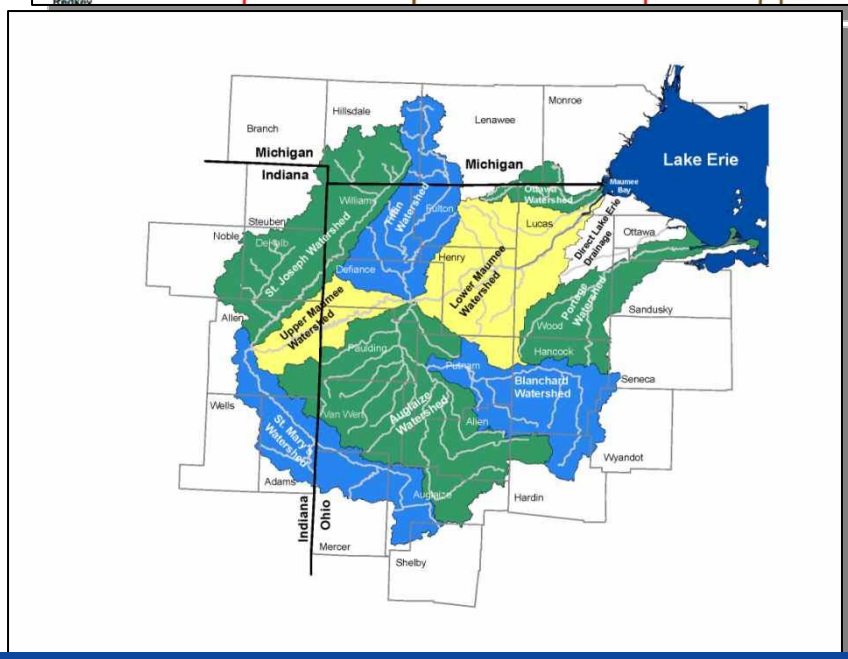
Western Lake Erie Basin Study
St. Marys Watershed Assessment

Final Draft

December 1, 2008





US Army Corps of Engineers®

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EXECUTIVE SUMMARY

Introduction: The St. Marys River watershed is one of eight subwatersheds within the Maumee River Watershed and comprises 13% of that watershed. It is delineated by the United States Geological Survey as 8-digit hydrologic unit number 04100004. The 524, 800-acre (820 square mile) watershed is located in Allan, Adams and Wells counties in northeastern Indiana, and Van Wert, Mercer, Shelby and Auglaize counties in northwestern Ohio. (Figure E-1). The watershed contains approximately 434 miles of tributary perennial streams. The St. Marys River originates near Minster, Ohio flowing to the northwest through St. Marys in Auglaize County, then through, Mercer and Van Wert counties in Ohio. The St. Marys River flows into Indiana southwest of Pleasant Mills, near the Indiana State Line and Highway 33. The river continues to the northwest, flowing through Decatur, Indiana into Allen County. It joins the St. Joseph River in Fort Wayne to form the Maumee River, which flows northeast and empties into Lake Erie.

St Marys River Watershed Profile

HUC:	04100008
Watershed size:	524,800 acres (848 sq. miles)
Land use:	84% agriculture 7% woodland 7% impervious 1% wetlands >1% open water
WQ Attainment:	An assessment of the number of streams in and out of attainment was not available at this writing.
Population:	768,810
Urban Area:	52,480
Peak Flow:	18,000 cfs
Congressional Reps:	Senator George Voinovich, Ohio Senator Sherrod Brown, Ohio Rep. Jim Jordan, 4th District Rep. Robert Latta, 5th District Senator Evan Bayh, Indiana Senator Richard Lugar, Indiana Rep. Mark Souder, 3rd District Rep. Mike Pence, 6th District
Potential Actions $:	To be determined.

Purpose and Authority: This project entails a multi-purpose/multi-objective evaluation of the Western Lake Erie Basin (WLEB) and Watersheds by the U.S Army Corps of Engineers (USACE) to 1) integrate existing projects/plans/studies; 2) assess program progress; and 3) plan future lake and watershed revitalization programs and projects from various federal, state, local and non-governmental organizations. The final product, a comprehensive Western Lake Erie Basin and Watershed Framework, will provide public agencies, watershed groups and other stakeholders with a tool to facilitate the restoration, protection and sustainable use of the water and related natural resources within the study area.

The WLEB study is authorized in Section 441 of the Water Resources Development Act (WRDA) of 1999. This authority directs the Assistant Secretary of the Army for Civil Works to conduct a study to develop measures to improve flood control, navigation, water quality, recreation, and fish and wildlife habitat in a comprehensive manner in the WWLEB

Methodology: The preparation of the assessment consisted of 1) a comprehensive review of existing studies and technical reports to identify problems, opportunities, and project needs; 2) hosting a workshop at a central location in the watershed where elected officials, agencies and citizens were invited to share their comments and identify local problems, needs and project opportunities; 3) distribution of a project needs request form to all county, community, state and local agencies and other nonprofit organizations by letter and also posting the request on the WLEB web site; 4) making direct contact with key agencies to request information on current projects and project needs; 5) distribution of draft materials to WLEB Partnership for review and comment; and 6) completion of both internal and external USACE Independent Technical Reviews (ITR).

Watershed Characteristics:

- ***Physical System and Natural Resources***: The St. Marys River watershed is relatively flat with an average drop of 1.5 to 2 feet per mile. Land use in the watershed is primarily agriculture (68.5%), with 21.1% classified as forest and open space, 9.8% urban, and <.001% (80 ac.) classified as wetlands (NRCS, 2007).
- ***Socio-economic Characteristics*:** The largest incorporated areas within the watershed (in order of size) are the Cities of Fort Wayne and Decatur, Indiana. The remainder of the watershed is primarily rural, with towns including St. Marys and Minster, Ohio. The watershed (in Fort Wayne) is home to several major corporations including the Brotherhood Mutual Insurance Company, Centennial Wireless and North American Van Lines. However, the predominant source of employment in the watershed is the agricultural sector.
- ***Cultural Attributes*:** Limited historic and archaeological resources have been identified in the area and there are no known current Native American interests in the area.
- ***Institutional and Regulatory Setting*:** Most of the land use is managed through rural zoning via county and township governments. Given the dominance of agriculture in the watershed, most of the area is subject to non-point pollution controls.

Resource Analysis: Issues and Opportunities:

- ***Flood Damage Reduction***: Significant flood risks exist due to the relative flatness of the watershed, particularly in the City of Fort Wayne. The confluence of the Upper Maumee and St. Marys in Fort Wayne, coupled with the rapid runoff associated with impervious surfaces in urban areas, contributes to commonplace flooding problems. Investigate of additional flood reduction measures within the watershed is warranted, such as removing structures from the floodplain or creating flood water impoundments upstream of Fort Wayne. The latter also has groundwater recharge benefits.
- ***Water Quality*:** Water quality ranges from good to poor in the watershed, with the latter primarily due to runoff from agricultural lands. Opportunities exist to develop riparian buffer strips to enhance side stream habitat while filtering runoff of sediments and nutrients.
- ***Natural Resource- based Recreation*:** Fishing and other active natural resource-based recreation opportunities are limited due to the dominance of agricultural land and associated access issues. Public facilities in the watershed do afford residents open space and passive recreation opportunities
- ***Fish and Wildlife Habitat*:** Habitat is restricted to fence rows and occasional woodlots along streams and ditches in the area. Most historic wetland resources have been converted to other uses.
- ***Commercial and Recreational Navigation:*** The St. Marys River does not support commercial navigation. Recreational navigation, such as canoeing or shallow draft fishing, is primarily associated with upland reservoirs, ponds or small lakes, and seasonally along 1st and 2nd order streams within the watershed..

Findings and Potential Actions: The St. Marys Watershed, like the WLEB in general, has lost most of the natural ecosystems and features that once reduced flows and sedimentation, and provided natural detention and filtration. Also, flooding is commonplace due to urbanization and encroachment into natural floodplains. This is particularly true within the City of Fort Wayne, which has historically experienced extensive and frequent flood damages. Overall water quality ranges from good in the lower portions of the WLEB to poor in the upper areas where extensive siltation and urban runoff is occurring.

Figure E-1. Location of the St. Marys River Watershed (Ohio DNR)

Potential actions will be established in the course of determining what the specific impairments within the watershed(s) are and whether the

impairments are point or non-point source. Potential actions likely will encompass various levels of structural, green engineering, non-structural and educational measures.

Specific priority potential actions are summarized below, and a complete listing is found in Appendix E.

ST. MARYS RIVER WATERSHED
PRIORITY POTENTIAL ACTIONS – A SUMMARY

- **Section 3. Flood Damage Reduction (and Water Supply, Sedimentation and Erosion)**
  - Develop watershed management plans to address flooding issues in vulnerable areas of the watershed.
  - Clear log jams/debris.
  - Develop and implement educational programs on improved ditch maintenance.
  - Promote sediment management plans.
  - Construct reservoir upstream of Decatur and Ft. Wayne.
  - Acquire repetitive loss properties.
- **Section 4: Water Quality**
  - Undertake log jam studies and GIS mapping initiatives to identify upstream causes of water quality degradation.
  - Continue to eliminate CSOs and SSOs throughout the watershed.
  - Upgrade the Rockford Water treatment plant.
  - Strengthen programs directed at soil erosion and sedimentation problems.
  - Expand technical assistance and demonstration programs for conservation tillage practices.
  - Promote natural stormwater and flood management practices.
  - Develop and maintain a comprehensive watershed management plan to guide current and future efforts.
- **Section 5. Natural Resource- based Recreation**
  - Prepare a comprehensive recreation plan to identify gaps, priorities, funding needs and opportunities for multi-objective recreation projects that help solve flooding problems and improve water quality.
  - Expand and protect parks along the St. Marys.

  Section 6. Fish and Wildlife Enhancement
  - Restore natural hydrology and flow.
  - Prioritize feasible enhancement and restoration easements
  - Perform a stream corridor survey.
  - Promote wildlife enhancement projects.
- **Section 7. Commercial and Recreational Navigation**
  - Investigate the removal of dams that currently impede recreational navigation.
  - Perform hydraulics/hydrology studies to better understand watershed characteristics.
  - Increase the number of access points for canoeing and kayaking.

Plan Implementation: The strategy for implementing identified potential actions will depend upon potential prospective sponsors (i.e., federal, state, regional, local, nonprofit, private). At the federal level and, specifically for those projects which the USACE decides to proceed with or further consider, the implementation strategy will depend upon whether the action falls within existing authorities or whether specific authority will be needed. In addition, funding the project will depend upon Congressional appropriations either for existing authorities or for specifically mandated projects.

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1. INTRODUCTION

1.1 Significance of the Planning Process

The importance of water and related natural resources to the environmental quality and economic well being of the Western Lake Erie Basin (WLEB) and its residents has long been recognized. Federal recognition is found in Section 441 of the Water Resources Development Act (WRDA) of 1999, which called upon the Secretary of the Army to "conduct a study to develop measures to improve flood control, navigation, water quality, recreation, and fish and wildlife habitat in a comprehensive manner in the Western Lake Erie Basin, Ohio, Indiana, and Michigan, including watersheds of the Maumee and adjacent Ottawa and Portage Rivers."

A Section 905(b) analysis (Reconnaissance Study) confirmed the federal interest in this initiative and facilitated an expanded focus leading to a Feasibility Study. That analysis also indicated that Representative Marcy Kaptur supported federal funding "to allow for

Figure 1-1. Location of Western Lake Erie Basin in the Great Lakes.

comprehensive problem and opportunity identification throughout the entire watersheds specified in the original legislation." Figure 1-1 depicts the WLEB in the context of the larger Great Lakes Basin.

The planning process for the Western Lake Erie Basin is significant on several levels, as it:

- *Addresses a number of problems and opportunities critical to the future of the Basin;*

- *Reflects the federal interest in the use, protection and management of the Basin's water and related natural resources*;
- *Embraces a comprehensive, watershed- based approach to planning;*
- *Features a highly collaborative process involving an array of partners*;
- *Consolidates, analyzes and summarizes a wealth of data and information, presenting it in a well documented and referenced "reader friendly" manner;*
- *Reflects a bias toward action, with a focus on practical and pragmatic guidance for future actions by a range of partners;*
- *Makes a critically important contribution to ecosystem restoration planning and management initiatives at the Great Lakes Basin level; and*
- *Provides a template for potential application to other watersheds within (and beyond) the Great Lakes Basin.*

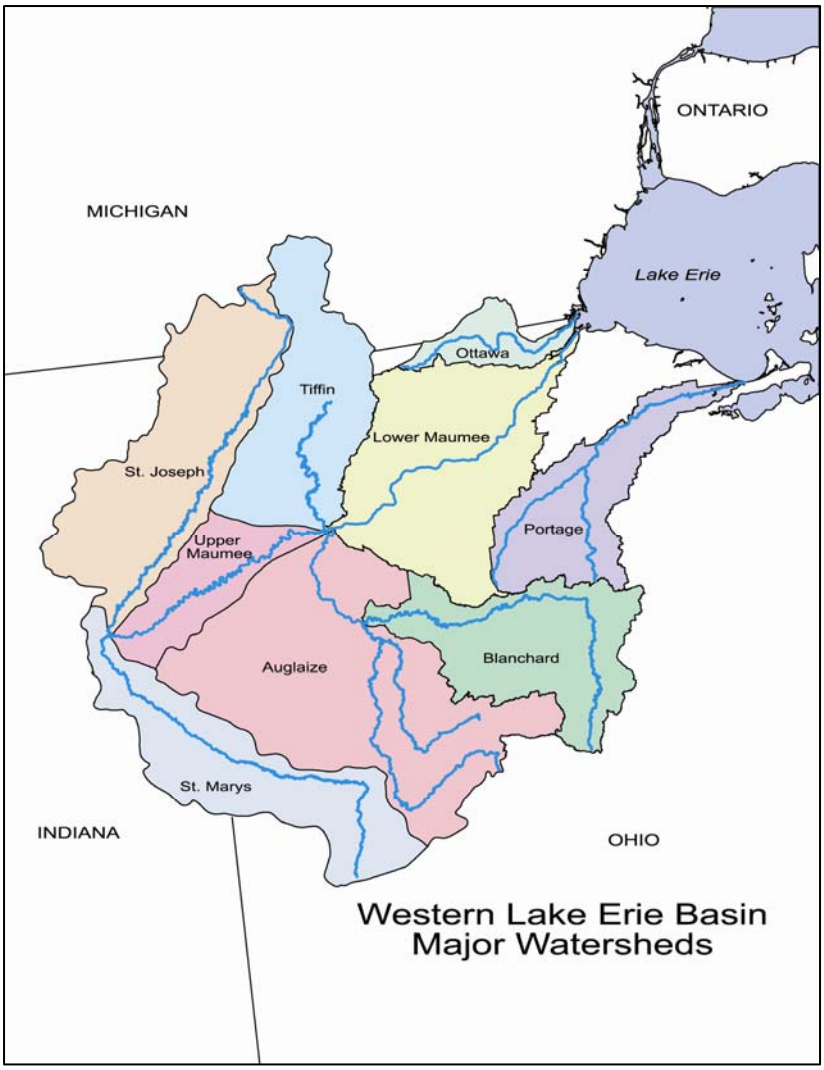


Figure 1-2. Western Lake Erie Basin major watersheds.

1.2 Plan Overview

1.2.1 Purpose: This project entails a multi-purpose/multi-objective evaluation of the Western Lake Erie Basin and Watersheds to (1) integrate existing projects, plans and studies; (2) assess program progress; and (3) incorporate future lake and watershed revitalization programs and projects into a comprehensive Western Lake Erie Basin and Watersheds Management Plan. Toward that end, USACE is completing existing conditions assessments for each of ten areas included in the WLEB project study area (i.e., Blanchard, Ottawa, Lower Maumee, Upper Maumee, Tiffin, St. Joseph, St. Mary's, Auglaize and Portage River watersheds, and the Maumee River Western Basin.) These watersheds are depicted in Figure 1-2. Individual watershed assessments will be rolled up into a comprehensive Western Lake

Erie Basin and Watersheds Management Plan to be submitted to the Congress.

1.2.2 Authority: The WLEB study is authorized under Section 441 of WRDA 1999. This authority directs the Assistant Secretary of the Army for Civil Works to conduct a study to develop measures to improve flood control, navigation, water quality, recreation, and fish and wildlife habitat in a comprehensive manner in the WLEB. The basin consists of the Maumee, Ottawa, and Portage River watersheds in the states of Ohio, Indiana and Michigan. In carrying out the study, the Secretary is directed to cooperate with (and consider the relevant programs of) interested federal, state and local agencies as well as non-governmental organizations.

USACE completed a Section 905(b) Reconnaissance Analysis in October 2001. USACE Headquarters subsequently approved)on December 9, 2003) an Expanded Reconnaissance Analysis as a basis for preparation of a Project Management Plan and Feasibility Cost-Sharing Agreement for detailed watershed studies. Based on that analysis, a Feasibility Cost Share Agreement (FCSA) was signed with the city of Toledo in May 2006. Additional agreements will be developed, as needed, for individual projects that may result from plan implementation.

Figure 1-3. WLEB partnership.

1.2.3 Desired Outcome: The planning effort responds to a directive in Section 441 of WRDA 1999 to "conduct a study to develop measures to improve flood control, navigation, water quality, recreation, and fish and wildlife habitat in a comprehensive manner…." This is to be accomplished through a partnership- based initiative entailing:

- A comprehensive review and analysis of existing studies, plans, reports and associated data and information;
- The identification of problems, opportunities and unmet needs as voiced by policy makers, opinion leaders and other stakeholders; and
- The generation of findings and potential actions that will provide a "blueprint" to guide various public agency and non-governmental partners in the selection, prioritization and implementation of specific actions to address problems and unmet needs.

Collectively, this goal (and its associated planning objectives) will lead to a desired outcome for the Basin and its residents*: the restoration, protection and sustainable use of the water and related natural resources of the Western Lake Erie Basin.*

1.3 Methodology

1.3.1 Planning Team: Roles and Responsibilities: Led by the USACE- Buffalo District, the Planning Team is comprised of the members of the WLEB Partnership, a collaborative multi-governmental (i.e., federal, state, local) initiative "dedicated to enhancing multi-purpose projects that improve land and water resource management in the basin and promote a healthy, productive watershed." The Partnership organizational structure includes a Leadership Committee supported by coordination teams addressing operations, project management, funding, research and data, and public outreach. (See Figure 1.1 and Table 1.1 in Appendix for details.) The Partnership is guided by principles that include collaboration and consensus building; capacity- building at the local level; a results-oriented approach; and a transparent, open process.

WLEB PARTNERS

U.S. Army Corp of Engineers
U.S. Department of Agriculture, Natural Resources Conservation Service
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
U.S. Geological Survey Ohio Water Science Center
Governor of Indiana
Governor of Michigan
Governor of Ohio
Indiana State Technical Committee
Michigan State Technical Committee
Ohio Department of Natural Resources, Div. of Soil and Water Conservation
National Association of Conservation Districts
Maumee River Basin Partnership of Local Governments

1.3.2 Plan Constituents: WLEB Plan constituents are both participants in- and beneficiaries of- the planning process. The Project Management Plan for the Reconnaissance level study notes that "….the Secretary [of the Army] was directed to cooperate with interested Federal, State, and local agencies and non-governmental organizations and consider all related programs of the agencies." Findings and potential actions generated by the planning process constitute a "capital improvements program" for the Basin that will involve all levels of government (and non-governmental stakeholders) in prioritization and implementation.

The U.S. Congress is a key constituent of the planning process, as indicated by its authorization in WRDA 1999. Constituents also include federal agencies (e.g., U.S. Army Corps of Engineers, Natural Resources Conservation Service, U.S. Environmental Protection Agency); state agencies (e.g., Departments of Natural Resources, Environmental Protection, Transportation); regional agencies and associations (e.g., Toledo Metropolitan Area Council of Governments, Western Lake Erie Basin Partnership); local agencies (e.g., cities and townships); and an array of citizen, business/ industry, and user groups with an interest in the restoration, protection and sustainable use of the resource.

1.3.3 Planning Principles, Assumptions and Constraints: The planning process was guided by a series of principles embraced by the Project Team and reflected in all aspects of its Work Plan. Team members agreed that project design and conduct would feature:

Partnership Mission Statement

The Western Lake Erie Basin Partnership is a tri-state partnership dedicated to enhancing multi-purpose projects that improve land and water resource management in the basin and promote a healthy, productive watershed.

- An **open and inclusive process** actively soliciting stakeholder engagement and substantive contributions to the planning effort;
- A **partnership- oriented process** driven by the collective input of all public and non-governmental entities with a role, responsibility or interest in the future of the Western Lake Erie Basin;
- A **watershed- based approach** favoring the use of hydrologic rather than geo-political boundaries in characterizing the resource and planning for its restoration, protection and sustainable use;
- A **multi-objective and multi-disciplinary process** recognizing the environmental, economic, social and cultural dimensions of resource use and stewardship;
- A **thorough examination and characterization of all relevant existing plans, studies, reports, data bases and other materials** contributing to an understanding of Basin conditions, issues, problems, unmet needs and prospective solutions;
- A **commitment to seek consistency with the range of existing plans and strategies** offering a vision for the Basin and recommendations to achieve it; and
  A **commitment to a concise, practical and pragmatic document** providing the reader with a "blueprint" of potential actions, their rationale, and their impact.

The Project Team designed its approach around a series of assumptions. USACE Principles and Guidelines, as well as applicable regulations and federal laws, have guided the planning process, as has authorizing language in Section 441 of WRDA 1999. Finally, based upon guidance received from Corps project officers, it was assumed that the Project Team would exercise some discretion (subject to final approval) in 1) selecting a preferred format and content for the individual watershed assessments; and 2) identifying "potential actions" relevant to all agencies and organizations within the Basin, including (but not limited to) USACE.

Figure 1-4. Satellite view of sediment plume entering Maumee Bay.

Constraints associated with the project relate primarily to focus, scope, budget, timeframe and implementation authority. The Project Team worked within the parameters of the WRDA language, which limited the primary focus to flood control, water quality, recreation, fish and wildlife habitat, and commercial and recreational navigation. Funding availability and completion deadlines also influenced project methodology and depth of analysis, placing some limitations on data/ information gathering

from various sources and, in particular, from stakeholder engagement. Finally, Project Team responsibilities were limited to the generation of "potential actions" and did not include detailed attention to plan implementation.

1.3.4 Communications and Coordination Strategy: The Project Team adopted a policy of "continuous communications" involving USACE, the project contractor (URS Corporation), the WLEB Partnership, and the larger community of stakeholders. Regularly scheduled coordination meetings between USACE and URS (including liaison with the WLEB Partnership) ensured a clear understanding of expectations, responsibilities and timelines. Stakeholder meetings at the onset of the planning process, complemented by interviews and other communications throughout the process, provided interested parties with multiple "access points" to contribute to/ comment on interim products.

1.3.5 Steps in the Planning Process: Watershed assessments are multi-objective initiatives that feature a flexible approach to plan formulation and evaluation. The outcome is a basin/watershed management plan that identifies potential actions (and sponsors) to achieve established objectives. Steps associated with this watershed assessment process include:

- Define the study area based on hydrologic units.
- Establish a watershed group (partnership) to participate in the planning process.
- Establish a framework for federal, state, local, and tribal involvement in the plan process.
- Investigate all problems, needs and opportunities consistent with authorizing language.
- Develop a vision for the watershed and associated goals and objectives
- Develop a scope of work for accomplishing all study tasks.
- Research historic and current conditions and uses of the watershed.
- Identify potential future changes in the watershed and associated future conditions.
- Qualitatively assess cumulative effects of various activities in the watershed.
- Evaluate alternative resource uses and environmental, economic and social impacts.
- Prioritize water and land-related resource problems and opportunities.
- Identify and evaluate conflicting uses and monetary/ non-monetary trade-offs.
- Develop measures to assess progress in implementing recommended future activities.
- Assess project costs, benefits, and environmental impacts of recommended activities.
- Identify and prioritize potential actions in each watershed.
- Document how potential actions will achieve restoration, protection and sustainable use.
- Determine the optimal schedule (and sponsor) for implementing potential actions
- Prepare a comprehensive watershed plan.
- Pursue USACE- identified projects under normal budget procedures.

These steps provided general guidance in the preparation of the St. Marys Watershed Assessment, consistent with the various principles, assumptions and constraints identified above.

1.3.6 Reference Materials: An extensive library was established to support project activities and provide cited references for planning documents. (Section 11 References Cited).

1.3.7 Plan Implementation Strategy: The watershed assessments will provide guidance to an array of public and non-governmental entities with a role and responsibility for the restoration, protection and sustainable use of the water and related natural resources of the WLEB. Specific approaches to plan implementation will be a function of requirements and procedures associated with potential sponsors. As noted, they will likely range from federal agencies and state/ local governments to private sector and other non-governmental entities.

The plan implementation strategy for federal projects will be dictated by the nature of the potential action, and whether that action can be implemented under existing authority or will require authorization by the Congress. Plan implementation for other projects will be accomplished via partnerships among local, state and federal entities and/or by specific sponsors. Funding sources for implementation will vary, but could include a broad range of traditional (e.g., federal, state and local government funding, foundations) and non-traditional sources (e.g., conservancy districts, utilities, assessments, mitigation banks, in-lieu fees).

1.4. Report Overview and Organization

This report is organized into multiple primary chapters that respond to authorizing language in Section 441 of WRDA 1999. An *overview of baseline watershed characteristics* is offered in Chapter Two, and includes the physical system and natural resources; socio-economic characteristics; cultural characteristics; the institutional and regulatory setting; and trends/ issues and their implications for watershed protection and management. Chapter Three focuses principally on *water quantity issues* (i.e., flood damage reduction, water supply, sedimentation, bank erosion) while Chapter Four addresses *water quality*. *Natural resource-based recreation* is the

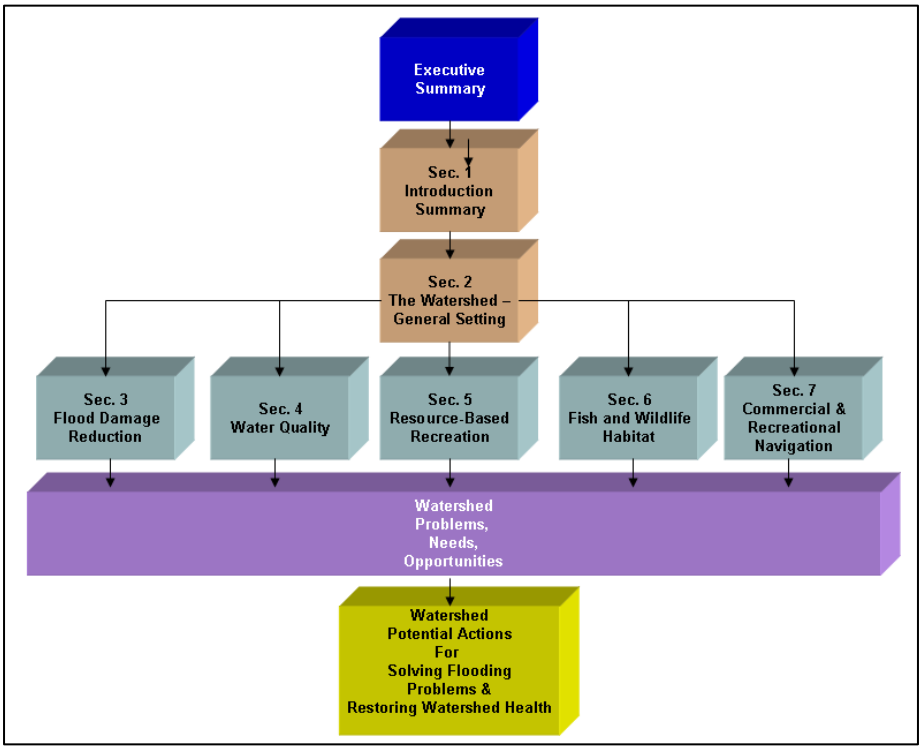


Figure 1-5. Report organization.

focus of Chapter Five, and focuses on parks (local and regional), hunting preserves, and other recreation activities (e.g., hiking, biking, canoeing, boating, fishing, hunting.) Chapter Six focuses on *fish and wildlife enhancement*, documenting problems, needs and opportunities associated with forested, riparian and wetland habitat resources. *Commercial and recreational navigation* is the topic of Chapter Seven, documenting existing facilities, uses and unmet needs that can be addressed by a series of potential actions. Based on the findings and potential actions discussed previously, Chapter Eight presents a preliminary listing of priority potential actions *(*drawn from plan development research), that are necessary for the restoration, protection and sustainable use of the water and related natural resources of the watershed. *Plan integration* is the focus of Chapter Nine, which discusses the relationship of individual watershed reports to the larger basin-wide integrated report that will be presented to the Congress. Chapter Ten addresses *plan implementation* and how project findings will be implemented and by whom.

2. THE WATERSHED - GENERAL SETTING

2.1 Introduction

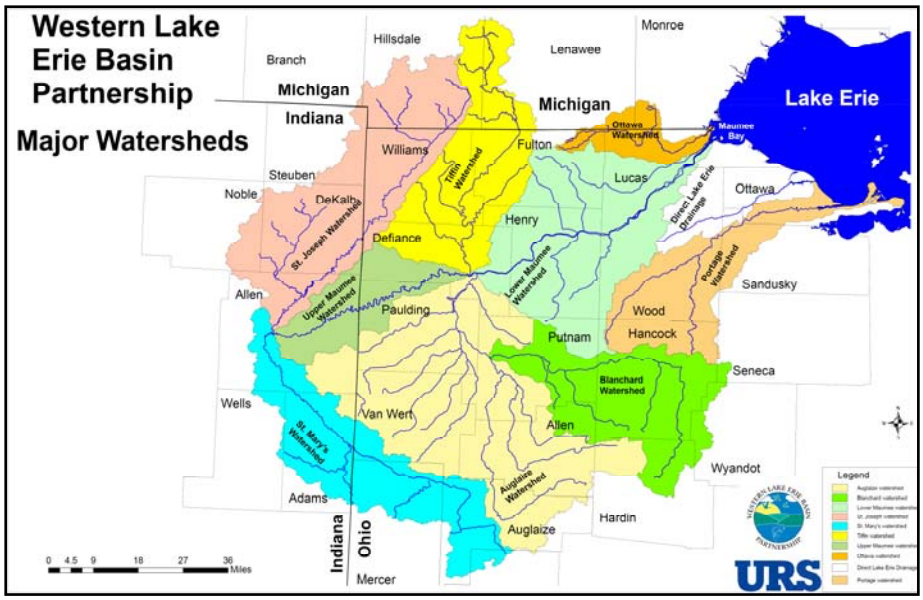


Figure 2-1. Western Lake Erie Basin Project Area.

The St. Marys River Watershed is one of 10 sub-watersheds included in the Western Lake Erie Basin Project Area (Figure 2-1). It is located within several counties of northeast Indiana and northwest Ohio (indicated in light blue in Figure 2-1). The St. Marys River begins in west-central Ohio near Minster, where it flows northward through the city of St. Marys, Ohio. The river continues flowing northward for approximately ten miles before turning west-northwest to flow through Decatur, Indiana. The river continues flowing northwesterly into the City of Fort Wayne, where it hooks around in its last half mile to join the St. Joseph River from the west to form the Maumee River in downtown Fort Wayne. The Maumee River then flows northeast approximately 150 miles from central Fort Wayne to its mouth at Lake Erie.

2.2 Physical System and Natural Resources

2.2.1 Location and Geography: The St. Marys River Watershed is located in northeastern Indiana and northwestern Ohio, covers an area of 814 square miles, and slopes down to the northwest from Shelby, Ohio (Figure 2-2). The watershed contains approximately 434 miles of tributary perennial streams (Figure 2-3).The St. Marys River originates near Minster, Ohio and flows to the northwest through Shelby, Auglaize,

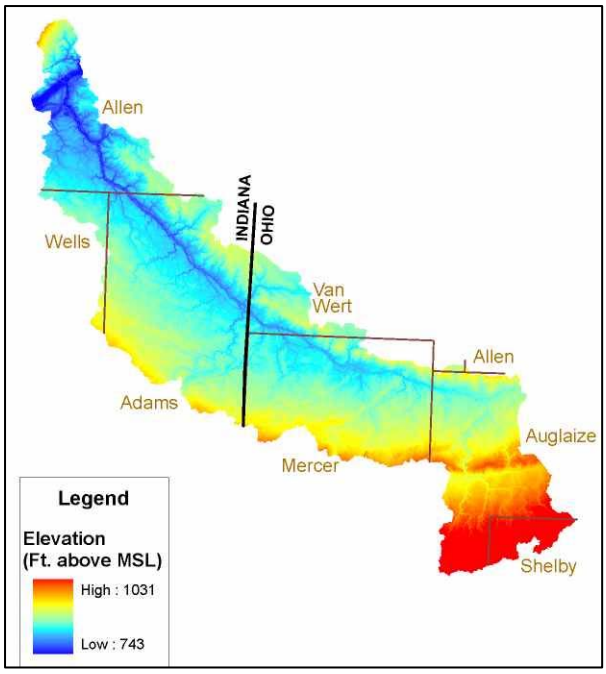


Figure 2-2. Elevation, St. Marys Watershed

Mercer and Van Wert counties in Ohio. The river flows into Indiana through Adams County southwest of Pleasant Mills, near the Indiana State Line and Highway 33. It continues to the northwest, flowing through Wells County and Decatur, Indiana into Allen County (Table 2-1). It joins the St. Joseph River in Fort Wayne to form the Maumee River, which flows northeast and empties into Lake Erie.

Land cover in the watershed is predominantly (68%) agricultural. with corn and soybeans comprising the majority of crops. The entire watershed is located in the Eastern Corn Belt plain ecoregion, characterized by smooth plains, beech/maple hardwood forest, and productive soils. Additional land uses include urban, wetlands and wooded areas. Decatur, Berne and Fort Wayne (all in Indiana) are major urban areas within the watershed. Decatur lies entirely within the watershed, while Berne and Fort Wayne are located within more than one watershed.

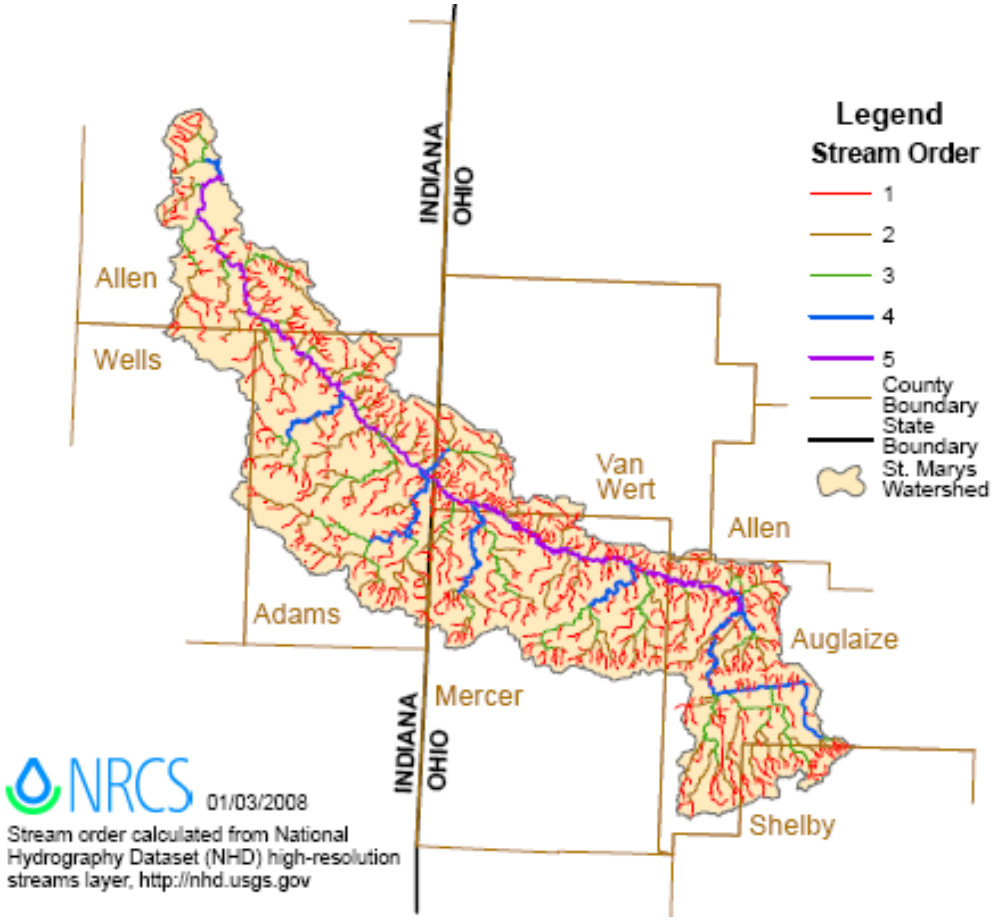


Figure 2-3. St. Marys River and tributaries.

The HUCs for the St. Marys River Watershed are:

HUC11 Water Assessment Unit Description
04100004 - St Marys River Watershed
04100008 010 - Clear Creek & East Fork St. Marys River
04100008 020 - Muddy Creek
04100008 030 - Center Branch of St. Marys River
04100008 040 - St Marys River below Center Branch to above Sixmile Cr.
04100008 050 - Kopp Creek
04100008 060 - Sixmile Creek

Table 2-1 - Counties located in the St. Marys Watershed

County	Total Acres	Acres in Watershed	% of Watershed Area	% of County in Watershed
Adams	217,855	158,828	31.3%	72.9%
Allen	423,033	71,536	14.1%	16.9%
Auglaize	257,604	100,072	19.7%	38.8%
Mercer	304,264	119,016	23.4%	39.1%
Shelby	262,903	15,136	3.0%	5.8%
Van Wert	262,801	29,844	5.9%	11.4%
Wells	236,450	13,676	2.7%	5.8%
Totals		508,214	100.0%	

2.2.2 Climate: Northern Indiana is located in the mid-latitude climate zone, within the Prevailing Westerlies. Summers are typically moderately hot for extended periods, while cold northern air masses dominate the region during winter months. Winter temperatures average 28° F, with summer temperatures averaging 72°. Due to the Prevailing Westerlies, most weather systems move west to east across the region, with the predominant surface wind from the southwest.

Annual precipitation is generally well distributed with somewhat larger amounts in late spring and early summer. Rainfall averages 36 inches per year with 60% falling between the April to September growing season (Figure 2-4). Snowfall averages 29 inches annually, also providing a vital source for soil moisture. The average relative humidity is 60% and, despite considerable cloudiness during the winter months, sunshine days average about 75% over the course of the year.

Temperature differences between daily highs and lows average about 20 degrees F°. The average growing season is 173 days, with the final spring freeze typically in late April and the first autumn freeze typically in mid-October.

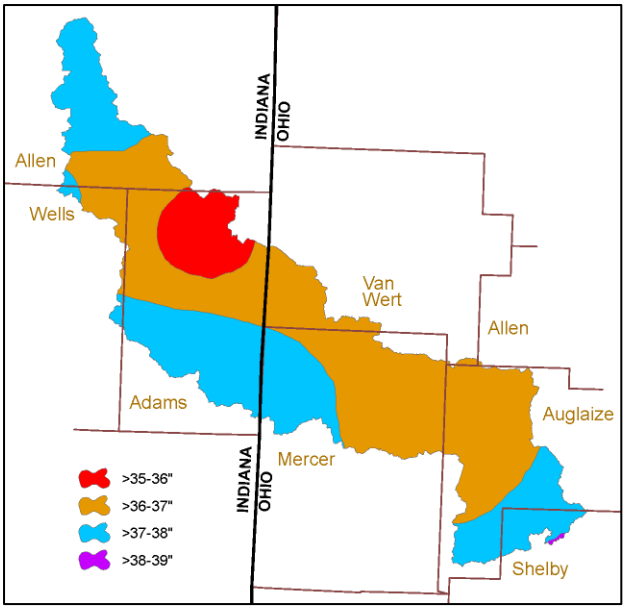


Figure 2-4. Rainfall, St. Marys Watershed

Snowfall in the St. Marys Watershed averages 32.4" per year. Six inch or greater snowfalls usually only occur once per season, and snow depth at any given time rarely exceeds 10”.

Typically, the last snow of the season occurs in mid-April, with the first snow occurring around the first of November. The snowiest season on record is 1981-82 with 81.2", contrasting with a record low of 8.3" in 1932-22. Freezing precipitation events are not uncommon but major storms are usually several years apart.

Rains and/or snowmelt occurring in winter and early spring are largely responsible for peak annual flooding along major streams; such events have caused significant damage and loss of property. Floods along the Maumee River are intensified when the St. Joseph and St. Marys Rivers reach peak flow at the same time. Due to the presence of urban development in Fort Wayne, Allen County has historically experienced the most significant flooding problems.

Several studies examining the current/ prospective impact of global warming on the Great Lakes Basin have been undertaken in recent years, with some focusing specifically on Lake Erie and Ohio. (Hall and Stuntz 2007, National Conference of State Legislatures 2008, Sousounis and Bisanz 2000, King et al. 2003, Croley 2003). These studies generally acknowledge a range of climate change impacts associated with increased average temperatures, including higher over-land evapotranspiration and lower runoff, reduced soil moisture, potentially lower groundwater tables and changes in stream base flows, alternation of wetland water balances, and increased summer storm intensity. The impact of these changes may include need for increased irrigation, change in available water resources for industry and citizens, degradation of water quality and increased treatment costs, potential increases in urban flooding due to higher intensity storms, and alternation if aquatic and wildlife resources, including species mix and diversity. Global warming and associated climate change impacts are increasingly important considerations in identifying potential actions needed to sustain and restore watershed health, and reduce the risks associated with watershed scale impacts.

2.2.3 Air Quality: Specific information relating to air quality within the watershed was not made available at the time of this report. Additional information may be added once the Rapid Watershed Assessment has been completed for the watershed. The only pollutants for which there are portions of Ohio and Indiana designated non-attainment are Ozone (eight-hour) and PM 2.5. All of the counties located in the St. Marys River Watershed are in attainment for Ozone and PM 2.5 (OEPA 2008a, IDEM 2008).

2.2.4 Geology: The St. Marys River Watershed has had extensive glaciation. The landscape of the Maumee River Basin is primarily a product of the latest Wisconsin glacial events of the Erie and Saginaw ice lobes, then as the floor of ancestral Lake Erie.

Major landscape elements include: 1) the Tipton Till Plain, a vast region of very low relief that generally corresponds to the southern part of the basin: 2) the Maumee Lacustrine Plain, a flat, nearly featureless paleo-lake bottom that generally corresponds to the central core of the basin, and 3) the Steuben Morainal Lake Area characterized by low-to high-relief and generally corresponding to the northern part of the basin.

The land surface over the greater part of the Maumee River basin is underlain by glacial till or till-like sediments. Such sediments are fine- to medium-grained and poorly-sorted, having minimal reworking by meltwater and mass movement. The surface till in most of the Maumee River Basin is typically clay rich, reflecting the abundance of both lake and shale bedrock in the source area of the Erie Lobe east of the basin. In contrast, tills of the Saginaw Lobe, which underlie Erie Lobe tills in many places in the northern part of the basin, are sandy due to the combination of coarse-grained bedrock and abundant outwash in the source area.

Deposits formed in glacial lakes are also widespread in the Maumee basin, especially in the east central part of the basin known as the Maumee Lacustrine Plain. Sediments range from silt and clay that settled out of the still water in the central portions of the lake, to coarse sand and gravel associated with high-energy shorelines.

Headwaters of the St. Marys River gather along the St. Johns Moraine in the Central Ohio Clayey Till Plain. The St. Marys flows across the Central Ohio Clayey Till Plain at an average gradient of about 2.5 feet per mile and joins the St. Joseph River at the western edge of the Maumee Lake Plain. The St. Marys River itself is comprised of Alluvial and Outwash deposits. The alluvium does not extend significantly beyond the channel. The surrounding clayey or silty soils have high runoff coefficients. These factors contribute to large, surface runoff and, ultimately, to flooding of the St. Marys River.

Watershed surface elevations range from 780 to 840 feet mean sea level. The area is very poorly drained, with ditches commonly used to carry runoff and to lower the characteristically shallow water table within the slow draining till.

2.2.5 Soils: The land surface over the greater part of the Maumee River basin is underlain by glacial till or till-like sediments. Such sediments are fine- to medium-grained and poorly-sorted having minimal reworking by meltwater and mass movement. The surface till in most of the Maumee River basin is typically clay rich, reflecting the abundance of both lake and shale bedrock in the source area of the Erie Lobe east of the basin. In contrast, tills of the Saginaw Lobe, which underlie Erie Lobe tills in many places in the northern part of the basin, are sandy due to the combination of coarse-grained bedrock and abundant outwash in the source area.

Deposits formed in glacial lakes are also widespread in the Maumee basin, especially in the east central part of the basin known as the Maumee Lacustrine Plain. Sediments range from silt and clay deposited in quiet water in the central portions of the lake, to coarse sand and gravel associated with high-energy shorelines.

Elevations range from 780 to 840 feet mean sea level. The area is very poorly drained, with drainage ditches commonly used to carry runoff and lower the characteristically shallow water table within the slow draining till. The St. Marys River itself is comprised of alluvial and outwash deposits. The alluvium does not extend significantly beyond the channel. The surrounding clay/ silty soils have high runoff coefficients. These factors contribute large, surface runoff and ultimately flooding of the St. Marys River.

Indiana, particularly in the central region, has some of the most productive soils in the United States. These soils, coupled with good management and a favorable climate, contribute to consistently high crop yield levels

2.2.6 Water Resources: Water resources within the watershed consist of a combination of surface (man made reservoirs, small lakes, and streams) and groundwater resources. Figure 2.2 depicts the network of streams and their stream order in the watershed, while Table 2.2 summarizes the stream data by county. The surface water resources of the Maumee River Basin include the Maumee, St. Marys, and St. Joseph Rivers; Cedar, Little Cedar, Blue, Fish, and Spy Run Creeks; an extensive network of smaller tributary streams and ditches; two man-made reservoirs; natural lakes; ponds; and scattered remnants of marshes, swamps, and other wetlands.

Table 2-2. Stream miles by order (NRCS, 2008).

Description	Acres of Standing Water (Lakes/ Ponds)	Total Miles of Streams	Total Miles 1st Order Streams	Total Miles 2nd Order Streams	Total Miles 3rd Order Streams	Total Miles 4th Order Streams	Total Miles 5th Order Streams
St. Marys Watershed	1009[1]	1303.9	713.0	285.9	140.5	75.7	88.8
Adams Co., IN Portion	360.4	371.1	196.7	90.4	40.1	22.9	21.0
Allen Co., IN Portion	294.8	161.7	80.3	35.8	23.3	2.8	19.6
Auglaize Co., Portion	250.9	304.5	157.0	73.1	32.6	29.2	12.6
Mercer Co., Portion	51.6	322.7	180.3	60.4	36.7	18.1	27.2
Shelby Co., Portion	27.6	43.9	31.5	10.0	2.4	N/A	N/A
Van Wert Co., Portion	20.8	90.2	58.5	15.2	5.4	2.7	8.4

The present surface-water hydrology of the Maumee River Basin is different from the natural drainage conditions that existed prior to permanent settlement of the area. The most extensive changes are related to clearing of hardwood forests and ditching and tiling of former swamps. The Three Rivers Water Filtration Plant was constructed at the confluence of Fort Wayne's three rivers in 1933. When it was built, it had the capacity to produce 24 million gallons of water per day (MGD). Since the original construction, there have been two major additions: a 24 MGD expansion in 1955 and a 24 MGD addition in 1981. The total capacity of the Plant

today is 72 million gallons per day, enough to supply the needs of Fort Wayne for at least the next 10 to 15 years.

While the urbanized Ft. Wayne portion of the watershed relies on city water supplies from the St. Joseph River, rural farms and smaller towns in the basin primarily rely on ground water supplies for drinking water (Figure 2-5).

In general, the groundwater resources of northern Indiana are good to excellent. Exclusive of some areas in northwestern Indiana, well yields from 200 to 2,000 gpm (or 0.3 to 2.8 million mpg can be expected in most areas. Major areas of groundwater availability are found where the productive Silurian-Devonian bedrock aquifer system underlies large areas and where deposits of glacial material up to 500 feet in thickness contain highly productive inter-till sand and gravel aquifers. A number of major outwash plain and "valley train" sand and gravel deposits are associated with the St. Joseph, Elkhart, Pigeon, Fawn, Eel and Tippecanoe River valleys. These sources are capable of large ground-water production. Wells with capacities greater than 400 gpm, or 0.6 mgd, are quite common. (Indiana DNR - http://www.in.gov/dnr/water/files/indiana-wa.pdf).

2.2.7 Aquatic Ecology: As noted in Table 2-3, water quality in the watershed is highly impaired, with five of six hydrologic units having at least half of their sites in non attainment due to factors such as habitat/ flow alternation, siltation, organic enrichment, low oxygen, nutrient enrichment and ammonia.

Table 2-3. Overall water quality assessment (NRCS, 2008).

Unit	Attainment Status			Impairment Causes					
	Watershed Assessment Unit Score	% Sites Full	% Sites Part or Non-Attainment	Habitat/Flow Alteration	Siltation	Organic Enrichment	Low Oxygen	Nutrient Enrichment	Ammonia
Headwaters 10	24	25%	75%	X		X	X	X	X
Outlet/Lye Creek 20	53	50%	50%	X	X	X	X	X	X
Eagle Creek 30	39	27%	73%	X	X	X	X	X	X
Ottawa Creek 40	54	50%	50%	X	X		X	X	
Riley Creek 50	7	7%	93%	X	X	X	X	X	
Cranberry Creek 60	75	56%	44%	X		X	X	X	X
Large River Unit	100	100%	0%	X		X		X	

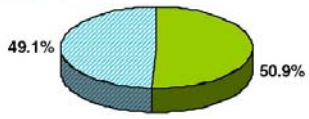
The Indiana Department Environmental Protection completed a 26 site sampling program in the major drainage systems and developed a provisional Index of Biotic Integrity (mIBI). Only one site is classified as non-impaired; 17 are slightly impaired; eight are moderately impaired; and none of the sites sampled are classified as severely impaired.

In 1991, the USEPA and IDEM sampled fish populations in the Maumee River Basin in Indiana. A total of 77 sites were sampled to develop an Index of Biotic Integrity (IBI) for the basin. Overall trends saw increasing biological integrity with increasing drainage area. In general, the St. Joseph River and its tributaries contain the most diverse fish community in the basin, and the St. Marys, the least.

Water Withdrawal in the St. Marys Basin

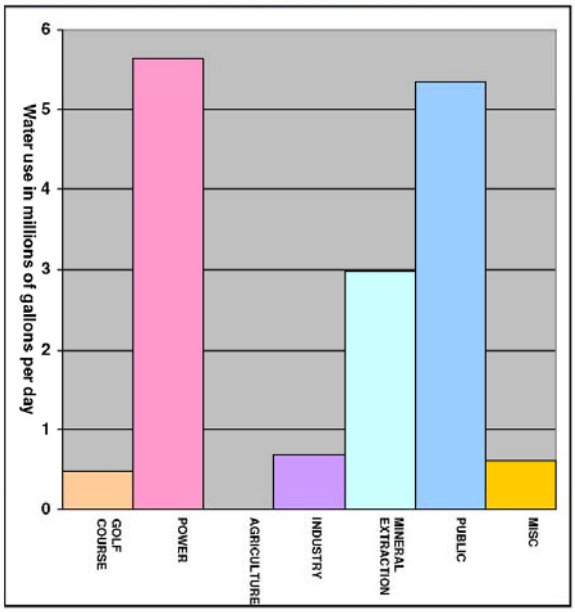
Total fresh-water withdrawal and source of water in 2005

Source	Water use, in million gallons per day	Percent of total use
Surface Water	7.74	49.1%
Ground Water	8.02	50.9%
Total	15.76	100.0%

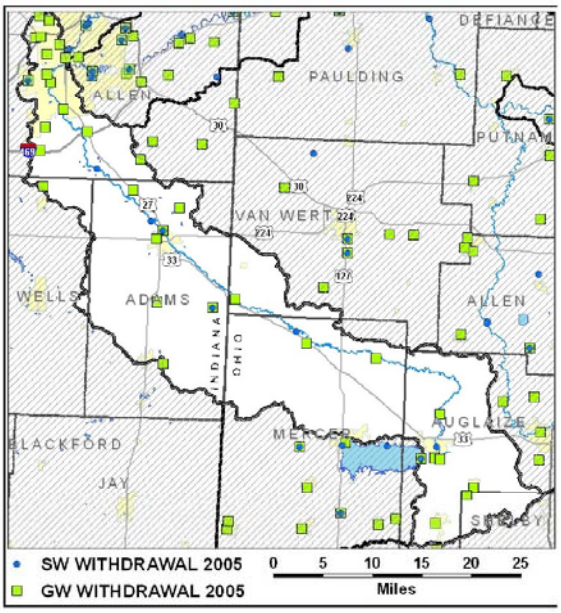


Ground Water Surface Water

Total fresh-water withdrawal by category in 2005



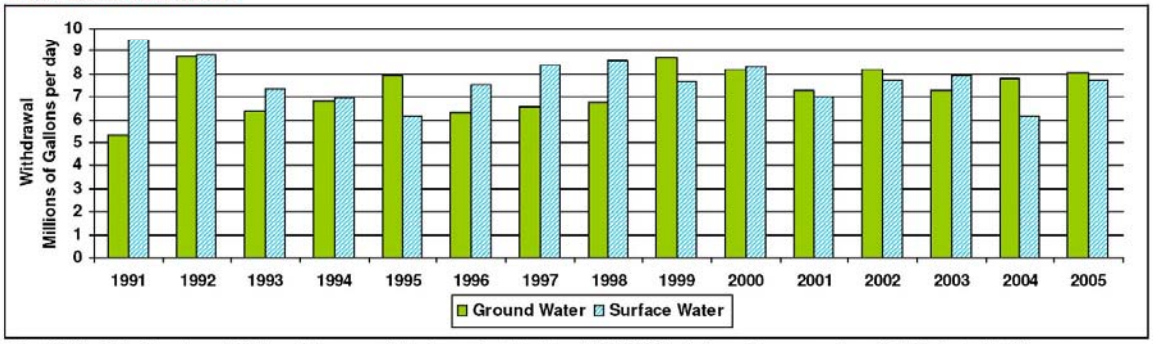
Location of facilities withdrawing water in 2005



Total fresh-water withdrawal by category in 2005 in millions of gallons per day

	Golf Course	Power	Agriculture	Industry	Mineral Extraction	Public	Misc	Total
Surface Water	0.05	5.64	0.00	0.47	1.34	0.00	0.23	7.74
Ground Water	0.44	0.00	0.00	0.22	1.63	5.35	0.38	8.02
Total	0.49	5.64	0.00	0.70	2.97	5.35	0.61	15.76
Percent Total	3.1%	35.8%	0.0%	4.4%	18.9%	34.0%	3.9%	100.0%

Water withdrawal trends



Provided by Ohio Department of Natural Resources (http://www.dnr.state.oh.us/tabid/4035/Default.aspx) in cooperation with U.S. Geological Survey (http://oh.water.usgs.gov/) and Natural Resources Conservation Service (www.oh.nrcs.usda.gov/). Indiana data provided by Indiana DNR (http://www.in.gov/dnr/water/water_availability/SWWF/index.html). See (www.dnr.state.oh.us/tabid/18805/Default.aspx) for explanation of data.

Figure 2-5. Water withdrawal from the St. Marys River.

2.2.8 Forests, Wetlands and Floodplains: A comprehensive inventory of Indiana's wetlands was completed by the U.S. Fish and Wildlife Survey as part of its National Wetlands Inventory. The National Wetland Inventory maps for Ohio have not yet been completed, particularly in the NW corner of the state. Current estimates indicate the Maumee River Basin contained 11,428 wetlands covering approximately 51.3 square miles or 32,830 acres. This was roughly four percent of the basins land area in Indiana. Palustrine wetlands constitute 99.5% of the region's wetlands, and nearly 86% of the total wetland area within the Indiana portion of the basin. Riverine and lacustrine wetland coverage accounts for approximately four and 10%, respectively. Fifty-seven percent of the Palustrine Wetlands in the Maumee River Basin are classified as forested, with 27% classified as emergent.

Wetlands in the Maumee River Basin can be further characterized by the duration and timing of surface inundation. Approximately 45% are seasonally flooded, 31% temporarily flooded, 12% semi-permanently flooded or intermittently exposed, and eight percent either saturated or permanently flooded. The remaining four percent are unclassified.

Size classification is important when evaluating different functions and values of a given wetland. With flood prevention, for example, a large wetland will provide increased water storage potential, whereas many species of waterfowl prefer smaller wetland areas for nesting and raising their young. In the Maumee River Basin, nine percent of wetlands are less that one acre in size, 44% are from one to 10 acres, 26% are from 10 to 40 acres, and the remaining 21% are greater that 40 acres.

2.2.9 Fisheries and Wildlife Habitat: The St. Marys River Watershed is located in the Eastern Corn Belt Plain ecoregion, characterized by smooth plains, beech/maple hardwood forests, and productive soils.

The Eastern Corn Belt Plain is a primary rolling till plain with local end moraines; the soil tends to be lighter in color, loamier, better drained and richer than other ecoregions in the area. Glacial deposits of Wisconsinan age are extensive and are not as dissected or as leached as the pre-Wisconsinan till which is restricted to the southern part of Ohio. Forests of American beech were once common on the Wisconsinan soils, while beech forests and elm-ash swamp forest dominated the wetter pre-Wisconsinan soils. Throughout this area today, extensive corn, soybean, wheat and livestock farming is dominant and has replaced the original beech forests and scattered elm-ash swamp forests.

It is estimated that only seven percent of the land use/land cover in the St Marys River watershed is forested, comprised of approximately 35,420 acres of deciduous forest. Wetland acreage is minimal and estimated at approximately 80 acres. Common tree species include oaks (red, white, bur, swamp white, chinquapin), green and white ash, maples (red, sugar, silver, box elder), basswood, elm, black walnut, honey locust, hackberry and other hardwoods. Many of the forested areas are found along major streams, and nearly all are privately owned. The small percentage of publicly owned forests are managed by county park districts; there is no state or federally owned forest land in the watershed.

2.3 Socio-economic Characteristics

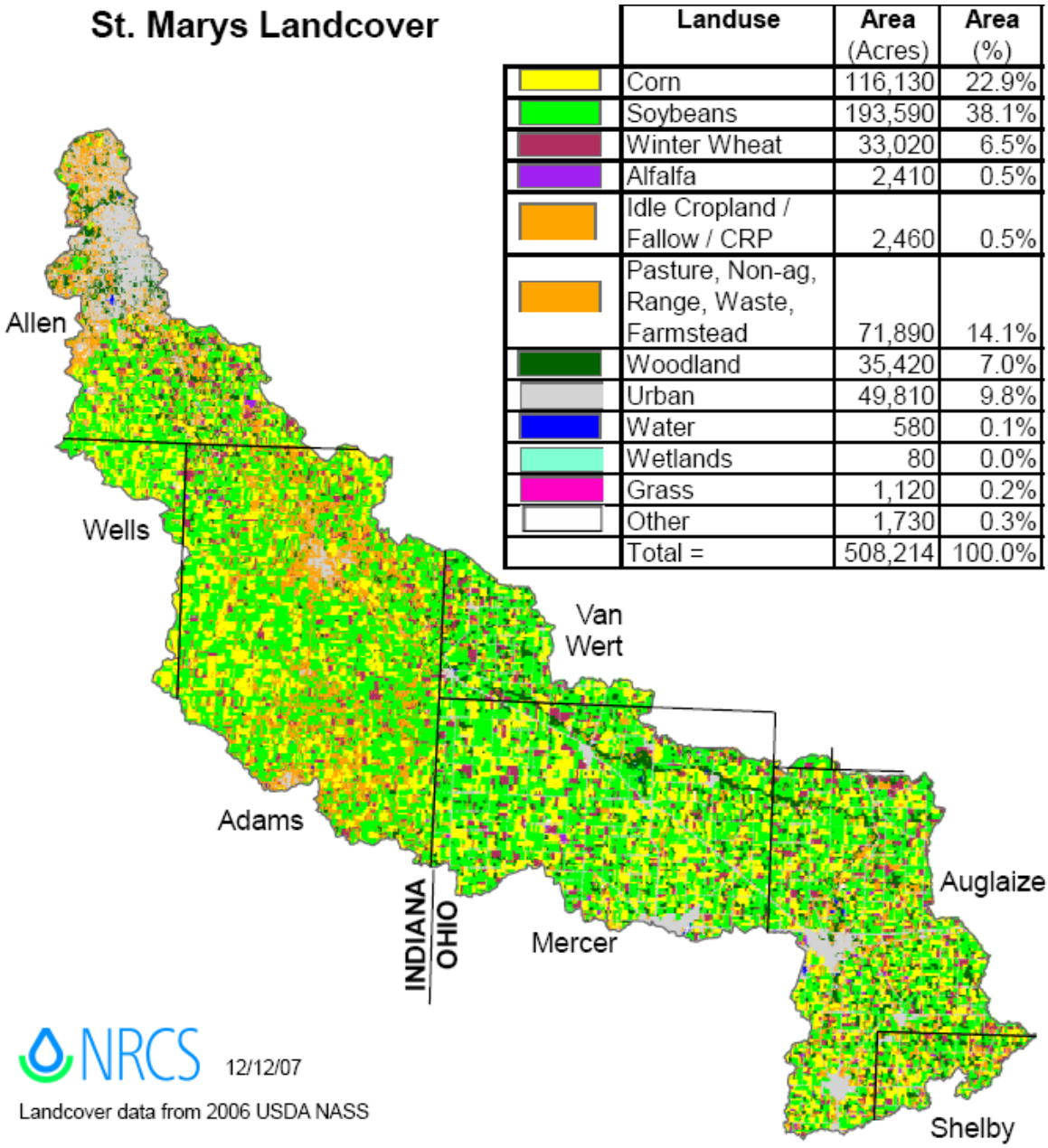
2.3.1 Demographics: Approximately 61% percent of the watershed's population lives in urban areas, with almost 80% residing in Allen County. The population is growing in the watershed, a trend that is expected to continue. Per capita income in the basin averages about 97 percent of that for Indiana. Recent unemployment trends are slightly higher than the state average, but lower than the national average. Employment and earnings by industry are largely based on manufacturing, the service industry, wholesale and retail trade, and government. These four economic sectors make up approximately 76 percent of the total employment earnings in the watershed. Additional demographic information is provided in Table 2.4.

Table 2-4. Demographic criteria and racial makeup in St. Marys watershed counties.

Demographic Criteria	Allen County, Indiana	Adams County, Indiana	Mercer County, Ohio	Auglaize County, Ohio
2006 Population	347,316	33,719	41,303	47,060
2000 Population	331,849	33,625	40,924	46,611
Median Value Housing Unit (2000)	$ 88,700	$ 85,400	$ 94,000	$ 90,600
Median Household Income (2004)	$ 42,867	$ 43,781	$ 46,210	$ 46,070
Persons living below Poverty Limit (2004)	11.3 %	10.1 %	6.4 %	7.0 %
Racial Makeup (2005)	**Allen County, Indiana**	**Adams County, Indiana**	**Mercer County, Ohio**	**Auglaize County, Ohio**
White Persons	84.3 %	98.7 %	98.4 %	97.9 %
Black Persons	11.79%	0.3 %	0.2 %	0.3 %
American Indian / Alaska Native	0.4 %	0.2 %	0.3 %	0.2 %
Asian Person	1.9 %	0.2 %	0.5 %	0.6 %
Native Hawaiian / Other Pacific Islander	0.1 %	0.0 %	0.0 %	0.0 %
Persons of 2 or more races.	1.6 %	0.6 %	0.6 %	0.9 %

2.3.2 Land Use: The primary land use within the St. Mary's River Watershed (68.5%) is agriculture, with primary field crops including soybeans, corn and wheat. Livestock raised in

the watershed include confined livestock (hogs) and some beef cattle. Other land uses include timber and scattered residential. Figure 2-6 displays the land use in the watershed.



	Landuse	Area (Acres)	Area (%)
	Corn	116,130	22.9%
	Soybeans	193,590	38.1%
	Winter Wheat	33,020	6.5%
	Alfalfa	2,410	0.5%
	Idle Cropland / Fallow / CRP	2,460	0.5%
	Pasture, Non-ag, Range, Waste, Farmstead	71,890	14.1%
	Woodland	35,420	7.0%
	Urban	49,810	9.8%
	Water	580	0.1%
	Wetlands	80	0.0%
	Grass	1,120	0.2%
	Other	1,730	0.3%
	Total =	508,214	100.0%

Figure 2-6. Land use in the St. Marys River Watershed.

2.3.3 Business and Industry: Major employers in the St. Marys River Watershed counties include A& L Laboratories, Almco Steel Products, Eaton Corporation, Purdue University – Ft. Wayne, Indiana Tech, and Marathana Industry.

2.3.4 Labor Force, Employment and Income: Data for the four counties with the most land mass in the St. Marys River Watershed is provided in Table 2-5. Information for counties in Indiana was obtained from Stats Indiana – Allen and Adams County Indiana Profile (http://www.stats.indiana.edu). Information for counties in Ohio was obtained from Ohio County Profiles, Ohio Department of Development, Office of Strategic Research (http://www.odod.state.oh.us).

In 2006, median household income ranged from $42,742 to $46,930 per county in the watershed.

Table 2-5. Labor force, employment, and income in Allen and Adams Counties, Indiana and Mercer and Auglaize Counties, Ohio.

Demographic Criteria	Allen County, Indiana	Adams County, Indiana	Mercer County, Ohio	Auglaize County, Ohio
Labor Force 2006	184,398	21,767	24,100	26,900
Employed Labor Force in 2006	175,277	20,456	23,200	25,800
Unemployed Labor Force in 2006	9,121	1,311	900	1,100
Unemployment Rate (2006)	4.9 %	6.0 %	4.0 %	4.5 %
Median Household Income (2004)	$ 42,867	$ 46,930	$ 42,742	$ 43,367

Unemployment rates were highest in Adams and Allen County at 6.0 and 4.9 percent, respectively. Over 9,000 people were unemployed in the largely urban Allen County in 2006.

Leading employment sectors include manufacturing, wholesale/retail business, health care and social services, federal/state/local government, accommodations and food services, and administrative services. Related growth sectors appear to be retail, finance and insurance, professional and technical services, administrative waste services, accommodation and food services, and local government.

Table 2-6 provides additional business, employment and income data income for counties lying wholly or partially within the St. Marys River Watershed. In 2005, private non-farm establishments with paid employees ranged from 594 to over 9,000 per county. The greatest number of establishments was in Allen County, IN; the lowest was in Van Wert County, OH.

Table 2-6. Business, employment, and income.

Maumee Sub-Basin – St. Marys									
County	Approx Part in Watershed	Population 2006	2000 Persons 18 – 64 Years Old%	2000 Persons 18 – 64 Years Old (Calc)	2005 Private NonFarm Establishments w Paid Employ	2005 Private NonFarm Employment	2000-2005 Priv. NonFarm Employment % Change	2004 Median Household Income	2004 Persons Below Poverty %
Indiana State		6,313,520	62.6%	3,952,263	149,871	2,610,899	-1.5%	$43,217	11.1%
Allen, IN	16.9%	347,316	61.5%	213,599	9,416	169,815	-5.1%	$42,867	11.3%
Adams, IN	72.9%	33,719	56.3%	18,983	786	13,523	-5.7%	$43,781	10.1%
Wells, IN	5.8%	28,199	60.7%	17,117	635	9,902	-13.3%	$45,645	7.6%
Ohio State		11,478,006	69.5%	7,977,214	270,968	4,762,618	-4.8%	$43,371	11.7%
Mercer, OH	39.1%	41,303	58.9%	24,327	1,015	14,297	-14.4%	$46,210	6.4%
Van Wert, OH	11.4%	29,303	60.7%	17,787	594	10,762	-6.1%	$42,351	7.0%
Auglaize, OH	38.8%	47,060	60.5%	28,471	1,031	19,167	7.0%	$46,070	7.0%
Shelby, OH	3.0%	48,884	60.5%	29,574	1,058	26,607	2.3%	$46,686	7.8%

Sources: Census 2000 Gateway, State and County Quick Facts, Census Bureau. Ohio County Profiles, Ohio Department of Development, 2004. 2002 Census of Agriculture – County Data, USDA, National Agricultural Statistics Service.

2.3.5 Property Values and Tax Revenues: Table 2-7 depicts the economic value for farm land and housing in the St. Marys River Watershed. In 2006, the number of housing units ranged from 11,619 (Wells County, IN) to 151,268 (Allen County, IN). Home ownership percentage per county ranged from 71.0% to 80.9%. The median value of owner occupied housing units ranged from $76,000 to $97,000 per county.

Table 2-7. Property statistics.

County	Approx Part in Watershed	2006 Housing Units	2000 Home Ownership Rate %	2000 Median Value of Owner Occupied Housing Units
Indiana		2,756,331	71.4%	$ 94,300
Allen, IN	16.9%	151,268	71.0%	$ 88,700
Adams, IN	72.9%	13,061	77.0%	$ 85,400
Wells, IN	5.8%	11,619	80.9%	$ 87,900
Ohio		5,044,709	69.1%	$103,700
Mercer, OH	39.1%	16,699	80.1%	$ 94,000
Van Wert, OH	11.4%	12,731	81.7%	$ 76,000
Auglaize, OH	38.8%	19,362	77.9%	$90,600
Shelby, OH	3.0%	19,850	74.3%	$97,000

Sources: Census 2000 Gateway, State and County Quick Facts, Census Bureau; Ohio County Profiles, Ohio Department of Development, 2004; and 2002 Census of Agriculture–County Data, USDA, National Agricultural Statistics Service.

Local tax revenues generally include revenue sharing (federal, State, local), sales taxes, and local property and service district taxes.

2.3.6 Natural Resource - based Recreation: Very few natural resource-based recreation opportunities are offered within the Indiana portion of the St. Marys River Watershed, There are no state parks within the watershed, and the river is classified as "non-navigable" by the state's Department of Natural Resources. This contrasts with Ohio, where Grand Lake St. Marys Reservoir, at the headwaters of the St. Marys River system, is part of the state parks

system. Originally developed as a feeder for the Miami and Erie Canal, Grand Lake St. Marys was, for many years, considered the largest man-made reservoir in the world. Covering 13,500 acres (55 km²) in Auglaize and Mercer Counties with an average depth of five to seven feet (1.5 to 2 m), Grand Lake Saint Marys and its associated state park offer swimming, boating (motor and non-motor), camping and fishing.

Hunting along much of the mainstem of the St. Marys River is largely limited to fencerows and along streams and ditches where only limited habitat exists. Recreation on the St. Marys River generally includes fishing, canoeing wading and sight-seeing. Since much of the St. Marys River is relatively narrow and shallow before reaching its confluence with the St. Joseph and Upper Maumee Rivers, only small, shallow-draft watercraft can navigate the river. A more detailed description of recreation resources in the watershed is provided in Chapter 5.

2.3.7 Public Facilities and Services: The watershed is easily accessible via interstate highways 69 and 75, plus several Indiana and Ohio state highways and county roads. US Highway 33 roughly parallels the route of the St. Marys River from St. Marys, Ohio to Fort Wayne, Indiana. Because of the heavy agricultural settlement of the watershed, improved roads allow access to most areas of the St Marys River Watershed, and are generally well maintained.

The cities of Fort Wayne and Decatur, along with other urban areas and smaller communities, offer services that include abundant power supply, law enforcement, fire and emergency services, medical care, recycling centers, libraries, and community/social service centers.

2.3.8 Quality of Life: Health, Safety and Aesthetics: Community aesthetics are tied to the presence of a rural landscape (primarily agricultural), open spaces, numerous small towns and the presence of the Upper Maumee River and associated active and passive recreation opportunities.

The status of outdoor recreation activities, an indicator of quality of life characteristics, is summarized in Table 2-8.

Table 2-8. SCORP Outdoor recreation statistics by county (ODNR, IDNR).

County	Total County Acreage	Rank	Outdoor Recreation Acres	Rank	% of Total Acres for Outdoor Recreation	Rank	2006 Population*	Rank	Outdoor Recreation Acres per 1,000 Residents	Rank
Ohio										
Van Wert	262,805	69	795	69	0.1	87	29,303	75	27	83
Auglaize	257,360	82	3,155	82	0.2	76	47,060	50	67	58
Mercer	303,064	32	14,135	32	1.0	35	41,303	62	342	22
Shelby	262,886	67	3,478	67	0.3	73	48,884	49	71	53
Indiana										
Allen, IN	420,480	1(IN)	4694	N/A	N/A	N/A	344,006	3(IN)	14	N/A
Adams, IN	216,960	18(IN)	859	N/A	N/A	N/A	33,849	48(IN)	26	N/A

2.4 Cultural Characteristics

There are a number of identified Native American, historic properties, and prehistoric archaeological sites along the Upper Maumee. Members of the Shawnee, Miami, and Ottawa Nations were the earliest residents. Tuendawie and Enswoscah tribes of the Wyandott and Miami Nations occupied high ground at the junction of the Auglaize and Maumee Rivers.

2.4.1 Significance: The National Historic Preservation Act of 1966 (16 U.S.C. 470 et seq.) defines historic properties as any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places (NRHP). The term includes artifacts, records and remains that are located within such properties. The term also includes properties of traditional religious and cultural importance to an Indian tribe that meet NRHP criteria. Under Section 106 of the Act, federal agencies, with direct or indirect jurisdiction over proposed federal or federally assisted undertakings, to take into account effects on historic properties. In consultation with the State Historic Preservation Office (i.e., Ohio Historical Society), Indian tribes and other interested parties, the federal agency makes a determination of significance of potentially affected historic properties. A determination of adverse effect may require further studies, the development of a mitigation plan, and data recovery or architectural recordation.

2.4.2 Historic Properties: The Maumee River Valley is believed to have three Johnny Appleseed Orchards along the river. John Chapman, known as Johnny Appleseed, was born on September 26, 1774 in Leominster, Massachusetts. He began wandering the new frontier planting apple orchards between his late teens and early twenties because he wanted to provide apple trees to settlers.

Johnny Appleseed's first documented presence in Fort Wayne dates from April to May of 1834, when he paid $250 for two parcels of land along the Maumee River east of Fort Wayne. However, local traditions place him in the area much earlier, possibly sometime between 1822-30. In addition to the two plots on the Maumee River, he purchased 74 acres in Wabash Township, Jay County; 42 acres in Eel River Township, Allen County; and another 18 acres on the Maumee River near one of his earlier plots. Of the three tracts along the Maumee, only the 42acres plot was fully developed, and featured a nursery of 15,000 trees by 1845. Upon his death in March of that year, it is believed that Johnny was buried somewhere on the mound in the old Archer Cemetery, now Johnny Appleseed Park.

The Wabash/Erie Canal, the longest ever built in the United States, passes through the Maumee Valley. It was completed in 1853, connecting 468 miles of waterways from Toledo, OH to Evansville, IN. The canal era hit its peak between 1827 and 1850, opening the area to export trade and bringing with it thousands of immigrants. Many canal towns were established along the way: some still exist, although most disappeared as the railroad arrived to take the canal's place.

2.4.3 Archeological Sites: Paleo-Indian studies have been completed by Indiana University-Purdue University at Fort Wayne (Andrew White and Robert G. McCullogh, 2005). The

studies documented Native American occupation of the area from ancient times to the present. This region is one of the few places in the lower Great Lakes where Native Americans have maintained an unbroken connection to their ancestral lands.

The great Miami war chief, Little Turtle, was buried with honors by the garrison of Fort Wayne in 1815 and his gravesite is hollowed ground for Miami and non-Miami citizens. Native Americans have occupied the Maumee Valley for about 12,000 years. Indiana artifacts and burial mounds have been discovered at various sites within the watershed.

2.4.4 Native American Interests: Native Americans arrived in the Maumee Valley about 12,000 years ago. From 5,000 B.C. – 1,000 B.C., Native Americans, known as the Archaic People, were nomadic, but would temporarily settle where game was plentiful and crops could be grown. During the Woodland period (about 1,000 B.C. to the arrival of Europeans), Native Americans settled in villages, built mounds, produced crops, and used pottery and tools. By the 1700's, several tribes had settled along the Maumee River; the Miamis at what is now Lakeside Park in Fort Wayne, and the Shawnee and Delaware at the confluence of the Auglaize and Maumee Rivers.

The Home of Miami civil chief Jean Baptiste de Richardville, built in 1827 in Fort Wayne, is recognized as the oldest house of a Native American in the heartland. Richardville built a large trading empire that was instrumental in opening up the western wilderness. Richardville took advantage of the long portage that the Miami controlled, the only dry land connecting the extensive river systems between New Orleans and Montreal.

Table 2.9 lists federally-recognized Native American Nations with an historic presence/ prospective interest in the WLEB.

In northwest Ohio, the area around Grand Lake St Marys in Mercer and Auglaize Counties played an important part in the development of the Northwest Territory. The St. Marys River served as a vital link between the Great Lakes and the Ohio River. Due to heavy water traffic, the renegades Simon and James Girty established a trading post that eventually evolved into the town of St. Marys. General "Mad" Anthony Wayne passed through the area in 1794 during his march to drive out the Shawnee, culminating in the Battle of Fallen Timbers. Some of Wayne's men returned here to make their homes.

In 1837, construction began on a reservoir needed to maintain the Miami-Erie Canal's five-foot depth. At its completion in 1845, 13,500-acre Grand Lake was the largest man-made lake in the world, connected to the canal by a three-mile feeder. The canal prospered until the coming of the railroads in the 1870s. The area experienced another boom in the late 1890s when oil was discovered. For a time, the lake was dotted with oil derricks. Today a pile of rocks near the center of the lake marks the spot of the last producing well.

Table 2-9: Federally recognized American Indian Nations with interest in the Western Lake Erie Basin.

Nation	Tribe Names
Delaware	Delaware Nation, Oklahoma
Miami	Miami Tribe of Oklahoma
Chippewa/Ojibwa	1. Bad River Band of the Lake Superior Tribe of Chippewa Indians of the Bad River Reservation, Wisconsin 3. Bay Mills River Reservation, Wisconsin 4. Keweenaw Bay Indian Community, Michigan 5. Lac Courte Oreilles Band of Lake Superior Chippewa Indians of Wisconsin 6. Red Cliff Band of Lake Superior Chippewa Indians of Wisconsin 7. Red Lake Band of Chippewa Indians, Minnesota 8. St. Croix Chippewa Indians of Wisconsin 9. Sokaogon Chippewa Community, Wisconsin 10. Turtle Mountain Band of Chippewa Indians of North Dakota
Ottawa	1. Little River Band of Ottawa Indians, Michigan 2. Little Traverse Bay Bands of Odawa Indians, Michigan 3. Ottawa Tribe of Oklahoma
Potawatomi	1. Citizen Potawatomi Nation, Oklahoma 2. Forest County Potawatomi Community, Wisconsin 3. Hannahville Indian Community, Michigan 4. Huron Potawatomi, Inc., Michigan 5. Match-e-be-nash-she-wish Band of Pottawatomi Indians of Michigan 6. Pokagon Band of Potawatomi Indians, Michigan and Indiana 7. Prairie Band of Potawatomi Nation, Kansas
Seneca	1. Seneca Nation of New York 2. Seneca-Cayuga Tribe of Oklahoma 3. Tonawanda Band of Seneca Indians of New York
Shawnee	1. Absentee-Shawnee Tribe of Indians of Oklahoma 2. Eastern Shawnee Tribe of Oklahoma 3. Shawnee Tribe, Oklahoma
Wyandotte	Wyandotte Tribe of Oklahoma

Tribal names reflect the list of Federally recognized tribes as currently listed by the Bureau of Indian Affairs. These names may vary from the official name attributed by each individual government.

2.5 Institutional and Regulatory Setting

2.5.1 Public Agencies and Programs: Table 2-10 identifies counties and other governmental units (incorporated and unincorporated) located partially or entirely within the St. Marys River Watershed. Incorporated areas have authority to regulate land use, while counties posses the authority to regulate land use in unincorporated areas.

Table 2-10 Local government subdivisions within the St. Marys River Watershed.

County	Other Governmental Unities

	Cities/Villages	Townships
	Indiana	
Adams	Decatur Monroe Berne	Preble, Root, Union, Kirkland, Washington, St. Marys, French, Monroe, Blue Creek, Hartford, Wabash, Jefferson
Allen	Ft. Wayne New Haven	Marion, Pleasant, Madison, Union, Adams, Cedar Creek
Wells	Ossian	Jefferson, Lancaster, Harrison, Nottingham
	Ohio	
Van Wert	Wren	Wilshire Liberty,
Mercer	Rockford Mendon Celina	Black Creek, Liberty, Dublin, Hopewell, Union, Center
Auglaize	St. Marys New Knoxville New Bremen Minster	Salem, Logan, Noble, Moulton, St. Marys, Washington, German, Jackson
Shelby	Keltersville Botkins	Van Buren, Dinsmore

Local/ regional agencies with watershed- related management authorities and interests are listed in Table 2-11. State government agencies with watershed- related missions and services are summarized in Table 2-12. Federal agencies with watershed- related programs are summarized in Table 2-13.

Table 2-11. Local/regional agencies with watershed related management authorities.

Agency	Description/Responsibilities	Watershed Services
Maumee Watershed Conservancy District (Political Subdivision of State of Ohio)	Help provide flood control and improve drainage for the St. Marys River basin.	Provide planning and funding resources.
Allen County Soil and Water Conservation District	Assist local residents, business and agencies in understanding and implementing their role in resource conservation	Ditch improvement and maintenance projects, manure management plan assistance, natural resource education and outreach
Allen County Emergency Management Agency	Planning services associated with natural and man-made disasters	Advocate for greater community efforts to mitigate and prepare for potential emergencies
Van Wert County Engineers	Responsible for the maintenance and improvement of culverts, storm sewers.	Ditch maintenance.
Van Wert County EMA	Serves the citizens of the County through effective planning for natural and man-made	Advocate for greater community efforts to mitigate and prepare for

Table 2-11. Local/regional agencies with watershed related management authorities.

Agency	Description/Responsibilities	Watershed Services
	disasters	potential emergencies.
Van Wert County SWCD	Protect and conserve the natural resources for all residents by providing technical, educational, and financial assistance.	CREP program, water quality studies, Link Deposit program.
Mercer County Engineers	Responsible for the maintenance and improvement of culverts, storm sewers.	Reviews development plans, maintenance for flooding and debris, long range planning and engineering, and drainage design.
Mercer County EMA	Serves the citizens of the County through effective planning for natural and man-made disasters	Advocate for greater community efforts to mitigate and prepare for potential emergencies.
Mercer County SWCD	Protect and improve the soil, water resources, and natural habitats in Mercer County.	Animal waste management, water management (drainage), erosion control, water quality improvement, woodland and wildlife habitat improvement, and public education and information.

Table 2-12. State Agencies having watershed related missions and authorities.

Agency	Description/Responsibilities	Watershed Management Services
Ohio Department of Natural Resources – Fish and Wildlife	Staff biologists research, survey, and watch over abundant species while working to restore those that are not abundant.	
Ohio Department of Natural Resources – Preserves & Scenic Rivers	The division oversees 128 natural areas and preserves and 20 scenic river segments, administers the Natural Areas Program, Scenic Rivers Program, Natural Heritage Database, Endangered Plant Law and Cave Protection Act. It also conducts and promotes research and educational programs designed to further the preservation of significant biological and geological features.	
Ohio Department of Natural Resources - Division of Geological Survey	To provide geologic information and services needed for responsible management of Ohio's natural resources.	Maintain records of all geologic information in the state, as well as geologic samples, and make both available to the public in the form of published maps and reports, open-file reports and records, and digital databases.
Ohio Environmental Protection Agency – Division of Surface Water	The Division of Surface Water is responsible for restoring and maintaining the quality of Ohio's rivers and streams	401 permitting, biological and water quality monitoring, CSO, compliance assistance, environmental mitigation, GIS, Lake Erie Programs, Non-point source program, water quality

Table 2-12. State Agencies having watershed related missions and authorities.

Agency	Description/Responsibilities	Watershed Management Services
		management plans, stormwater, TMDLS, wetland ecology
Ohio Environmental Protection Agency – Division of Drinking and Groundwaters	Protect human health and the environment by characterizing and protecting ground water quality and ensuring that Ohio's public water systems provide adequate supplies of safe drinking water.	Drinking water assistance funds, Drinking water program, groundwater program, environmental education
Ohio Environmental Protection Agency- Division of Environmental and Financial Assistance		Administers the Water Pollution Control Loan Fund, the Drinking Water Assistance Fund, and the Village Capital Improvements Fund.
Ohio NRCS		EQUIP, farm bill, watershed planning, resource conservation and development program, conservation buffer programs
Ohio Department of Transportation	Monitoring and implementing environmental laws, rules and regulations through ODOT's environmental, design, construction and maintenance programs to efficiently and effectively deliver projects that comprise the Department's Transportation Improvement Program	Develop policies, Best management practices, training, NPDES permit compliance, ecological/permits
Ohio Department of Agriculture	Livestock Environmental Permitting Program, Pesticide Regulation Program, Plant Industry Division Plant Pest Control Program, farmland preservation	Agricultural easements, land trust program, dairy farm regulations, pesticide/fertilizer education,
Ohio Department of Development		Clean Ohio Program
Ohio Water Development Authority	provide financial assistance for environmental infrastructure	Drinking water funding, sewer funding, stormwater funding, emergency assistance, Lake Erie costal erosion projects, dam safety and solid waste projects
Ohio Public Works Commission		Provides low-interest loans and grants for infrastructure facilities, Provides grants for local road and bridge projects
Indiana		
Office of Environmental Adjudication	Provide independent, fair and efficient resolution of disputes to decisions made by the Indiana Department of Environmental Management	Resolve enforcement disputes
Department of Environmental Management (IDEM)	provide quality environmental oversight and technical assistance in your community and around the state	Monitoring, enforcement, drinking water permits, wastewater permits, wet weather permits, wetlands and water quality programs,

Table 2-12. State Agencies having watershed related missions and authorities.

Agency	Description/Responsibilities	Watershed Management Services
		environmental clean up, land application oversight, CAFO construction oversight,
Natural Resources Commission	Autonomous board that addresses issues pertaining to the Department of Natural Resources	The commission enacts permanent laws while the Department of Natural resources passes emergency regulations.
Department of Natural Resources	Manager of public lands	Fish and wildlife programs and property management, nature preserves, reservoir property maintenance, outdoor recreation, state forest and state parks, historic preservation & archaeology, lakes floodplains & water management, native and exotic plant programs.
Indiana State Department of Agriculture	Make agriculture a key part of the state's economic revitalization and establish Indiana as a leader in the global agricultural economy	Flood information for farmers, livestock irrigation, livestock producer certification programs, land resources council.

Table 2-13. Federal agencies providing watershed services.

Agency	Mission/Authorities	Watershed Services
Federal Emergency Management Agency	Reduces loss of life and property	Floodplain mapping, disaster mitigation, natural disaster mitigation planning assistance
National Oceanic & Atmospheric Administration	Understands and predicts changes in the earth's environment and conserve costal and marine resources	Threatened and endangered species, coastal zone management
Natural Resources Conservation Service	Assists landowners and managers with soil, water and natural resource management	Soils maps, technical assistance, agricultural, Bumps cost estimate assistance, EQIP, CRP, WRP, native plants
U.S Environmental Protection Agency	Restores and maintains watersheds and their ecosystems to protect health, support economic development and recreational activity, and provide healthy habitat for fish, plants, and wildlife	Watershed data and information, Best Management Practices, and information/ education
U.S. Army Corps of Engineers	Investigates, develops and maintains the nation's water and related environmental resources	Water resources planning, shore protection, flood studies, wetland permitting, hydrographic information
U.S. Fish and Wildlife Service		Endangered species by region/state, national wetland inventory, habitat and wildlife, wetlands
U.S. Geological Survey U.S. Geological Survey – Ohio Div. U.S. Geological Survey –	Provides information to minimize loss of life and property from natural disasters, manage water, biology, energy and mineral resources, and	Prepares topographic, floodplain and other maps; gathers stream flow and other water data; and undertakes special studies

Table 2-13. Federal agencies providing watershed services.

Agency	Mission/Authorities	Watershed Services
Michigan Div.	enhance and protect quality of life.	

2.5.2 Non- governmental Organizations and Programs: This category includes non-profit, non-governmental organizations concerned with watershed- related issues. Table 2-14 summarizes identified groups in the St. Marys River Watershed.

Table 2-14. Non-governmental organizations and programs.

Agency	Program Description/Responsibilities	Watershed Services
American Rivers	Works with partners "on the ground" to protect our rivers, clean water, and healthy communities.	Restores rivers, protects natural floodplains, promotes best practices for protection of clean water supply and storage, and assists with policy , education and outreach
Defiance College	Educational programs related to water and ecology.	Provides monitoring support and data
Ducks Unlimited	Conserves, restores and manages wetlands and associated habitats for North America's waterfowl	Wetlands restoration and conservation services, farm bill support, and conservation programs
Environmental Defense Foundation	Works with landowners, businesses, indigenous groups and others to restore ecosystems and protect biodiversity.	Provides habitat and river restoration services; promotes expanded incentives for private lands stewardship; advocates on law and policy issues
Joyce Foundation	Supports efforts to protect the natural environment of the Great Lakes.	Provides grant funding programs for restoring river ecosystems, and advocating investment in Great Lakes restoration
Maumee Watershed Conservancy District (Political Subdivision of State of Ohio)	Administers flood control and drainage improvement programs.	Funds flood reduction projects (primarily in the Auglaize watershed)
MRBPLG	Regional network of local governments and other partners within the Maumee River Basin that evaluates policies and supports and promotes issues and programs, and activities that will benefit water quality within the tri-state region.	Provides advocacy, education and outreach services
Northwest Ohio Flood Mitigation Partnership	Consortium of private and public sector interests dedicated to solving flooding problems in northwest Ohio.	Provides funding, public education and advocacy services
Ohio Environmental Council	Work with individuals, government, local groups and businesses to enhance the quality of life in communities and sustain natural systems	Advocacy, education and outreach, grant funding, environmental watch services
Ohio Farm Bureau Federation	Works on behalf of members at the state and federal level with regulatory agencies, and locally with every county in Ohio	Policy development and advocacy services
Ohio Pheasants	Provides funds for local habitat projects,	Fundraising for habitat restoration

Table 2-14. Non-governmental organizations and programs.

Agency	Program Description/Responsibilities	Watershed Services
Forever	conservation education, and other conservation causes.	
The Nature Conservancy – Ohio Chapter	Protects ecologically important lands and waters	Habitat and species protection, restoration and conservation programs
Tri-Moraine Audubon Society	Promotes the conservation and restoration of ecosystems, including agricultural systems, while focusing on the enjoyment of birds and the natural environment through fellowship, education, and stewardship (Ohio Chapter for Allen, Auglaize, Hancock, Hardin, Logan, Mercer, Shelby, and Van Wert Counties)	Educational and information services focusing on ecological resources
Purdue Extension	Enhance stewardship and innovative monitoring, modeling, and management of natural resources.	Improve the use of plants and animals, educational programs and information about agriculture, natural resources, and the food system, research, outreach and education in the Great Lakes region.
Johnny Appleseed Metropolitan Park District	Comprehensive park system of natural areas and preserves designed to enhance the quality of life of the citizens of Allen County by providing passive outdoor recreational and educational opportunities while conserving and protecting the natural resources.	Outreach and education programs.
Hoosier River Watch	Stewardship of Indiana's waterways through a volunteer stream monitoring and water quality education program.	Increase public awareness of water quality issues and concerns by training volunteers to monitor stream water quality.

2.5.3 Regulatory Framework for Watershed Management: A broad range of regulations and programs exists in Indiana and Ohio at the state and local level for regulating and managing land use, flood risk management, water quality, water supply, and protecting wetlands, threatened and endangered species. Table 2-15 provides an overview.

Table 2-15. Summary of watershed management regulations.

Regulatory Program/Requirement	Description	Implementing Agency

Table 2-15. Summary of watershed management regulations.

Regulatory Program/Requirement	Description	Implementing Agency
Concentrated Animal Feeding Operations	National Pollutant Discharge Elimination System (NPDES) regulations and requirements for concentrated animal feeding operations (CAFOs) to control spills and runoff of nutrients and other pollutants from these operations, also includes NPDES Construction Permits	Ohio Environmental Protection Agency
Drainage/Floodplain Regulations	Mapped floodplains are subject to Ohio and FEMA floodplain management regulations and local government floodplain management regulations	Community or county engineer, building inspector (depends on the designated floodplain administrator), ODNR Division of Water, Floodplain Management Section; County Engineer
General Construction Permit	General permit for statewide regulation for stormwater discharges associated with construction activity	Ohio Environmental Protection Agency
Groundwater Monitoring	Oversees implementation of the Ohio Ground Water Protection and Management Strategy: manages and promotes participation in Ohio's Wellhead Protection Program; manages the State's Underground Injection Control Program (UIC): monitors, through sampling and analysis, the quality of the ground water found in the various geologic regions around Ohio; conducts specialized monitoring studies to identify ground water contamination problems; works with the Ohio Department of Natural Resources and Ohio EPA's Division of Surface Water to identify, quantify, and remediate the adverse impacts on ground water caused by non-point source activities; administers the State Coordinating Committee on Ground Water to enhance coordination among.	Ohio Environmental Protection Agency
Hazard Mitigation Plans – MOEMA & OEMA/FEMA	A plan which details actions before a disaster strikes to prevent permanently the occurrence of the disaster or to reduce the effects of the disaster when it occurs. It is also used effectively after a disaster to reduce the risk of a repeat disaster.	County EMA agency, FEMA, Ohio EMA
Hazard Mitigation Plans (by County)	Identifies natural hazard risks and project needs to reduce hazards.	MOEMA , OEMA, and FEMA
Livestock Environmental Permitting Program	Regulates concentrated animal farm facilities (CAFFs) in Ohio for the purpose of protecting surface and groundwater. ODA manages both PTI and PTO's.	Ohio Department of Agriculture
Long Term Control Plans	The LTCP is a plan with a schedule to control CSO discharges to the area waterways	Municipalities, USEPA, Ohio Environmental Protection Agency
NPDES Industrial	Dischargers with a storm water discharge associated	Ohio Environmental

Table 2-15. Summary of watershed management regulations.

Regulatory Program/Requirement	Description	Implementing Agency
Permit	with industrial activity that is discharged via a point source (including discharges through a municipal separate storm sewer system) to surface waters of the state are required to obtain coverage under this program	Protection Agency
Phase II MS4 Permits	General permit for the statewide regulation of Small Municipal Separate Storm Sewer Systems (MS4) to discharge storm water	Ohio Environmental Protection Agency
TMDL's	A TMDL is the sum of the allowable loads of a single pollutant from all contributing point and non-point sources	Ohio Environmental Protection Agency
Groundwater Wells	Private water systems are regulated by the Ohio Department of Health and include potable water wells, ponds, springs, cisterns and hauled water storage tanks that provide drinking water to fewer than 25 people, less than sixty days out of the year, and have less than 15 service connections. This includes single water supplies that serve homes, small businesses, small churches, small mobile home parks or communities with fewer than 25 residents.	Ohio Department of Health
Indiana		
Phase II MS4 Permits	General permit for the statewide regulation of Small Municipal Separate Storm Sewer Systems (MS4) to discharge storm water.	Indiana Department of Environmental Management
General Construction Permit	General permit for the statewide regulation for Storm Water Discharges Associated with Construction Activity	Indiana Department of Environmental Management
NPDES Industrial permit	Dischargers with a storm water discharge associated with industrial activity that is discharged via a point source (including discharges through a municipal separate storm sewer system) to surface waters of the state are required to obtain coverage under this program	Indiana Department of Environmental Management
Long Term Control Plans	The LTCP is a plan with a schedule to control CSO discharges to the area waterways	Municipalities, USEPA, IDEM
Hazard Mitigation Plans – MOEMA & OEMA/FEMA	A plan which details actions before a disaster strikes to prevent permanently the occurrence of the disaster or to reduce the effects of the disaster when it occurs. It is also used effectively after a disaster to reduce the risk of a repeat disaster.	County FEMA agency, FEMA
Groundwater Monitoring		Indiana Department of Environmental Management
TMDLs	A TMDL is the sum of the allowable loads of a single pollutant from all contributing point and non-point sources	Indiana Department of Environmental Management
404 Permitting, Dredging	Provides wetland protection, and guidance for dredging.	USACE

2.6 Trends, Issues and Implications for Watershed Protection and Management

An analysis of existing conditions in the St. Marys River Watershed, as presented above, elicits the following trends, issues and implications for watershed protection and management.

- Agriculture is the predominant land use in the watershed and, as such, local non-point pollution programs are subject primarily (except for concentrated animal feedlot operations (CAFOs) to non-regulatory based Best Management Practices (BMPs) initiatives at the federal, state and county levels.
- Continued increases in commodity prices (e.g., corn, wheat) will provide compelling incentives for farmers to bring additional land into production, and to alter crop selection. The tension between rural agricultural economy drivers and the importance of maintaining watershed health via agricultural BMPs will create challenges.
- The St. Marys River Watershed has a flat topography, making drainage and associated flooding events a continuing problem.
- Aggressive stormwater and floodplain management programs, coupled with innovative watershed management strategies, will be key to addressing both water quality concerns and historic drainage and flooding problems.

In the following sections, the St. Marys River Watershed assessment focuses on five areas specified in Sec. 441 of the Water Resources Development Act. Potential actions for improving watershed health and addressing a range of problems and opportunities are presented.

- Section Three: Flood Damage Reduction, Water Supply, Sedimentation and Bank Erosion
- Section Four: Water Quality
- Section Five: Resource- based Recreation
- Section Six: Fish and Wildlife Habitat
- Section Seven: Commercial and Recreational Navigation

3. FLOOD DAMAGE REDUCTION, WATER SUPPLY, SEDIMENTATION, AND BANK EROSION

3.1 Introduction

The purpose of this section is to identify and assess existing water resource problems, needs, opportunities and trends in the St. Marys River Watershed and to document findings and identify potential actions. The following subsections deals specifically with flood damage reduction, water supply, sedimentation and stream bank erosion.

3.1.1 General Land Use Characteristics, Impervious Cover: As noted in Chapter 2, the predominant land use in the St. Marys River Watershed is agricultural (68%), with fields and pastureland an additional 14%. Approximately 10% of the watershed is classified as urban, and is located primarily in the northern portion of the watershed.

3.1.2 Drainage Areas by Political Subdivisions: Table 2-1 provides an overview of counties (and associated acreage) located in the watershed. Thirty one percent of Adams County is located within the watershed, followed by Mercer and Auglaize Counties, with 23% and 19%, respectively. Wells and Shelby Counties have the least amount of land in the watershed with 3% or less.

3.1.3 General Flow Conditions: The Maumee River Basin includes streams with some of the lowest mean annual flows in the region, with mean annual runoff of the Maumee River at Waterville at 10.7 inches. Mean annual precipitation is relatively low and fairly evenly distributed across the basin, with runoff in the southern portion lower than those in the northwestern part of the basin.

Base-flow characteristics of streams in the Maumee River Basin are much more variable than mean annual flow characteristics. Mean base-flow indices indicate that ground water may contribute as little as 25% of mean annual flow of streams in the southern till plains area of the basin while streams in the northwestern part may derive as much as 65% of mean annual flow from ground water discharge.

Fifty percent duration flows of streams in the Maumee River Basin vary in similar manner as the base-flow indices. The 90% duration flow of 0.07 cfs per square mile of the Maumee River at Antwerp reflects augmentation at Fort Wayne, as the relative base flow in the St. Marys River is less than in the St. Joseph River.

The 10% duration flows of streams in the Maumee River Basin are relatively low, averaging about 2.2 cfs per square mile. Peak discharges for two year recurrence interval floods are also relatively low, averaging about eight cfs per square mile for the larger streams and proportionately more for smaller streams. Low permeability of soils in much of the basin favors direct surface runoff, but the flat topography tends to attenuate flood peaks. Areas of hummocky terrain in the northwestern parts of the basin contain large amounts of natural storage that attenuates flood peaks. Floods in the Maumee River Basin are characterized by

slowly rising flood stages of prolonged duration. Extensive channelization in the basin has resulted in many enlarged channels.

Table 3-1 presents stream gage data for the St. Marys River, and is followed by additional stage and flow data at the Rockford, Decatur and Fort Wayne locations Tables 3-2, 3-3, 3-4). Also provided (Table 3-5) are USGS discharge-frequency relationships.

Table 3-1. St. Marys River stream gage data.

Gage	Gage #	Drainage Area in Square miles	Period of Record	
			Begin Date	End Date
St. Marys River at Rockford, Oh	4180988	340	12/31/2005	12/31/2005
St. Marys River at Decatur, IN	4181500	621	2/12/1932	12/30/2005
St. Marys River near Fort Wayne, IN	4182000	762	4/4/1931	12/31/2005
Harber Ditch at Fort Wayne, IN.	4182590	21.9	2/10/1965	5/31/1991
Spy Run Creek at Fort Wayne, IN	4182810	14	3/14/1982	2002

St. Marys River at Rockford, OH (04180988)

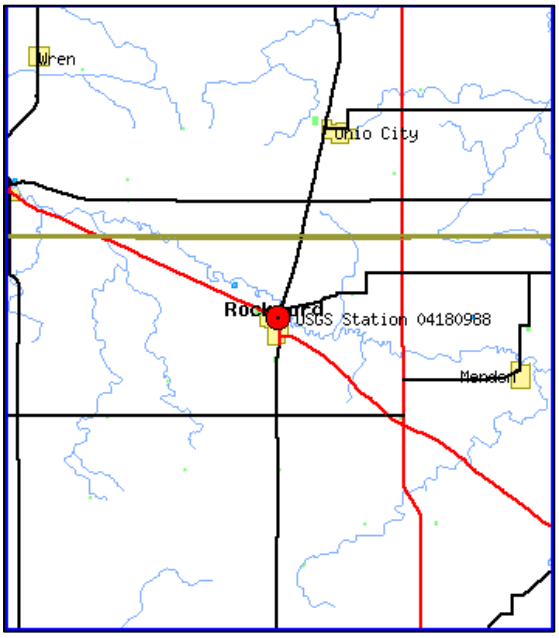
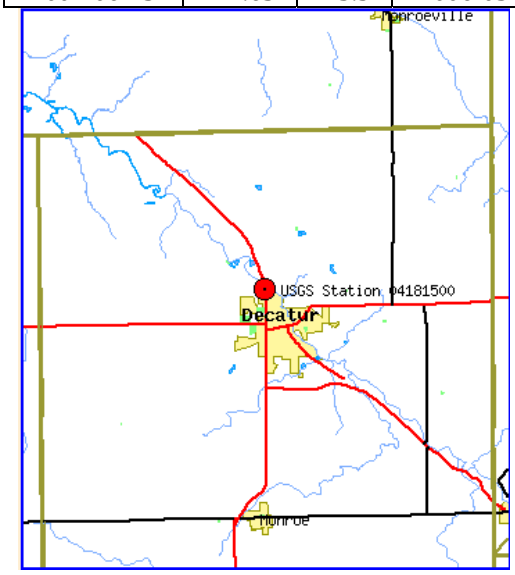


Figure 3-1. Location of the stream gage at Rockford, OH. (04180988)

LOCATION— Lat 40°41'41", long 84°38'48", in NE 1/4 sec. 6, T.1 N., R.3 E., Mercer County, Hydrologic Unit 04100004, on left bank downstream from the SR 118 bridge, on north side of Rockford, 0.1 mi north of intersection of SR 33.

Table 3-2. St. Marys River at Rockford, OH (04180988) stage and flow data.

Date	Gage Height (ft)	Flow (cfs)	Date	Gage Height (ft)	Flow (cfs)	Date	Gage Height (ft)	Flow (cfs)
2008-10-30	1.30	13.9	2007-05-15	2.84	62.3	2006-02-08	8.49	1107
2008-09-18	1.09	9.68	2007-01-16	11.80	4890	2006-03-15	9.25	1700
2008-08-26	1.32	17.4	2006-12-05	10.35	2330	2006-03-08	2.78	55.6
2008-06-19	2.42	86.0	2006-08-18	1.68	29.6	2005-11-22	6.91	479.0
2008-02-07	14.23	8190	2006-06-29	2.74	59.4	2005-11-18	9.10	1380
2007-11-01	2.15	24.3	2006-06-06	9.65	1630	2005-10-31	5.79	329.0
2007-10-30	2.44	34.4	2006-03-22	4.14	148.0	2005-10-14	1.55	24.0
2007-07-13	1.42	17.4	2006-03-20	5.32	262.0	2005-10-12	1.64	30.4
2007-06-25	1.65	23.9	2006-03-15	9.25	1760	2005-09-14	1.82	38.4



St. Marys River at Decatur, IN (04181500)
LOCATION—Lat 40°50'55", long 84°56'16", in SW1/4SW1/4 sec.27, T.28 N., R.14 E., Adams County, Hydrologic Unit 04100004, on right bank 10 ft downstream from bridge on U.S. Highway 27; 0.5 mi upstream from Holthouse Ditch, 1.3 mi north of Decatur, and at mile 29.1.

Figure 3-2. Location of the stream gage at Decatur, IN. (04181500)

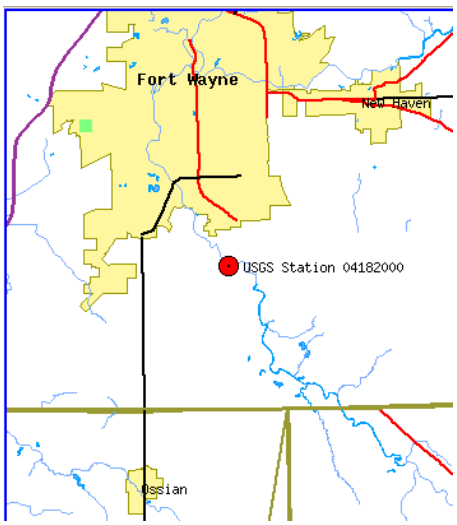
Table 3-3. St. Marys River at Decatur, IN (04181500) stage and flow data.

Date	Gage Height (ft)	Flow (cfs)	Date	Gage Height (ft)	Flow (cfs)	Date	Gage Height (ft)	Flow (cfs)
2/12/1932	11.9	1750	4/8/1957	21.49	7700	3/14/1982	24.4	10900
5/14/1933	19.5	4860	6/14/1958	20.49	6170	5/2/1983	17.54	3680
3/31/1934	15.9	2840	2/10/1959	24.22	11300	3/21/1984	18.79	4480
5/7/1935	18.1	3940	2/11/1960	18.49	4200	2/25/1985	24.31	10300
2/28/1936		5200	4/26/1961	21.8	8100	3/19/1986	17.73	3770
1/16/1937	22	8580	1/27/1962	20	5510	10/2/1986	12.91	1970
4/10/1938	21.1	6740	3/8/1963	20.58	6310	4/7/1988	15.6	2910
3/14/1939	22.1	8800	4/23/1964	20.66	6450	5/26/1989	20.32	5690

Table 3-3. St. Marys River at Decatur, IN (04181500) stage and flow data.

Date	Gage Height (ft)	Flow (cfs)	Date	Gage Height (ft)	Flow (cfs)	Date	Gage Height (ft)	Flow (cfs)
4/21/1940	19.3	4710	3/5/1965	17.31	3570	5/17/1990	20.48	5840
6/12/1941	14.2	2330	2/11/1966	12.3	1910	12/31/1990	23.81	9580
4/12/1942	19.5	4860	12/11/1966	21.92	5910	7/17/1992	24.13	10400
5/18/1943	23.4	12000	2/3/1968	21.97	5950	7/5/1993	21.28	6630
4/12/1944	22	8580	1/31/1969	20.46	4790	4/13/1994	20.1	5490
6/21/1945	18.5	4180	2/3/1970	18.45	3600	4/11/1995	18.33	3870
12/31/1945	17.3	3480	2/23/1971	18.43	3580	5/29/1996	21.21	6360
6/2/1947	20.3	5620	4/23/1972	22.42	7470	1997		
3/22/1948	20.43	5740	3/16/1973	19.04	4220	4/10/1998	20.56	6090
2/15/1949	18.29	4060	1/22/1974	22.86	9860	1/25/1999	23.12	9390
2/15/1950	23.6	10800	2/26/1975	20.17	5630	6/15/2000	18.98	4520
12/7/1950	20.61	5990	2/18/1976	22.26	8090	2/10/2001	17.15	3480
3/13/1952	20.4	5740	3/5/1977	16.93	3280	3/31/2002	19.98	5480
3/4/1953	17.6	3460	3/23/1978	23.55	10100	7/9/2003	26.92	15000
8/5/1954	12.32	1690	3/5/1979	22.59	8560	6/14/2004	20.63	6590
3/4/1955	21.57	7740	6/4/1980	22.69	8710	1/14/2005	24.2	10800
11/17/1955	17.69	3700	6/15/1981	21.48	7000	12/30/2005	18.87	4990

St. Marys River near Fort Wayne, IN (04182000)



LOCATION - Lat 40°59′16″, long 85°06′43″, in A. LaFontaine Reserve, T.29 N., R.12 E., Allen County, Hydrologic Unit 04100004, on left bank 130 ft downstream from Anthony Boulevard Extension, 0.8 mi downstream from Houk Ditch, 5 mi south of Fort Wayne, and 10.8 mi upstream from mouth.

Figure 3-3. Location of the stream gage at Fort Wayne, IN. (04182000)

Table 3-4. St. Marys River near Fort Wayne, IN (04182000) stage and flow data.

Date	Gage Height (ft)	Flow (cfs)	Date	Gage Height (ft)	Flow (cfs)	Date	Gage Height (ft)	Flow (cfs)
4/4/1931	7.49	2000	4/8/1957	16.57	8990	5/2/1983	11.82	5140
1/17/1932	11.54	4440	6/14/1958	15.06	6980	2/13/1984	13.72	6680
5/14/1933	14.08	6620	2/11/1959	19.42	13600	2/26/1985	18.33	12400
3/31/1934	10.41	3670	2/11/1960	12.63	4940	7/16/1986	12.5	5690
5/8/1935	12	4830	4/28/1961	15.54	8120	2/4/1987	8.55	2850
2/27/1936	16.9	7500	1/28/1962	14	6070	4/7/1988	9.87	3740
1/17/1937	16.83	9430	3/8/1963	15.62	7500	5/27/1989	14.07	7000
4/11/1938	14.92	7400	4/23/1964	14.33	6450	2/23/1990	14.66	7520
3/15/1939	16.07	8110	3/5/1965	11.3	4230	1/1/1991	17.92	10700
4/22/1940	12.29	4960	2/11/1966	7.76	2250	7/18/1992	17.07	9790
6/13/1941	9.5	2970	12/12/1966	15.29	7810	7/6/1993	14.07	7030
4/13/1942	12.74	5070	2/4/1968	15.2	7680	4/13/1994	13.73	6700
5/19/1943	18.79	13400	1/31/1969	14.12	6340	4/11/1995	11.96	5180
4/13/1944	16.38	8930	2/4/1970	12.32	4840	5/30/1996	14.6	7410
4/2/1945	12.79	5150	2/20/1971	11.4	4290	3/1/1997	15.23	7990
1/1/1946	11.92	3500	4/24/1972	15.67	8390	4/11/1998	14.32	7270
6/3/1947	15.03	7150	3/16/1973	12.04	5170	1/25/1999	17.03	9790
3/23/1948	14.35	6560	1/23/1974	16.94	9670	6/15/2000	12.37	5650
5/23/1949	12.85	5150	2/26/1975	13.1	6020	2/10/2001	11.79	5210
2/16/1950	18.34	12300	2/19/1976	15.75	8860	4/1/2002	13.49	6560
12/7/1950	14.87	6770	3/4/1977	11.96	5130	7/9/2003	21.2	16000
3/14/1952	14.69	6570	3/21/1978	18.39	11200	6/14/2004	15.48	8310
3/4/1953	12.01	4470	3/5/1979	16.39	9120	1/14/2005	19.06	12100
4/12/1954	7.37	1950	6/5/1980	15.82	8960	12/31/2005	11.87	5270
3/5/1955	16.18	8350	6/16/1981	14.75	7460			
2/25/1956	13.05	5150	3/14/1982	19.66	12600			

Table 3-5. Discharge-frequency relationships (USGS).

Frequency/ Duration (%)	Return Interval (years)	Peak Flow St Marys River at Decatur cfs	Duration St Marys River at Decatur cfs	Peak Flow St Marys River near Ft. Wayne cfs	Duration St Marys River near Ft. Wayne Cfs
50	2	5,580	130	6,570	147
20	5	8,090	714	9,270	807
10	10	9.900	1,510	10,800	1,770
5	25	11,900	2,430	12,600	3,000
2	50	13,400		13,800	
1.0	100	14,800	4,640	14,900	5,680
0.5	200	16,200		15,900	
0.2	500	18,000		17,200	

3.2 Water Supply

Water usage in the St. Marys River Watershed is 76.2% from surface waters, and 23.8% from ground water. Use includes 27% for domestic, 47% for industrial, 14% for commercial, 5% for mining, and 7% for livestock. (USGS, 1995).

3.2.1 Water supply – Groundwater: Outside of incorporated areas, the majority of residents obtain their drinking water via private wells. Yields from wells range from < 5 gal./min. to upwards of 25 gal./min.

3.2.2 Surface Water Supply and Drinking Water Quality Issues: Water supply is presently adequate and is expected to be so into the foreseeable future. However, all three rivers at Fort Wayne are on the 2004 Indiana Department of Environmental Management 303(d) list of impaired water for CSOs, point source pollution, non-point source pollution, Superfund site, heavy metals, fish consumption advisory, PCBs, mercury, dissolved oxygen, habitat alterations and siltation/erosion.

The Indiana Department of Environmental Management (IDEM) has assessed water quality of 764 miles of stream in the Maumee River Basin (within the State of Indiana) for designated uses of aquatic life support and recreational use. For aquatic life support, 649 miles (85%) are supportive; 31 miles (five percent) are supportive but threatened; nine miles (one percent) are partially supportive; and 75 miles (nine percent) are not supportive. For full-body contact recreational use, 110 miles (14%) are supportive with the balance (654 miles, 86%) not supportive. The majority of river reaches that do not support aquatic life are impaired by low levels of dissolved oxygen (DO) in the water column. Recreational use impairment is primarily related to high levels of coliform bacteria, specifically E. coli.

According to the U.S. Environmental Protection Agency (USEPA), E. coli is the greatest reported impairment (at just over 60%) to the St. Marys River, with PCBs a distant second at 14%. At this location in the Maumee River Watershed, suspended sediments and nutrients are minor contributors to water quality impairments. The primary sources of E-coli are likely farm runoff from livestock operations and urban stormwater runoff/combined sewer overflows.

A December 28, 2007 news release from USEPA announced that "the City of Fort Wayne has agreed to make an estimated $250 million worth of improvements to resolve longstanding problems with overflows from its sewer system. The city's sewer system, which serves approximately 220,000 people, transports the city's sewage for treatment at a wastewater treatment plant prior to discharging it into area rivers and streams. Overflows from the city's collection system discharge raw sewage directly into rivers and streams and can be a major source of water pollution. Fort Wayne's overflows currently number approximately 60 per year."

Urban, rural, and agricultural run-off continue to be problematic in the St. Marys River Watershed., as are community and rural septic systems (08/08/06 Workshop). This problem is further recognized in an article by Da Ouyang, Jon Bartholic and Jim Selegean entitled *Assessing Sediment Loading from Agricultural Croplands in the Great Lakes Basin* (The Journal of American Science, 2005). This article ranks the Maumee River system as the leading contributor of sediment to the entire Great Lakes system. It also states that conventional tillage practices contribute significantly to sediment loading. Conservation tillage practices can reduce the amount of sediment runoff by one half, while no-till techniques result in less than one-quarter the amount of sediment runoff typically associated with conventional tillage.

3.3 Flood Control Infrastructure, Flood Characteristics, Programs and Best Management Practices

3.3.1 Dams and Reservoirs: The relatively flat topography of the Maumee River Basin presents few good sites for development of on-stream reservoirs, and not many large ones have been constructed. Cedarville Reservoir on the St. Joseph River is an important on-stream reservoir that supplies Fort Wayne. At Defiance, there is a relatively large hydroelectric power dam on the Auglaize River. Grand Lake straddles the Lake Erie-Ohio River divide, capturing water from tributaries of the Wabash River and St. Marys River for the Ohio-Erie Canal. There are three large low head dams of canal era vintage on the Maumee River at Independence and Grand Rapids (USFWS).

Off-stream reservoirs are well suited for water supply storage in the Maumee River Basin. These reservoirs are created by enclosing land with earth embankments. Water is pumped from nearby streams during high flow periods to fill the impoundment. Communities in the Maumee River Basin with off-stream storage reservoirs include Lima, Van Wert, Paulding, Findlay, Ottawa, Archbold, Wauseon, Delta, Swanton and Metamora. Many smaller communities obtain adequate source of supply from bedrock aquifers, but development of large quantities of supply from these aquifers is generally restrained by dewatering conflicts and highly

mineralized water at greater depths (USFWS). Tables 3-6 and 3-7 list the substantial dams in the watershed.

Table 3- 6. Dams in the St. Marys River Watershed.

Name of Dam	County	Year Completed	ID	Purpose	Stream	Inspected
Mrc Lake Dam	Mercer	Unknown	Oh02099	Recreation, Private	Tributary To St. Mary's River	Yes
Resor Pond Dam	Van Wert	1959	Oh02537	Recreation, Public	Tributary To St. Marys River	Yes
Grand Lake St. Marys - East Embankment	Auglaize	1841	Oh00581	Recreation, Public	Outlet To Miami And Erie Canal Feeder	Yes
Forty Acre Pond Dam	Auglaize	1840	Oh00582	Recreation, Public	Miami & Erie Canal	Yes
Williams Lake	Auglaize	Unknown	Oh01215	Recreation, Private	Offstream	Yes
St. Marys Lime Sludge Lagoons	Auglaize	1988	Oh01212	Waste Retention	Koop	Yes
Unknown	Auglaize	Unknown	Oh01213	Recreation, Private	Tributary To Carter Creek	Yes

Table 3-7. Dam details in the St. Marys River Watershed.

Name of Dam	County	Height (feet)	Length (feet)	Surface area (acres)	Storage (acre-feet)	Drainage Area (sq. mi.)
Mrc Lake Dam	Mercer	12.0	No Data	4.3	No Data	0.15
Resor Pond Dam	Van Wert	16.3	450	3.4	No Data	0.05
Grand Lake St. Marys - East Embankment	Auglaize	17.9	7980	13981.0	No Data	110.30
Forty Acre Pond Dam	Auglaize	15.0	6400	68.0	492.1	1.81
Williams Lake	Auglaize	11.0	No Data	5.0		0.00
St. Marys Lime Sludge Lagoons	Auglaize	13.0	2640	12.0	128.0	0.03
Unknown	Auglaize	15.0	No Data	3.5	No Data	0.30

3.3.2 Extent of Drainage Controls in Place (levees, other features, diversions): Information for this section was not available at the time of this report. A rapid watershed assessment is currently planned for this watershed and additional information may be added once available.

Figure 3-4: Typical drainage ditch in Northeast Ohio with Windrow (Source: ODNR, 2008c).

3.3.3 Extent of Alteration of Drainage System: An extensive rural drainage system exists within the watershed and throughout the WLEB. These systems include the networks of tile and open drainageways (ditches) that receive water from individual farms, home lots, and small rural communities (ODNR, 2008b). An accurate county by county breakdown of "rural drainage systems" within the watershed does not exist. However, a comprehensive understanding of this drainage system will be critical to understanding what additional studies and strategies may be needed to solve problems.

Most of these rural drainage systems have been installed without any BMPs and, consequently, may be contributing to both water quality and flooding problems.

ODNR recently issued a framework document titled, "Rural Drainage Systems – Agencies and Organizations Reach Consensus on Ways Forward" (ODNR 2008b). The document provides a framework for balancing socio-economic drainage needs (e.g., local flooding, row crop production) with environmental stewardship (e.g., water quality, soil erosion and sediment control, and fish and wildlife habitat).

ODNR is also developing an "Ohio Drainage Manual" which will set criteria for evaluating drainage projects and environmental resources and identify BMPs for prospective application. One such BMP being evaluated is the "two-stage ditch" (Figure 3-7). Several demonstration projects have been completed, and early results indicate that this BMP provides enhanced water storage during peak flows while also improving overall ecological health of the area. Further research is needed to fully evaluate system- wide use of this BMP and associated economic and environmental benefits.

Many agricultural areas within the watershed have been tiled and/or incised with channels to improve drainage. Drainage alterations and structures are also found where the floodplains are crossed by numerous highways and railroads, as well as urban areas where floodplains have experienced encroachments from development.

Figure 3-5. Two stage ditch in Northwest Ohio (ODNR 2008b).

3.3.4 Floodplains, Status of Mapping: The status of floodplain mapping status varies widely in the watershed: some communities have updated maps, others do not. Table 3-8

shows the schedule to update the floodplain mapping through FEMA's Map Motorization Program. The maps will be issued on a county basis.

Table 3-8. Status of floodplain mapping.

County	Status
Indiana	
Adams	Preliminary Maps 2007
Allen	Preliminary Maps 2007
Wells	Preliminary Maps 2007
Ohio	
Auglaize	Scoping June 5, 2008
Mercer	Scoping June 5, 2008
Van Wert	Project Deferred
Shelby	In progress

3.3.5 Stream Bank Erosion: Information for this section was not available at the time of this report. A rapid watershed assessment is currently planned for this watershed and additional information may be added once available.

3.3.6 Flooding History and Characteristics Profile: Flooding is common in the Upper portion of the Maumee River Basin and the St Marys River corridor. Because of clay/ silty soils found in the watershed, the basin has high runoff coefficients, indicating that a large percentage of the rainfall and snowmelt in the basin readily translates into surface runoff and frequent flooding.

The City of Fort Wayne has historically been subjected to severe flooding, as the confluence of the St. Joseph, St. Marys and Maumee Rivers is located in the City of Fort Wayne. There are also three feeder creeks (i.e., Spy Run Creek, Fairfield Ditch, Junk Ditch) to the St. Marys River that also experience flooding when the latter is swollen and backwatering occurs.

USACE has worked with the City of Fort Wayne for over half a century in developing over 54,000 feet of flood control projects to reduce the flood threat and damage throughout the city. A combination of levees, flood walls, pumping stations, bypasses, warning systems and relocations have been employed to reduce flood damages. Some features are used in combination for redundancy or as a multi-faceted measure of protection. The central and western portions of the system encompass the St. Marys River in Fort Wayne to its confluence with the Maumee, along with tributaries Junk Ditch and Spy Run Creek.

Despite the longstanding investment in protection measures, flash flooding continues on Spy Run Creek, occurring yearly since 2002. A July 2003 flood on the St. Marys prompted a Section 205 study by USACE, although federal funding was suspended in 2005. Another significant flood event occurred on the St. Marys in January, 2005, prompting the City of Fort Wayne to develop flood projects using local funds. The city identified five areas that have had repetitive flooding and were most vulnerable to significant flood damages: the Woodhurst

neighborhood; Park/Thompson/Walderon Circle neighborhood; Tillman Road; Thieme Drive and Berry Street; and the Fairfield Ditch (a secondary feeder for the St. Marys River).

The City of Fort Wayne selected to develop flood damage reduction projects for the Woodhurst, Winchester Road, Park/Thompson/Walderon Circle and Tillman Road locations. The Fairfield Ditch project is located in the St. Marys River Watershed. All these projects are located directly on the St. Marys River except for the Fairfield Ditch project. This site is under investigation for possible flood protection by USACE- Detroit District. The development of a project in this location would be rather complex and will require that a feasibility study be conducted.

3.3.7 Status of Riparian/Floodplains/Wetlands Integrity: Floodplains and their associated stream, wetland and shoreline areas are significant watershed assets, due to multiple benefits related to environmental quality, natural resource management, and recreational opportunities. Floodplains are generally best able to provide these benefits if kept in a natural condition. Alterations of floodplains have resulted in increased flood and stormwater hazards, reduced water quality, loss of habitat and recreational opportunities and poor aesthetics within communities. Wherever possible, the natural characteristics of floodplains and their associated water bodies should be preserved. (MRBC 1993)

The Maumee River Basin Commission (MRBC) has been actively addressing the issue of floodplain integrity. Over the 1993-1995 time period, the MRBC produced a comprehensive, multi-volume report evaluating watershed needs related to floodplain management. The first report volume, titled “Resources and Trends of the Maumee River Basin, Indiana”, provides a thorough review and compilation of available information on a variety of topics relevant to flood control efforts, including history, resources and economy, trends, river description and flooding, and problems and needs. The second report volume, titled “Maumee River Basin Flood Control Master Plan – Damage Inventory Report” provides a detailed account of the nature and severity of the flood damages in the Basin divided into study reaches. The third report volume, titled “Maumee River Basin Flood Control Master Plan Damage Inventory Report (Appendices)”, provides damage details for all structures considered in the study. The fourth report volume, titled “Maumee River Basin Flood Control Master Plan Main Report”, summarizes the major findings of the master pl(n study, documents the identification, development, screening and selection of the alternative solutions, and provides an implementation plan for the recommended Master Plan components. The fifth report (“Maumee River Basin Flood Control Master Plan Appendices 1 through 8 to Main Report”) and sixth report (“Maumee River Basin Flood Control Master Plan Comment Response Document”) provide supporting data and documentation.

A significant contribution of the MRBC work was the development of uniform model flood hazard area ordinances and storm drainage/erosion control ordinances for use by all communities and counties within the Basin. The purpose is to recommend drainage and detention criteria and requirements with the objective to prevent:

- Increases in downstream flooding due to new urbanization;

- Increases in the magnitude and frequency of small flood events which contribute to increased bank erosion;
- Increases in drainage-related damages due to inadequate design of local drainage systems;
  The loss of beneficial stream uses due to degraded stormwater quality; and
- The loss of beneficial stream uses due to adverse hydrologic and hydraulic impacts of urbanization.

This model ordinance presents a regulatory approach to stormwater management that emphasizes conservative approaches to stormwater drainage and detention. It should be augmented by a planning process that examines existing and future watersheds needs.

3.3.8 Natural Hazard Mitigation Planning: Natural Disaster Mitigation Plans are available for most counties. These plans, which present community strategies for mitigating future natural disasters, frequently identify flooding as a natural disaster of predominant concern. Plans were prepared in response to grants received from the Ohio Emergency Management Agency and the Federal Emergency Management Agency (FEMA). Plans are updated every five years and identify steps (project needs) to reduce priority natural disaster risk. Approved plans require that mitigation funding from FEMA be secured.

Figure 3-6 identifies six categories of tools available to solve local flooding problems, as identified by the Ohio Emergency Management Agency. Often, some of these tools can provide important watershed health benefits such as restoring floodplains and riparian areas and encouraging better land use practices in and around floodplains. Table 3-9 presents, for illustrative purposes, selected findings of hazard mitigation reports available in the Upper Maumee River Watershed. Local tools to reduce identified flood risks are identified as well. (Further detail is found in Section 3, Flood Damage Reduction.

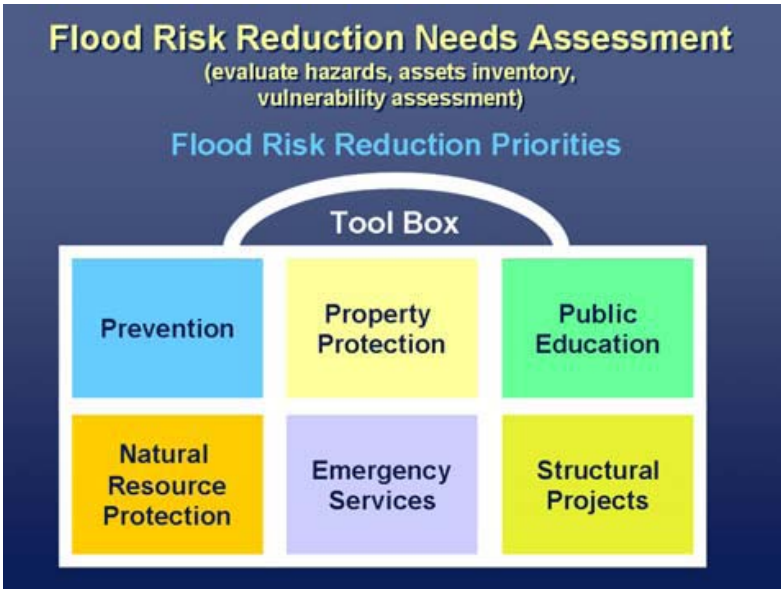


Figure 3-6. Flood risk reduction tools to solve local flooding problems.

Table 3-9. Summary of hazard mitigation plans available for the St. Marys River Watershed.

County	Watershed Flood Risks	Plan for Reducing Flood Risks
Indiana		
DeKalb	Information not available at the time of this report.	Information not available at the time of this report.
Allen	River, flash and urban flooding are the predominant types of flooding in the county. Numerous disasters have been declared, and have caused millions of dollars in damages to homes, businesses, personal property and agriculture. The extent of potential economic loss within the City of Fort Wayne and vicinity has caused flooding to be a major identified risk for the county. There are 158 structures which are expected to sustain some type of damage in a 100-yr storm.	Long-range planning, zoning, and subdivision control ordinances guide or restrict development from hazardous areas. The county's GIS system includes the most recent flood boundaries. Allen County, the City of Fort Wayne, Huntertown, Leo-Cedarville, and the City of New Haven have Stormwater Quality Management Plans and stormwater ordinances in place.
Ohio		
Auglaize	Information not available at the time of this report.	Information not available at the time of this report.
Mercer	Information not available at the time of this report.	Information not available at the time of this report.
Shelby	Information not available at the time of this report.	Information not available at the time of this report.
Van Wert	Information not available at the time of this report.	Information not available at the time of this report.

3.3.9 Status of Runoff Controls/Best Management Practices/Rehabilitation: Information for this section was not available at the time of this report. A rapid watershed assessment is currently planned for this watershed and additional information may be added once available.

3.4 Existing Conditions: Problems and Concerns

3.4.1 Water Supply: At the current time, surface water supplies appear to be adequate in the watershed, although concerns about water quality are well documented. Regional groundwater trends are largely unknown and warrant additional study given reliance on groundwater sources for water supply.

3.4.2 Flood Damage Reduction and Flood Risk Management: Table 3-10 summarizes flood damage reduction and flood control problems, as identified by various public officials and agencies.

Table 3-10. Flood damage reduction and flood control problems and concerns.

WLEB Resource Category	Name	Description	Political Subdivision
Flood Damage Reduction	Comprehensive flood plans	Comprehensive flooding plan is needed for the City of Fort Wayne. Existing projects are localized and do not address the overall problems.	Fort Wayne
Flood Damage Reduction	Flood mitigation plan	Citizens in Fort Wayne feel that the Trier Ditch flood alternative identified by USACE in 1987 would have been more effective in diverting water around the City of Fort Wayne.	Fort Wayne
Flood Damage Reduction	Current and future hydraulic models	No water level gauge at the confluence with the St. Mary's and St Joseph Rivers. Current models may not be accurate.	USGS
Flood Damage Reduction	Impervious surfaces	Impervious surfaces in the city are adding to flooding and runoff.	Fort Wayne
Flood Damage Reduction	Upstream development	Upstream development of Decatur may be contributing to the dangerous flooding in Decatur.	Decatur
Flood Damage Reduction	Comprehensive model floodplain regulations	Many communities have adopted minimum NFIP standards but there needs to be consistency between the regulations. The recommendation is to adopt a basin-wide floodplain ordinance.	Allen, and Adams Counties Fort Wayne,
Flood Damage Reduction	Comprehensive floodplain regulations	Regulations are needed to prevent or eliminate 100-year flooding in the Maumee River Basin and to prevent or eliminate five year repetitive loss flooding in agricultural areas of the basin.	Allen, and Adams Counties Fort Wayne, Auburn, Decatur, Indiana
Flood Damage Reduction	Debris clearing	There is a need for clearing and snagging and for deepening stretches of the rivers. Shallow waters, debris and fallen trees/stumps create access and navigation problems for recreational use of the rivers.	Entire watershed

3.4.3 Sedimentation and Stream Bank Erosion: A multi-objective approach to drainage and stormwater management is needed based on the principles of watershed and stream function. It would be helpful to provide protection of stream reaches that currently have a stable channel form and/or healthy biological conditions from encroachment or modification of the channel, floodplain or riparian area. Channel design and management that incorporates fluvial features will increase stability, improve water quality and support aquatic habitat. Expansion of the riparian corridor is needed, and research is essential to assess performance of individual

streams, the drainage network and the watershed for a broad suite of hydrological, ecological, economic and social parameters.

Although comprehensive soil erosion and sedimentation programs have been implemented through NRCS, enhanced efforts are needed. When complete, the NRCS Part 2 Rapid Watershed Assessment will identify needs. Table 3-11 summarizes key problems and concerns.

Table 3-11. Sediment and stream bank erosion problems and concerns.

WLEB Resource Category	Name	Description	Political Subdivision/Agency
Flooding and Water Supply	Sediment loadings	There is a need to reduce sediment load. (Watershed Assessment Workshop)	NRCS, Soil and Water Conservation Districts
Flooding	Comprehensive floodplain regulations	Regulations are needed to prevent or eliminate 100-year flooding in the Maumee River Basin and to prevent or eliminate five year repetitive loss flooding in agricultural areas of the basin.	Allen, and Adams Counties Fort Wayne, Decatur, Indiana
Flooding	Need for repair and stabilization of eroding river banks.	There is a need for buffer zones and bio-engineered solutions and plantings (such as Mesic Prairie Grasses). Erosion control mats called Geo-Jute are coconut mesh mats which completely decompose in 4 years, leaving behind: Indian Grass, Virginia Wild Rice, Wild Barley and other DNR approved riparian vegetation and grasses to reduce sedimentation in the river and erosion along the riverbanks.	NRCS, Soil and Water Conservation Districts

3.5 Anticipated Conditions: Opportunities and Unmet Needs

3.5.1 Water Supply: Water supply issues/ shortages are not anticipated in the foreseeable future. However, the quality of surface water supplies is of concern, and the quantity. Quality of groundwater sources has not been well documented. In addition, the potential impact of climate change on available surface and ground water supplies (e.g., lower groundwater tables, increased irrigation requirements) is a relevant concern throughout the WLEB. Population growth in the region (at least on a localized basis), could result in increased demand for water.

3.5.2 Flood Damage Reduction and Flood Control: Table 3-12 summarizes opportunities and needs.

Table 3-12. Flood damage reduction and flood control opportunities and needs.

WLEB Resource Category	Name	Description	Political Subdivision
Flood Damage Reduction	Comprehensive flood plans	Perform two dimensional hydrodynamic modeling of the rivers that converge in Fort Wayne.	Fort Wayne, USACE
Flood Damage Reduction	Flood mitigation plan	Re-examine USACE 1987 study alternatives for the City of Fort Wayne.	Fort Wayne, USACE
Flood Damage Reduction	Stream gage	New water level gauge needed at the confluence of the St. Marys and St. Joseph Rivers.	Fort Wayne, USGS
Flood Damage Reduction	Green engineering	Use of underground detention and soft engineering to combat increasing impervious surfaces rather than constructing levees.	Multiple jurisdictions
Flood Damage Reduction	Restore wetlands to reduce peak discharges	Increase USDA/NRCS practice of restoring wetlands to reduce peak discharges.	All
Flood Damage Reduction	Stream gages	Install stream gage stations at the mouth of each major tributary to measure flow, water quality and sediment loads.	All
Flood Damage Reduction	Stop logs in drainage ditches to slow down runoff	Increase use of control drainage practices (e.g., using stop logs to slow down runoff from tiled fields at certain times of the year).	All
Flood Damage Reduction	Comprehensive floodplain regulations	Prevent/ eliminate 100-year flooding in the watershed, and prevent/ eliminate five year repetitive loss flooding in agricultural areas.	Allen, and Adams Counties Fort Wayne, Decatur, Indiana
Flood Damage Reduction	Comprehensive model floodplain regulations	Many communities have adopted minimum NFIP standards but there needs to be consistency between the regulations. The recommendation is to adopt a basin-wide floodplain ordinance.	Allen, and Adams Counties Fort Wayne, Decatur, Indiana

3.5.3 Sedimentation and Stream Bank Erosion: Sedimentation and stream bank erosion opportunities and needs are summarized in Table 3-13.

Table 3-13. Sedimentation and stream bank erosion opportunities and needs.

WLEB Resource Category	Name	Description	Political Subdivision
Flood Damage Reduction	Sediment control devices	Add low level outlets at all control structures so sediment deposition upstream of the structures can be periodically flushed downstream.	
Flood Damage Reduction	Erosion screening	Identify and screen sites where stream bank erosion is occurring and where a federal interest may exist.	SWCD, USACE, MRBC, MRBPLG
Flood Damage Reduction	Stream inventory	Develop an inventory of stream bank erosion problem sites.	SWCD, USACE, MRBC, MRBPLG
Flood Damage Reduction	Comprehensive floodplain regulations	Prevent/ eliminate 100-year flooding in the watershed, and prevent/ eliminate five year repetitive loss flooding in agricultural areas.	Steuben, Allen, and Adams Counties Fort Wayne, Decatur, Indiana
Flood Damage Reduction	Comprehensive watershed plan	Preserve, restore and enhance wetlands to improve water quality, provide habitat, store and delay floodwaters, act as a buffer, and provide outdoor recreation.	Allen, and Adams Counties Fort Wayne, Decatur, Indiana

3.6 Past/ Ongoing Studies and Data Gaps

3.6.1 Water Supply: Past/ ongoing studies and data gaps relative to water supply are summarized in Table 3-14.

Table 3-14. Water supply past, ongoing studies and data gaps.

Study(Sponsor)	Description	Recommendations	Estimated Costs
ODNR County Water Use Study, various counties	Presents water use profiles for each county; including surface and groundwater usage by category	No recommendations.	N/A
Great Lakes Basin Framework Study (Great Lakes Basin Commission, 1976).	*Appendix 15, Irrigation* Identifies and evaluates the current status and any trends in agricultural irrigation; no specific information on the Upper Maumee, but does provide general	Need to address a projected steady increase in demand for irrigation, with 21,000 acre feet of water needed by 2020	No cost estimate

Table 3-14. Water supply past, ongoing studies and data gaps.

Study(Sponsor)	Description	Recommendations	Estimated Costs
	information on the Western Lake Erie Basin		
Great Lakes Basin Framework Study, Appendix 6, Water Supply, Municipal, Industrial, Rural (Great Lakes Commission, 1976).	Municipal, industrial and rural water uses were analyzed separately to determine past use and trends in water supply. Municipal water supply includes communities of all sizes that are served by a central water supply system. Industrial water supply pertains to manufacturing industries and does not include electric generating plants. Rural water supply covers the farm and rural communities where water is not supplied by a central system.	Need to identify key recommendations	No cost estimate
Northwest Ohio Water Plan, 1986 Update	Copy of report not reviewed.	No data.	No data.

3.6.2 Flood Damage Reduction and Flood Control: Several studies have been completed to assess solutions to reduce flood damage and provide flood control. They are summarized in Table 3-15.

Table 3-15. Flood damage reduction past, ongoing studies and data gaps.

Study(Sponsor)	Description	Recommendations	Estimated Costs
Maumee River Basin, Indiana and Ohio, Interim Survey Report on Flood Control at Findlay, Ohio, 1962, (USACE – Detroit District)	This study looked at several potential solutions to flooding, including floodplain evacuations, upstream reservoirs, channel improvements, stream diversions, levees, and floodwalls.	Recommended plan of improvement includes a series of floodwalls and levees combined with the diversions of Eagle and Lye Creeks.	Need to gather costs
Maumee River Basin, Indiana and Ohio, Interim Survey Report on Flood Control at Ottawa, Ohio, 1965 (USACE – Detroit District).	Study examined several potential solutions to flooding problems within the city, including upstream reservoirs, evacuation of the floodplain, channel improvements, a high velocity channel, diversions, and levees and floodwalls. Work never completed.	Potential solutions to flooding problems within the city include upstream reservoirs, evacuation of the floodplain, channel improvements, a high velocity channel, diversions, and levees and floodwalls.	

Table 3-15. Flood damage reduction past, ongoing studies and data gaps.

Study(Sponsor)	Description	Recommendations	Estimated Costs
Western Lake Erie Basin Water Resources Protection Plan, Ohio, Indiana and Michigan" (2005)	Heavy rains on July 4, 2003 caused extensive flooding in the region.	1. Keep high value development such as homes and businesses out of the floodplain to reduce/prevent flood damages. 2. Where communities have already built in or near the floodplain, remedial actions should include channel modification, relocation, flood proofing and establishment of wetland areas along the stream corridor that serve as natural flood storage areas. 3. Flood reservoirs are not an option due to the primarily flat terrain in the Maumee Basin.	
Maumee River Basin Commission	Comprehensive floodplain regulations Flooding and non-structural mitigation	Adopt a basin-wide floodplain ordinance; many communities have adopted minimum NFIP standards but consistency between regulations is needed.	
Maumee River Basin Commission	Comprehensive master plan	Provide for the long term management of basin water resources.	

3.6.3 Sedimentation and Stream Bank Erosion: A summary of past, ongoing studies and data gaps is presented below (Table 3-16).

Table 3-16. Sedimentation and stream bank erosion past, ongoing and data gaps.

Study(Sponsor)	Description	Recommendations	Estimated Costs
Great Lakes Basin Framework Study (Appendix 18–Flood Erosion and Sedimentation), 1976, Great Lakes Basin Commission.	Reports findings from analysis of erosion and sedimentation processes, with an emphasis on predicting future trends in erosion and sedimentation rates.	Solutions to erosion and sedimentation problems are presented, but have limited relevance due to outdated nature of report and more recent advances in soil erosion and sedimentation control technology/ practices.	
Status and Trends in Suspended Discharges, Soil Erosion, and Conservation Tillage in the Maumee River Basin, Ohio, Michigan, and Indiana (USGS 2000)	The relation of suspended-sediment discharges to conservation-tillage practices and soil loss were analyzed for the Maumee River Basin in Ohio, Michigan, and Indiana. Cropland in the basin is the largest contributor to soil erosion and suspended-sediment	Water-quality data in combination with soil-loss estimates were needed to draw these conclusions. These findings provide information to farmers and soil conservation agents about the ability of conservation tillage to reduce soil erosion and suspended sediment discharge from the Maumee River Basin.	No estimate provided

Table 3-16. Sedimentation and stream bank erosion past, ongoing and data gaps.

Study(Sponsor)	Description	Recommendations	Estimated Costs
	discharge to the Maumee River and the river is the largest source of suspended sediments to Lake Erie. Retrospective and recently-collected data from 1970–98 were used to demonstrate that increases in conservation tillage and decreases in soil loss can be related to decreases in suspended sediment discharge from streams.		

3.7 Findings

Summarized in this section are findings drawn from various reports and analyses relating to water supply; flood damage reduction and flood control; and sedimentation and stream bank erosion in the St. Marys River Watershed.

3.7.1 Water Supply: In general, ground water supply capacity is adequate at this time. Surface water resources also appear to be adequate for both public and private consumers. Over the longer term, however, uncertainties exist relative to the potential impact of climate change on available surface and groundwater supplies (e.g., lower groundwater tables, increased irrigation requirements). In addition, population growth in the region (at least on a localized basis), could result in increased demand for water.

3.7.2 Flood Damage Reduction and Flood Control: Information for this section was not available at the time of this report. Additional information may be added once the Rapid Watershed Assessment has been completed.

3.7.3 Sedimentation and Stream Bank Erosion: Stormwater runoff into streams and drainage ways is a leading water quality problem in the St. Marys River Watershed, as well as a major contributor to flooding problems. Given the large number of rural drainage ditches in the watershed, BMPs need to be developed to ensure that drainage improvements and maintenance activities do not increase sediment loadings to the mainstem and tributaries of the St. Marys River Watershed. A comprehensive inventory of the rural drainage system is needed.

3.8 Potential Actions

A number of potential actions for flood damage reduction, flood control, water supply, and sedimentation and stream bank erosion have been identified (Table 3-17). These potential actions should be carefully reviewed and prioritized by the WLEB Partnership.

Table 3-17. Flood damage reduction, flood control, water supply, sedimentation and stream bank erosion potential actions.

Description	Potential Sponsors	Costs Estimates	Time Frame
Construct reservoir upstream of Decatur and Fort Wayne to alleviate flooding.	Maumee River Basin Commission	$50,000,000	2014+
Acquire all residential structures in floodplain	Maumee River Basin Commission	$16,600,000	2010-2014
Water Treatment Plant	Rockford	$2,500,000	2009
Support implementation of additional conservation practices in watershed to reduce sediment loads and erosion by increasing payments to offset gains in price of commodity crops.	NRCS	$2,000,000	2010-2014
Limit additional development and restore flood retention capabilities of floodplains.	Counties	$1,000,000	2010-2014
Continue acquisition of structures along Junk Ditch to maintain overflow path capacity.	Maumee River Basin Commission	$1,000,000	2010-2014
Update floodplain maps and establish base flood elevations.	FEMA	$600,000	2010-2014
Clear log jams, junk, debris from streams and ditches.	Counties	$500,000	2010-2014
Continue Stream Obstruction Removal Program - Special Area of Concern, Section between Adams/Allen County Line and I-469 & Annual Reconnaissance	Maumee River Basin Commission	$325,000	2010-2014
Construct larger on-site detention ponds for future development.	County Engineer	$200,000	2010-2014
Complete Houk Ditch/Trier Ditch overflow evaluation to determine feasibility of designating path as an Impact Area and recommended measures.	Maumee River Basin Commission	$200,000	2010-2011
Continue to identify and provide cost-share match to landowners (agriculture) to compensate them for land conversion programs (floods, riparian areas, etc.)	Maumee River Basin Commission	$150,000	2010-2014
Adopt flood plain, stormwater policies/ordinances/public education.	Ohio Environmental Education Fund	$115,000	2009-2013

Table 3-17. Flood damage reduction, flood control, water supply, sedimentation and stream bank erosion potential actions.

Description	Potential Sponsors	Costs Estimates	Time Frame
Prepare inventory of culverts causing historic flooding and target them for retrofitting.	Counties	$100,000	2010
Enhance data and mapping of flood prone areas outside the floodplain. Development of floodplain maps for local streams not on FIRMs or county maps.	Counties	$100,000	2010-2014
Update/complete Flood Hazard mapping for St. Mary Watershed: IN	Maumee River Basin Commission	$100,000	2010
Yost Levee Removal /Bypass Channel evaluation.	Maumee River Basin Commission	$100,000	2012-2012
Install/operate river gage on Main Street Bridge to calibrate River Hydraulic Model.	Maumee River Basin Commission	$97,500	
Conduct comprehensive inventory and assessment of rural drainage system to better understand this important “drainage infrastructure” and better management maintenance practices to reduce sediment loadings and aquatic habitat.	County Engineer	$75,000	2011
Establish post-flood damage assessment protocol.	Maumee River Basin Commission	$75,000	2011
Incorporate stream restoration and protection into drainage projects.	County Engineer	$50,000	2009-2014
Build collaborative relationships with Ohio communities and the State of Ohio to develop more restrictive standards as they apply to floodplain and stormwater management.	Maumee River Basin Commission	$50,000	2010
Evaluate feasibility of nonstructural tools to reduce or eliminate stream maintenance (woody debris removal)	Maumee River Basin Commission	$50,000	2010-2014
Maintain Junk Ditch/Little River overflow floodplain to assure land use changes do not significantly decrease flow, complete evaluation/Master Plan Update.	Maumee River Basin Commission	$50,000	2010
Identify areas for restoration of natural hydrology and flow characteristics to also benefit flood mitigation.	SWCD	$50,000	2010

Table 3-17. Flood damage reduction, flood control, water supply, sedimentation and stream bank erosion potential actions.

Description	Potential Sponsors	Costs Estimates	Time Frame
Establish cost estimates and schedules for implementing nonstructural flood mitigation recommendations presented in County Natural Disaster Mitigation Plans.	County EMAs	$40,000	2012
Increase freeboard for structures along the St. Marys River corridor	Maumee River Basin Commission	$40,000	2010-2014
Conduct drainage feasibility study on the Fairfield Ditch area.	USACE	$40,000	2010-2012
Implement education programs on improved ditch maintenance program – not striping/spraying.	SWCD	$25,000	2010
Analyze repetitive flood properties and identify feasible mitigation options.	FEMA	$20,000	2012
Develop program to educate building owners in flood hazard areas (including behind levees) to obtain flood insurance to close gap between insured structures and number of structures in the flood hazard area.	Maumee River Basin Commission	$15,000	2010
Promote Wetland Reservoir Subsurface Irrigation Systems as a method of providing seasonal floodplain storage by "temporarily" plugging drainage tiles in late fall after crops have been harvested and then removing said plug several weeks prior to spring planting season. This dual use of property could provide water quality benefits, wildlife habitat, and stormwater runoff detention.	Maumee River Basin Commission	$10,000	2010
Expand distribution of MRBC newsletter to targeted audiences.	Maumee River Basin Commission	$5,000	2010-2014
Purchase homes for demolition along Winchester Road and place levees to compensate for the 100-yr flood elevation.	Fort Wayne	$0	2012
Update Northwest Ohio water Supply Plan.	ODNR	$0	2010-2011

4.0 WATER QUALITY

4.1 Introduction

Presented in this section is an overview of water quality problems, needs and opportunities in the St. Marys River Watershed. Much of the information presented in this section is based upon the Biological and Water Quality Study completed by Ohio EPA (OEPA. 2007).

Figure 4-1. Confluence of the St. Mary's, St. Joseph, and the Upper Maumee Rivers.

4.2 Water Quality Characteristics

Water quality problems in the St. Marys River Watershed reflect the predominantly agricultural use of the land (e.g., sedimentation, fecal coliform contamination, nutrient enrichment).

Numerous reaches of the St. Marys River are currently on the US EPA 303(d) list for impairments associated with mercury, habitat alterations, PCBs, nutrients, pathogens, impaired biotic community, siltation, un-ionized ammonia, toxicity, *E.coli* and flow alteration. There have been no TMDLs conducted for the watershed to date. Table 4-1 lists the water bodies and causes of impairment.

Table 4-1. Streams and pollutants that are 303(d) listed within the St. Marys Watershed. (USEPA 2008)

Waterbody	Siltation	Turbidity	PCBs	Other Habitat Alteration	Flow Alterations	Pathogens	Nutrients	Impaired Biotic Communities	Ammonia	Unknown Toxicity	Organic Enrichment
St. Marys, headwaters to Kopp Creek (IN)				X			X	X			
St. Marys, Kopp Creek to Sixmile Creek (IN)				X			X	X			X
St. Marys, Sixmile Creek to Twelvemile Creek (IN)				X							X
Blue Creek				X		X					x
Maumee River Mainstem (Indiana border to Lake Erie)	X	X	X	X	X		X		X	X	

Table 4-1. Streams and pollutants that are 303(d) listed within the St. Marys Watershed. (USEPA 2008)

Waterbody	Siltation	Turbidity	PCBs	Other Habitat Alteration	Flow Alterations	Pathogens	Nutrients	Impaired Biotic Communities	Ammonia	Unknown Toxicity	Organic Enrichment
Spy Run Basin						X					
St. Marys River						X		X			
St. Marys River Trib						X		X			
St. Marys River-Willshire						X		X			
Wittmer No 1 Ditch						X		X			
Yellow Creek						X		X			
Borum Run And Tribs						X		X			
Decatur Tribs						X		X			
Duer Ditch (Adams) And Other Tribs						X		X			
Farlow Ditch And Tribs						X		X			
Gates Ditch						X		X			
Gerke/Weber Ditch And Tribs						X		X			
Habegger Ditch						X		X			
Holthouse Ditch-Kohne Ditch						X		X			
Junk Ditch And Other Tribs						X		X			
Little Blue Creek						X		X			
Lowther Neuhaus Ditch-Unnamed Tributary						X		X			
Martz Creek-Ruppert Ditch And Unnamed Tributary						X		X			

According to US EPA, primary causes of these impairments include non-irrigated crop rotation, channelization, removal of riparian vegetation and streambank destabilization along agricultural fields, and minor municipal point source pollution. Table 4-2 provides an overview of principal water quality concerns for the watershed.

Table 4-2. Principal water quality concerns in the St. Marys River Watershed. (USEPA 2008)

Causes of Impairment	Sources of Impairment
FCA (Mercury)	Atmospheric deposition
Organic enrichment/ low dissolved oxygen	WWTP, CSO, SSO, urban diffuse runoff, agricultural runoff
Other habitat alterations	Channel modification, drainage modifications
FCA (PCBs)	WWTP, CSO, SSO, urban diffuse runoff,

Table 4-2. Principal water quality concerns in the St. Marys River Watershed. (USEPA 2008)

Causes of Impairment	Sources of Impairment
	agricultural runoff
Nutrients	WWTP, CSO, SSO, urban diffuse runoff, agricultural runoff
Pathogens	WWTP, CSO, SSO, urban diffuse runoff, agricultural runoff
Impaired biotic communities	WWTP, CSO, SSO, urban diffuse runoff, agricultural runoff
Siltation	CSO, SSO, urban diffuse runoff, agricultural runoff
Un-ionized ammonia	WWTP, CSO, SSO
E. coli	CSO, SSO, agricultural runoff
Unknown toxicity	
Flow alteration	Tile drainage, channel straightening

4.3 Water Quality Infrastructure, Programs and Best Management Practices

Water quality and assessment programs in place throughout the watershed are effective tools to identify needs, problems and opportunities. Existing water quality data, as well as continued monitoring, provide insight into current conditions and guide program and practice development. In addition, a number of public and nongovernmental agencies and organizations work with landowners to educate and promote land stewardship and provide funding for agricultural BMPs. Information from the numerous studies in the watershed provides a valuable screening tool for assessing and developing actions to improve water quality. Many of these entities have been established with the primary goal of improving and/ or protecting the natural resources of the watershed, such as Soil and Water Conservation Districts. Others have been established to implement or enforce environmental and natural resource rules and regulations, but also may provide significant funding, expertise and training. These include NRCS, ODNR, OEPA, IDEM and IDNR programs that address a wide range of problems through funding, education, priority setting and program/project management.

NRCS Programs

- Conservation Innovation Grants (CIG)
- Conservation Security Program
- Cooperative Conservation Partnership Initiative (CCPI)
- Environmental Quality Incentives Program (EQUIP)
- Farm and Ranch Lands Protection Program (FRPP)
- Grazing Lands Conservation Initiative (GLCI)
- Resource Conservation and Development Program (RC&D)
- Wetlands Reserve Program (WRP)
- Wildlife Habitat Incentives Program (WHIP)
- Ohio Lake Erie Buffer Program
- Urban Conservation

Urban and agricultural BMPs implemented within the watershed are supported by a variety of federal, state and local agencies, organizations and funding sources. For example:

- Long Term Control Plans have been developed for some communities in the watershed and, when implemented, will eliminate or reduce CSO/SSO discharges.
- Section 319 funds are available for projects that improve water quality within the watershed.
- NRCS Agricultural BMPs (e.g., filter strips, riparian buffers, conservation tillage) are directed at water quality improvements through soil erosion and sediment control.
- Funds and programs are available to facilitate WWTP upgrades, as well as replacement of failing Home Sewage Treatment Systems (HSTS), in the interest of improving water quality.
- Protection of agricultural and natural lands is a priority for land conservancies operating within the watershed.

Principal federal and state agencies working with agricultural producers include NRCS and OEPA, respectively. NRCS funds conservations practices with demonstrated effectiveness in reducing pollutant loads, such as filter strips, conservation tillage practices and riparian buffers.(NRCS 2004). Some of the more important programs dedicated to BMP implementation within the watershed include:

- **Agricultural Programs:** Ohio initiated its first Conservation Reserve Enhancement Program (CREP) in the Lake Erie watershed. CREP is a state, federal and private partnership to enroll 67,000 acres of conservation practices (e.g., buffers strips, riparian buffers, wildlife habitat, wetlands, windbreaks) on environmentally sensitive lands in the watershed. Landowners enrolling cropland and marginal pastureland along streams and ditches will receive annual payments and cost-share from USDA. In addition, landowners may receive state bonus payments to establish, maintain and extend certain conservation practices. Currently 10,721 acres have been added since 1997.

- **Stormwater programs:** Phase II communities are required to develop stormwater management plans that address a series of minimum control measures. Among others, this includes development of BMPs for construction and post-construction stormwater runoff control. In addition, a general permit is required for any construction activity disturbing more then one acre of land within the watershed. NPDES permit requirements are in place for several locations in the Indiana portion of the watershed, including the City of Fort Wayne, Huntertown, LeoCedarville, New Haven and Allen County. Each of these communities has a stormwater management plan in place as well as regulatory ordinances. At present, agricultural activities are exempt from permit regulations.
.

- **Section 319 projects**: Section 319(h) of the federal Clean Water Act provides funding for various types of projects that reduce non-point source water pollution. Funds may be used to conduct assessments, develop and implement TMDLs and watershed management plans, provide technical assistance, demonstrate new technology and/or provide education and outreach. Section 319(h) implementation grant funding is targeted to waters where non-

point source pollution is a significant cause of aquatic life use impairments. Currently, there are no active 319 projects in the watershed.

Unsewered areas are typically found in rural areas or newly developing areas on the urban fringe which is the majority of the watershed. Since housing density is relatively low in these areas, sewer lines have not yet been constructed as it is often cost prohibitive. There are two types of wastewater treatment in the watershed:

Septic systems offer the minimum treatment, or primary treatment of domestic wastewater. In these systems, wastewater is stored in an underground tank where solids settle out and are stored for later removal. The remaining gray water is then filtered through a leachate bed and thereby returned to ground or surface water. Septic systems require somewhat porous soils, which allow the wastewater to percolate through the ground layers. Every few years septic systems need to be pumped out to remove stored sewage solids. With this type of sewage system, discharge will be diffuse. Each home in a residential development may be outfitted with its own septic system, all of which may eventually recharge to a single stream or ground water source. Septic systems in the St. Marys River Watershed are found primarily in rural communities.

Aeration systems are similar to septic systems except the sewage is oxygenated with an aerator, which allows for wastes to break down aerobically. Like the septic systems, aeration systems must also be pumped every few years to remove the stored sewage solids. Unlike septic systems, numerous aeration systems in a single housing development often share a common drainage tile, which usually discharges directly to a stream or river.

4.4 Existing Conditions: Problems and Concerns

Diffuse runoff from urban areas may transport a variety of pollutants, depending on the specific land use and activity in an area. Urban and suburban runoff may include runoff from roads, parking lots, rooftops, industrial areas and other impervious surfaces. Such runoff may or may not be regulated by the Clean Water Act or state environmental protection laws depending upon the population density and size of an urban area, industrial use or commercial use.

The water quality impacts of urban and suburban runoff include changes to local hydrology due to increased impervious surface areas which reduce infiltration and increase runoff. Developed areas typically have greater peak flows, reduced base flows, and shorter concentration times than undeveloped, agricultural and rural areas. This often results in flooding, stream bank erosion, channel incision and others changes detrimental to the health of streams. Stormwater run-off may also carry a variety of pollutants associated with construction activities into water courses, as well as metals, nutrients, sediment and organic material associated with diffuse runoff from developed areas. Pollutants can also include toxics depending upon specific activities in urban areas, as well as bacteria if CSOs/SSOs are a concern.

Table 4-3 summarizes water quality problems and concerns.

Table 4-3. Water quality problems and concerns.

WLEB Resource Category	Name	Description	Political Subdivision
Water Quality	CSO/septic	Evaluation of septic systems within the entire watershed and specifically in Allen County	Allen County
Water Quality	Illicit discharge	Leakage from Anthony Blvd. to New Haven and within the entire watershed	Ft. Wayne
Water Quality	Watershed coordination	Inadequate coordination and liaison with local SWCDs	All
Water Quality	Fertilizers and pesticide runoff	Chemical runoff from lawn fertilizers used in commercial and residential developments	All
Water Quality	Organic enrichment/ D.O., bacteria, nutrients	Failing HSTS	All
Water Quality	Temperature, DO, nutrients, siltation, pesticides	Riparian removal	All
Water Quality	Siltation	Non irrigated cropland	All
Water Quality	Pesticides	Toxics/ fish advisories	All

4.5 Anticipated Conditions: Opportunities and Unmet Needs

Due to the extent of agricultural land use in the St. Marys River Watershed, farming activities are responsible for many of the impairments identified by US EPA (e.g., non-irrigated crop rotation, channelization, removal of riparian vegetation and streambank destabilization along agricultural fields, municipal point source pollution.) Opportunities to address these impairments include agricultural BMPs that limit erosion, nutrients delivery and pesticide delivery; improvements to unsewered areas; agricultural nutrient management plans; and more focused application of volunteer programs. Opportunities and unmet needs, as reported by individuals and within relevant reports, are presented in Table 4-4.

Table 4-4. Water quality opportunities and unmet needs.

WLEB Resource Category	Name	Description	Political Subdivision
Water Quality	Ditch improvement	Enlist Indiana farmers to test an approved design for drainage ditches that reduces sediment and improves water quality and wildlife habitat.	Indiana, The Nature Conservancy
Water Quality	Erosion control	Implement conservation tillage programs.	All

Table 4-4. Water quality opportunities and unmet needs.

WLEB Resource Category	Name	Description	Political Subdivision
Water Quality	Erosion control	Establish riparian buffers/ vegetation.	All
Water Quality	Erosion control	Use constructed or restored wetlands as sediment traps.	All
Water Quality	Erosion control	Erosion control programs are voluntary and participation is not targeted towards land contributing the most sediment.	All
Water Quality	Erosion control	Increase acreage of corn and soybeans grown under conservation tillage in the watershed to 75%.	All
Water Quality	Erosion control	Increase the acreage of filter strips and sod waterways.	All
Water Quality	Nutrients, sediments, pesticides	Increase participation in existing NRCS conservation programs.	All
Water Quality	Nutrients, sediments, pesticides	Prioritize areas for volunteer programs. Provide enhanced monetary incentives for participants from high priority areas (e.g. areas contributing larger amounts of pollutants.)	All
Water Quality	Nutrients, sediments, pesticides	Establish regulations requiring conservation practices.	All

4.6 Past/ Ongoing Studies and Data Gaps

Table 4-5 summarizes past/ongoing studies and data gaps in the watershed. A particularly critical gap is the completion of the TMDLs for the entire watershed, as they will facilitate development of a comprehensive plan to address specific contaminants causing impairments to stream segments.

Table 4-5. Water quality past, ongoing studies and data gaps.

WLEB Resource Category	Name	Description	Recommendations
Water Quality	St. Marys River Watershed TMDL	This report calculates a TMDL for habitat (flow and sedimentation), dissolved oxygen (DO), total phosphorus, ammonia, and bacteria that is expected to assure attainment of the designated aquatic life and/or recreational use. Further, it will suggest how each TMDL may be allocated among the following sources of pollutants	OEPA

Table 4-5. Water quality past, ongoing studies and data gaps.

WLEB Resource Category	Name	Description	Recommendations
		identified as contributing to each particular impairment. There are currently no TMDLs completed for this watershed other than the St. Mary's drainage contribution.	
Water Quality	Ohio EPA Biological and Water Quality Report	A water quality report specific to this watershed needs to be completed.	OEPA
Water Quality	Lake Erie Protection and Restoration Plan	Focuses on specific measurements of water quality and identifies additional initiatives or resources necessary to accomplish Quality Index goals and objectives.	Ohio Lake Erie Commission
Water Quality	Western Lake Erie Basin Partnership Strategic Plan	Establishes goals for each of the strategic objectives developed by the partnership.	WLEB
Water Quality	Maumee River Area of Concern 2004 Stream and Septic Monitoring Study	Incorporates major work plan and monitoring plan elements and both stream and septic system monitoring for the Maumee River AOC Remedial Action Plan.	USACE, TLCHD, TMACOG

4.7 Findings

Water quality and related environmental assessment programs are in place throughout the watershed, and are effective tools in identifying needs, problems and opportunities for improvement. Existing water quality data, along with ongoing monitoring efforts, provide insight into current conditions and guide the selection and application of BMPs.

NRCS supports programs to assess water quality issues related to agricultural lands, and local Soil and Water Conservation Districts work with land owners to implement programs. A limitation to this approach is that all areas of the watershed are given equal priority. Given that some areas of the watershed may contribute greater pollutant loads due to soil type, proximity to water bodies, crop type, and farming practices, a prioritization system that targets land owners contributing greater pollutants should be established.

Multiple public entities at the local, state and federal levels are contributing to water quality improvement efforts within the watershed. Measures to enhance progress include targeting areas contributing greater pollutant loads, providing greater incentives for participation in voluntary programs, and accelerating the rate at which waters are assessed and the sources and causes of impairments are identified.

4.8 Potential Actions

Table 4-6 identifies potential actions needed to restore water quality in the watershed. This list warrants consideration by the WLEB Partnership as potential actions are prioritized.

Table 4-6. Water quality potential actions.

Description	Potential Sponsors	Costs Estimates	Time Frame
Construct reservoir upstream of Decatur and Fort Wayne to alleviate flooding.	Maumee River Basin Commission	$50,000,000	2014+
Acquire all residential structures in floodplain	Maumee River Basin Commission	$16,600,000	2010-2014
Water Treatment Plant	Rockford	$2,500,000	2009
Support implementation of additional conservation practices in watershed to reduce sediment loads and erosion by increasing payments to offset gains in price of commodity crops.	NRCS	$2,000,000	2010-2014
Limit additional development and restore flood retention capabilities of floodplains.	Counties	$1,000,000	2010-2014
Continue acquisition of structures along Junk Ditch to maintain overflow path capacity.	Maumee River Basin Commission	$1,000,000	2010-2014
Update floodplain maps and establish base flood elevations.	FEMA	$600,000	2010-2014
Clear log jams, junk, debris from streams and ditches.	Counties	$500,000	2010-2014
Continue Stream Obstruction Removal Program - Special Area of Concern, Section between Adams/Allen County Line and I-469 & Annual Reconnaissance	Maumee River Basin Commission	$325,000	2010-2014
Construct larger on-site detention ponds for future development.	County Engineer	$200,000	2010-2014
Complete Houk Ditch/Trier Ditch overflow evaluation to determine feasibility of designating path as an Impact Area and recommended measures.	Maumee River Basin Commission	$200,000	2010-2011
Continue to identify and provide cost-share match to landowners (agriculture) to compensate them for land conversion programs (floods, riparian areas, etc.)	Maumee River Basin Commission	$150,000	2010-2014
Adopt flood plain, stormwater policies/ordinances/public education.	Ohio Environmental Education Fund	$115,000	2009-2013

Table 4-6. Water quality potential actions.

Description	Potential Sponsors	Costs Estimates	Time Frame
Prepare inventory of culverts causing historic flooding and target them for retrofitting.	Counties	$100,000	2010
Enhance data and mapping of flood prone areas outside the floodplain. Development of floodplain maps for local streams not on FIRMs or county maps.	Counties	$100,000	2010-2014
Update/complete Flood Hazard mapping for St. Mary Watershed: IN	Maumee River Basin Commission	$100,000	2010
Yost Levee Removal /Bypass Channel evaluation.	Maumee River Basin Commission	$100,000	2012-2012
Install/operate river gage on Main Street Bridge to calibrate River Hydraulic Model.	Maumee River Basin Commission	$97,500	
Conduct comprehensive inventory and assessment of rural drainage system to better understand this important “drainage infrastructure” and better management maintenance practices to reduce sediment loadings and aquatic habitat.	County Engineer	$75,000	2011
Establish post-flood damage assessment protocol.	Maumee River Basin Commission	$75,000	2011
Incorporate stream restoration and protection into drainage projects.	County Engineer	$50,000	2009-2014
Build collaborative relationships with Ohio communities and the State of Ohio to develop more restrictive standards as they apply to floodplain and stormwater management.	Maumee River Basin Commission	$50,000	2010
Evaluate feasibility of nonstructural tools to reduce or eliminate stream maintenance (woody debris removal)	Maumee River Basin Commission	$50,000	2010-2014
Maintain Junk Ditch/Little River overflow floodplain to assure land use changes do not significantly decrease flow, complete evaluation/Master Plan Update.	Maumee River Basin Commission	$50,000	2010
Identify areas for restoration of natural hydrology and flow characteristics to also benefit flood mitigation.	SWCD	$50,000	2010
Establish cost estimates and schedules for implementing nonstructural flood mitigation recommendations presented in County Natural Disaster Mitigation	County EMAs	$40,000	2012

Table 4-6. Water quality potential actions.

Description	Potential Sponsors	Costs Estimates	Time Frame
Plans.			
Increase freeboard for structures along the St. Marys River corridor	Maumee River Basin Commission	$40,000	2010-2014
Conduct drainage feasibility study on the Fairfield Ditch area.	USACE	$40,000	2010-2012
Implement education programs on improved ditch maintenance program – not striping/spraying.	SWCD	$25,000	2010
Analyze repetitive flood properties and identify feasible mitigation options.	FEMA	$20,000	2012
Develop program to educate building owners in flood hazard areas (including behind levees) to obtain flood insurance to close gap between insured structures and number of structures in the flood hazard area.	Maumee River Basin Commission	$15,000	2010
Promote Wetland Reservoir Subsurface Irrigation Systems as a method of providing seasonal floodplain storage by "temporarily" plugging drainage tiles in late fall after crops have been harvested and then removing said plug several weeks prior to spring planting season. This dual use of property could provide water quality benefits, wildlife habitat, and stormwater runoff detention.	Maumee River Basin Commission	$10,000	2010
Expand distribution of MRBC newsletter to targeted audiences.	Maumee River Basin Commission	$5,000	2010-2014
Purchase homes for demolition along Winchester Road and place levees to compensate for the 100-yr flood elevation.	Fort Wayne	$0	2012
Update Northwest Ohio water Supply Plan.	ODNR	$0	2010-2011

5.0 RESOURCE-BASED RECREATION

5.1 Introduction

Resource-based recreation problems, needs and opportunities are discussed in this section and generally address activities such as boating, canoeing, hiking, biking, hunting, fishing and passive outdoor recreation.

Figure 5-1. Impediments to recreation on the St. Marys River.

5.2 Resource- based Recreation, Supply and Demand: Resource-based recreation is critical to the overall environmental and economic health of the watershed, as well as the quality of life of its residents and visitors. Numerous agencies play an active role in maintaining open space and recreation areas within the watershed.

The Maumee River Valley is one of eleven rivers and streams in Ohio that have received Scenic River designation. The 43-mile portion of the Maumee River extending between the Indiana/Ohio state line to the Ohio Route 24 bridge near Defiance is designated as a State Scenic River. In addition to providing habitat, coastal natural areas in the watershed also serve as recreation and tourism attractions for activities that include hunting, bird watching and hiking. This includes wetlands and shoreline habitat areas set aside as preserves and/or for public access.

The Ohio and Indiana SCORP indicate that most people in the Upper Maumee River Watershed have a multitude of quality outdoor recreation opportunities at their disposal. The Ohio SCORP also indicates that most Ohioans are reasonably satisfied with their outdoor recreation experiences and their favorite sites are readily accessible.

ODNR provides substantial information relative to GIS, web sites, and reports, including reference to Ohio Public Fishing Areas, Ohio Public Boating Areas (including facilities), Boating on Ohio's Streams, Boating on Ohio's Waterways Plan, Ohio Water Trails Program, and Canoe and Kayak Registrations, etc.

Numerous county parks exist in the Fort Wayne area. These include Fox Island County Park, Meta County Park, and Cook's Landing County Park.

Table 5-1 provides a descriptive listing of boating areas (and amenities) on the river. Data for sites in Indiana were not readily available. As noted, amenities are limited to roadside parking and parking lot pull off.

Table 5-1. Boating areas on the St. Marys River (ODNR 2004).

Upper Maumee River	Roadside Parking	Parking Lot Pull off	Canoe Rentals	Canoe Ramp Only	Trailer/ Cartop Ramp	Restrooms	Camping	Picnic Area	Water	Food	County
Memorial Park off Chestnut Street in St. Marys, roadside access river right	X										Auglaize
Auglaize Co. Rd. 53 bridge north of St. Marys, between St. Marys River Road and Delphos-St. Marys Road, Roadside access river right	X										Auglaize
Auglaize Co. Rd. 200 bridge (Barber-Werner Road) south of Kassuth, roadside access river right	X										Auglaize
Palmer Road bridge west of Mendon, roadside access river right	X										Mercer
Fort Adams historic marker pull off on S.R. 127 bridge east of Rockford, access river left		X									Mercer
Frysinger Road bridge east of Rockford, roadside access river left	X										Mercer
Town Line Road bridge west of Rockford, roadside access river right	X										Mercer
S.R. 81/49 bridge in Willshire, roadside access river right	X										Van Wert
DAM - rock dam downstream of the S.R. 81/49 bridge in Willshire, portage river left											Van Wert
Roadside access and trail at railroad tracks below S.R. 81/49 bridge in Willshire about 1 mile (off S.R. 49), roadside access river right	X										Van Wert

Parks play a central role in community life for sports, festivals, seasonal events and related activities. Many communities within the Upper Maumee River Watershed maintain parks and recreation programs and facilities that include trails, bike routes, reservoirs and natural areas. In addition, non-governmental groups (e.g. churches, conservation clubs, Salvation Army, YMCA, community recreation associations) provide additional recreational programs and facilities.

5.3 Existing Conditions: Problems and Concerns

With recreational fishing making up a part of watershed recreational activates, fish advisories are a concern within the watershed. The Ohio EPA has issued an advisory recommending a limit of 1 meal per month for Freshwater Drum, Northern Pike and Saugeye caught in the St.

Marys River, in all Counties. Indiana indicates that Black redhorse, Common Carp, Channel Catfish, Largemouth Bass, Silver Redhorse and White Suckers caught in the St. Marys should be consumed no more than once per month.

Table 5-2 summarizes problems and concerns in the Upper Maumee River Watershed, most of which are associated with lack of funding to support existing recreation infrastructure.

Table 5-2. Recreation opportunities and unmet needs.

WLEB Resource Category	Name	Description	Political Subdivision	Sponsoring Entity	Estimated Cost
Recreation	Greenways	Preservation of riparian corridors/greenways for water quality and wildlife habitat.	All		
Recreation	Adaptive reuse of public lands	Existing parklands and reservoirs offer opportunities for adaptive re-use for changing trends and coordination for better utilization.	All		
Recreation	Combining resources with other public entities	Public facilities such as schools, universities/colleges, airports, golf courses, and old industrial sites (brownfields) offer additional opportunities	All		
Recreation	Combining resources with other private entities	Private/non-profit entities (e.g., camps, sport clubs) may be willing to cooperate with public programs	All		
Recreation	Farm parks	Establish "farm parks" in the watershed as an additional recreational amenity, using successes in Ohio (e.g., Lake Farm Park in Lake County, Creek Bend Farm in Sandusky County)	All		
Recreation	Park conservation	Expand and protect parks along the Maumee River (including floodplains) via conservation easement areas, the wetland reserve program or the CREP program.	All		
Recreation	Park conservation	Citizens want more canoeing, however, logs and the need for clearing and snagging block complete access along rivers.	All		

5.4 Anticipated Conditions: Opportunities and Unmet Needs: Anticipated conditions are expected to be similar to existing conditions, although resource constraints (i.e., funding limitations) will be increasingly problematic. Many properties and facilities in the watershed are old and deteriorating, and lack of funding and grant programs for operations and maintenance is a priority concern. Increasing open space as well as improving areas and programs already in existence is critical to sustaining recreation within the watershed. Improvements to both water quality and habitat will also positively impact recreational uses.

Recreation opportunities and unmet needs, based upon workshop outcomes and related project research, are presented in Table 5-3.

Additional identified needs within the watershed involve expansion and connection of an already extensive trail system. Trail alignments to improve existing trails and underdeveloped trail sections are an unmet need within the watershed and would enhance existing recreational areas. An example is the Spencerville-Elgin Rail Trail (Indiana High Rail), an old rail line that crosses the Miami-Erie Canal at Spencerville. This local short line extends from Woodburn, Indiana through Defiance and into Henry County, terminating at Liberty Center, Ohio.

Resource constraints will determine the extent to which recreation opportunities and unmet needs in the St. Marys River Watershed can be addressed. Many properties and facilities in the watershed are old and deteriorating, and requirements for improvements and maintenance compete with plans for facility development and expansion. Non-compatible land uses impose challenges as well, as they can impact both existing and prospective resource-based recreation facilities and opportunities.

Local leadership and volunteerism is recognized as a key component in addressing opportunities and unmet needs associated with resource-based recreation. Collaboration among local governments is essential, given concerns over the challenges and time requirements associated with securing state and federal assistance with desired projects. Such collaboration is needed for planning, funding acquisition, integrating resource-based recreation facilities and opportunities; and achieving efficiencies in terms of operations and maintenance. In addition, multi-objective planning is a key consideration, recognizing that projects with water quality, fish and wildlife and related dimensions (e.g., dam removal, erosion control, flood control) can also yield significant recreational benefits.

The 2003 Ohio SCORP confirmed that there are a number of needs, such as continued operation and maintenance funding for existing facilities and services and preservation and development efforts of applicable resources, facilities, and services to meet changing population demands. Multi-level integrated cooperative efforts were also stressed as important to the region. The needs of high ranking outdoor recreation facilities include those for fishing, picnicking, camping, observation/viewing activities, and a variety of trails (including water access, scenic, historical, hiking/biking, motorized, and equestrian) including their associated services (e.g. parking, scenic/historic views, access, food, rest rooms, picnic camping) (ODNR, 2003).

5.5 Past/ Ongoing Studies and Data Gaps

A series of plans, studies and reports produced in recent years (or presently underway) provide valuable insights into existing and anticipated conditions, problems, needs and opportunities associated with resource- based recreation in the St. Marys River Watershed. Based upon a review of these materials, coupled with workshop outcomes, a number of data gaps and information needs were identified. A summary is provided in Table 5-3 below:

Table 5-3. Recreation past/ongoing studies and data gaps.

WLEB Resource Category	Name	Description	Recommendations
Past Studies			
Recreation	2003 Ohio SCORP Study	Study periodically conducted to assess recreational gaps and needs in the interest of determining priorities for ODNR and local officials.	Needs include operations and maintenance funding for existing facilities and services; continued preservation and development efforts of applicable resources;, facilities, and services to meet changing population demands; multi-level integrated cooperative efforts; outdoor recreation facilities include those for fishing, picnicking, camping, observation/viewing activities; trails (including water access, scenic, historical, hiking/biking, motorized, and equestrian); and associated services (e.g. parking, scenic/historic views, access, food, rest rooms, picnic camping).
Recreation	Boating on Ohio's Waterways Plan (ODNR, 2004)	Examined existing and anticipated conditions, problems, needs and opportunities, along with recommendations pertaining to Ohio's recreational waterways.	Provide additional access points/ facilities for carry-in access to rivers and streams in the watershed.
On Going Studies			
Recreation	Western Lake Erie Basin Study	The study area consists of the western basin of Lake Erie (encompassing portions of the states of Ohio, Indiana and Michigan).	Ongoing
Recreation	SCORP 2008 Study	Serves as a guide in outdoor recreation planning, acquisition, development and management. Also provides a contemporary assessment of outdoor recreation needs and how public and private interests can meet those needs within constraints of the state's resources.	Numerous recommendations identified; applicability to St. Marys River Watershed has not been assessed.
	Discover Ohio	Representatives from National Park	

Table 5-3. Recreation past/ongoing studies and data gaps.

WLEB Resource Category	Name	Description	Recommendations
	Water Trails	Service and Ohio Greenways are actively working to promote the development of car-top/carry-in stream and river access as well as water trail planning through a partnership between local groups and the DOWT group. Future discussions with the Ohio Department of Transportation will be instrumental in the planning of access points at the locations of highway/river crossing intersections	
Recreation	Western Lake Erie Basin Study	The study area consists of the western basin of Lake Eire (encompassing portions of the states of Ohio, Indiana and Michigan (with a focus on the watersheds of the Maumee, Portage and Ottawa Rivers (including the St. Marys River Watershed).	Ongoing
	NW Ohio Greenway Plan	Led by Toledo Metroparks, Ohio Greenways Inc. and the US National Parks Service "Rivers & Greenways" section.	

5.6 Findings

The St. Marys River Watershed offers its residents and visitors a range of resource- based recreation opportunities. Challenges include the need for additional future capacity, funding for maintenance of existing recreation infrastructure, and funding to support new initiatives. A significant opportunity exists with regard to multi-objective projects that can resolve current problems (e.g., flooding, water quality degradation) while, at the same time, enhancing recreational opportunities for both residents and visitors. An opportunity also exists to focus on the historical significance of the St. Marys River Watershed, recognizing that Fort Wayne has been designated a National Heritage Area and other sites are of historical significance (e.g., Johnny Appleseed burial site, Wabash-Eire Canal, site of the Battle of Kekionga, historical downtown Fort Wayne, Indian burial grounds.)

5.7 Potential Actions

Table 5-4 below describes potential actions based upon a review of existing and ongoing studies.

Table 5-4. Recreation potential actions.

Description	Potential Sponsors	Costs Estimates	Time Frame
Expand and connect an already extensive trail system via planning and construction.	Park Districts	$4,000,000	
Expand and protect parks along the St. Marys River, in the interest of protecting floodplains, via measures such as conservation easements, the wetland reserve program and the CREP program.	NRCS	$1,000,000	2010-2014
Establish recreational pathways along filter strips serving as greenways.	Park Districts	$100,000	
Formulate non-structural flood damage and ecosystem restoration projects to provide recreational opportunities.	USACE	$75,000	
Determine the feasibility of clear and snag projects to deepen stretches of the river to increase historical tours via canoe.	Maumee River Basin Commission	$40,000	
Restore historical docks and places along the river.	The Historical Center, Ft. Wayne	$20,000	
Clear and snag logs blocking access/canoeing opportunities	Maumee River Basin Commission	$0	2010

6. FISH AND WILDLIFE HABITAT

6.1 Introduction

This section of the existing conditions assessment provides an overview of fish and wildlife habitat resources in the watershed. Land use in the watershed, like most of the watersheds within the WLEB, is predominantly agricultural and, consequently, fish and wildlife habitat is limited.

6.2 Fish and Wildlife Characteristics

Prior to European settlement, the Maumee River Basin was a vast wilderness of lakes, rivers, wetlands, forests and prairies that harbored a great diversity of fish and wildlife species. The widespread clearing and drainage that followed settlement has dramatically altered the landscape, reducing the region's wetland acres by more than 85%, and virtually eliminating native prairie and savanna. These large-scale conversions of native habitat had significant impacts on fish and wildlife resources, particularly wetland and aquatic species, and grassland dependent birds. Despite rehabilitation efforts, wetlands continue to be lost at a rate that exceeds replacement, and undisturbed grassland habitat is a rarity on the landscape. In addition to direct loss, wildlife habitat, especially wetlands, can be degraded by contamination from agricultural and urban runoff, isolation from other habitats, and increased predation.

A primary focus of the St. Marys River Watershed stakeholders is the recreation or rehabilitation of former wetlands and associated uplands that supported migratory birds. In the northeast pothole region, this takes the form of wetland basins (marshes) surrounded by upland native prairie, which provides breeding and migration habitat for waterfowl such as mallard and blue-winged teal, and marsh birds such as rails, bitterns, and herons. In addition, the federally endangered Indiana bat utilizes riparian (streamside) forests for breeding, foraging, and migration habitat.

Along the floodplains of the larger river systems in northern Indiana, including the St. Marys, forested wetlands are a major focus of rehabilitation activities. These areas provide important breeding and migration habitat for waterfowl, Neotropical migrant songbirds and, as noted above, the federally endangered Indiana bat. Reforestation techniques involve planting mainly 1-2 year old nursery seedlings adapted to floodplain conditions, and controlling competing weed competition for at least three years.

Many species of grassland dependent migratory birds have been declining in recent decades, due in large part to the loss of suitable grassland nesting habitat. Species such as bobolink, grasshopper sparrow, Henslow's sparrow, and upland sandpiper are forced to nest in less secure or isolated patches of habitat, which are subject to high rates of disturbance from owing and nest predation.

Invasive species are one of the major threats to the integrity of native terrestrial and aquatic ecosystems, as their aggressive growth habits crowd out native species and form dense single-species stands. Partnership organizations are actively working in the watershed to help control invasive species on private lands. Control work is often labor intensive, and targeted species include purple loosestrife, common reed, reed canary grass, garlic mustard, bush honeysuckle, buckthorn, and tall fescue.

Implementation of previously completed programs and project types, particularly in concert with watershed BMPs, sedimentation and stream bank erosion, water quality, and recreation will benefit fish and wildlife. On-going authorities, programs and projects of the USFWS and state agencies in the St. Marys River Watershed can also facilitate fish and wildlife habitat objectives. Chapter 2 of this report ("General Setting") provide further detail on opportunities for development of fish and wildlife habitat.

The USACE is also in a position to facilitate fish and wildlife habitat improvement via its associated authorities in jurisdictional areas, as appropriate. Projects or programs that are implemented to address specific problems with fish and wildlife habitat may wholly, or in part, also complement objectives that address problems in sedimentation, stream bank erosion, flood control, water quality and recreation.

Table 6-1 identifies various segments of the St. Marys River and associated conservation priorities as identified by USGS.

Table 6-1. St. Marys River segments identified by the Gap Program as having a high conservation priority (USGS 2008).

14-HU	14-HU Site Name	Highest Criterion Attainment	Discussion
04100004-020-030	St. Marys River below Hussey Creek to above Twelvemile Creek (except Eightmile Creek)	3rd fish (90%) bivalves (95%)	High priority based on fish and bivalve species richness relative to stream size in the Lake Erie Basin
04100004-030-010	St. Marys River below Twelvemile Creek to above Black Creek.	3rd fish/bivalves (95%)	High priority based on fish and bivalve species richness relative to stream size in the Lake Erie Basin
04100004-030-040	St. Marys River below Black Creek to above. Twentysevenmile Creek	3rd fish (90%) bivalves (95%)	High priority based on fish and bivalve species richness relative to stream size in the Lake Erie Basin

Habitat is a critical part of the stream environment. Alteration of natural stream features and modifications to natural hydrology can exacerbate other concerns, such as thermal stress and flow. Structures and activities in the waterway that alter flow may be a source of stressors, such as increased sedimentation or barriers to the upstream migration of aquatic organisms. In addition, instability of channel bottoms and the predominance of fine silty channel materials are a both a symptom and a cause of poorly functioning stream habitat.

Traditional drainage has focused on providing an outlet for subsurface drainage and rapid removal of stormwater resulting in deepened headwater channel construction, over wide and trapezoidal channel bottom design. While solving an immediate problem, each of these comes at the expense of other important stream features. Changes to stream gradient, velocity, conveyance and sediment transport have a direct impact on habitat on all but the most tolerant fish and macroinvertebrate species. Removal of wooded and riparian areas has dramatically altered an ecosystem many plants, birds, and animals require for survival. This removal of streambank vegetation has also resulted in increased water temperature and reduction of shaded protection for aquatic species.

The use of BMPs to correct the effects of stream alteration must consider all impacts. Simply restoring habitat will not restore aquatic life unless sediment and nutrient loadings have also been addressed. Problems and concerns in the watershed are summarized in Table 6-2.

Table 6-2. Fish and wildlife habitat problems and concerns.

WLEB Resource Category	Name	Description	Political Subdivision
Fish and Wildlife Habitat	Stream Alteration	The habitat quality in streams and rivers within the watershed is currently impacted by sedimentation, wetland and riparian loss, and stream modification due to agricultural production in the upper portion of the watershed.	All Counties
Fish and Wildlife Habitat	Removal or vegetation	The removal of forest cover for agricultural purposes has also been extensive throughout the watershed. Scattered woodlots and little riparian corridors account for the only wooded habitat remaining.	All Counties
Fish and Wildlife Habitat	Dams	Several dams located within the St. Marys River Watershed may also contribute to habitat issues.	Counties
Fish and Wildlife Habitat	Stream Impairments	Portions of the St. Marys watershed are on the 303(d) list of impaired streams.	EPA
Fish and Wildlife Habitat	Habitat fragmentation	Urbanization is causing habitat fragmentation.	All Counties
Fish and Wildlife Habitat	Non-point source regulations	Lack of enforcement of existing laws such as NPDES.	US EPA/ ODNR/ IDEM
Fish and Wildlife Habitat	Nutrient loadings	Elevated nutrients such as ammonia, phosphorus, and *E. coli* from agricultural activity is affecting habitat.	All counties
Fish and Wildlife Habitat	Conservation practices	Lack of funding for public and non-profit conservation efforts.	All counties
Fish and Wildlife Habitat	Habitat loss	Loss of riparian habitat.	All counties
Fish and Wildlife	Invasive species	Nuisance species are negatively affecting	All counties

Table 6-2. Fish and wildlife habitat problems and concerns.

WLEB Resource Category	Name	Description	Political Subdivision
Habitat		habitat.	
Fish and Wildlife Habitat	High mosquito populations	Mosquito population is a problem. Also, the St. Marys Watershed is an important bird fly over route.	All counties

6.4 Anticipated Conditions: Opportunities and Unmet Needs

Implementation of previously discussed programs and project types (e.g., watershed BMPs, sedimentation and stream bank erosion, water quality, recreation) will also benefit fish and wildlife habitat enhancement. Ongoing authorities, programs and projects of the USFWS and relevant state agencies can also advance fish and wildlife habitat objectives.

An Ohio update of the National Wetlands Inventory is currently underway and expected to be completed by June 2009; it will serve as the first statewide update since the original inventory in 1974. The new inventory, used in tandem with the Ohio Wetland Restoration and Mitigation Strategy Blueprint, will provide access to precise wetland data and sound strategies for protection, and will serve as an official addendum to the 2008 SCORP (ODNR, 2008).

The USACE may be able to facilitate fish and wildlife habitat improvement via associated authorities in jurisdictional areas, as appropriate. Projects or programs that are implemented to address specific problems with fish and wildlife habitat may wholly, or in part, also complement objectives that address problems in sedimentation, stream bank erosion, flood control, water quality and recreation. Table 6-3 summarizes opportunities and unmet needs.

Table 6-3. Fish and wildlife habitat opportunities and unmet needs.

WLEB Resource Category	Name	Description	Political Subdivision
Fish and Wildlife Habitat	Fish and Wildlife Habitat Restoration Plan	A restoration plan is needed in the St. Marys to identify riparian, wetland and general habitat restoration needs and high priority restoration sites in the watershed. Restoration of wetland and riparian area may provide flood storage and water quality benefits.	Counties, ODNR
Fish and Wildlife Habitat	Fish and Wildlife Habitat Restoration Plan	A restoration plan is needed to identify riparian, wetland, and general habitat restoration needs and high priority restoration sites in the watershed. Restoration of wetland and riparian area may provide flood storage and water quality benefits as well.	Counties, ODNR

Table 6-3. Fish and wildlife habitat opportunities and unmet needs.

WLEB Resource Category	Name	Description	Political Subdivision
Fish and Wildlife Habitat	Funding for conservation practice needs	Funding for habitat enhancement programs and staff to implement new programs and keep current programs moving forward.	NRCS, Federal Partners
Fish and Wildlife Habitat	Land Banking	Consolidate and prioritize conservation lands within the watershed to maximize resources.	Counties, ODNR
Fish and Wildlife Habitat	Education and Outreach	Promote erosion control, conservation, habitat, green space, and no-till.	SWCDs
Fish and Wildlife Habitat	Conservation programs	Enforce/Implement NRCS programs with continued funding.	NRCS, SWCDs

6.5 Past/ Ongoing Studies and Data Gaps

Very few studies have characterized existing conditions and needs for fish and wildlife habitat in the St. Marys River Watershed. Table 6-4 lists ongoing studies and data gaps in the watershed.

Table 6-4. Fish and Wildlife Habitat past/ongoing studies and data gaps.

WLEB Resource Category	Name	Description	Recommendations
Fish and Wildlife Habitat	Ohio Aquatic Gap Analysis – An Assessment of the Biodiversity and Conservation Status of Native Aquatic Animal Species. 2006	Identifies potential high-priority conservation areas, focusing on aquatic habitat. A terrestrial GAP analysis is still in progress.	Analysis is still underway.
Fish and Wildlife Habitat,	Ohio Comprehensive Wildlife Plan 2006	10 year plan to improve fish and wildlife resources in the State. Plan identifies priority areas.	Does not identify the St. Marys River Watershed as a priority focus area for fish and wildlife conservation
Fish and Wildlife Habitat	Western Lake Erie Basin Partnership Strategic Plan	Establishes goals for each of the strategic objectives developed by the partnership.	Road map for Basin-wide improvement

6.6 Findings

The St. Marys River Watershed has excellent wildlife resources in its managed areas, where continued preservation is essential. Beyond those areas and, due largely to the predominance of agriculture, habitat is limited. Several conservation programs are being used (or could be used) to directly or indirectly increase the amount of fish and wildlife habitat in the watershed. Programs include:

- **Conservation Reserve Program (CRP):** A voluntary program available to agricultural producers to help them enhance environmentally-sensitive land. Producers enrolled in CRP plant long-term, resource-conserving covers (e.g., introduced or native grasses or hardwood trees) to improve the quality of water, control soil erosion and enhance wildlife habitat. In return, FSA provides participants with rental payments and cost-share assistance for 10 to 15 years. The long-term time frame ensures that investments in environmental benefits accrue over a longer period.
- **Lake Erie Conservation Reserve Enhancement Program**: A local, state, federal and private partnership to **reduce sediment pollution** in Lake Erie and its watersheds by installing 67,000 acres of filter strips, riparian buffers, wetland restoration, hardwood tree plantings, wildlife habitat, and field windbreaks. The CREP is a component of CRP.
- **Environmental Quality Incentive Program (EQIP**): A voluntary, federally funded program providing farmers with incentive payments, as well as technical assistance for conservation activities that help limit soil erosion, improve water and air quality, and protect wildlife habitat. The EQIP Forestry program is targeted at local landowners who want to improve existing woodlots and plant new trees on land that does not qualify for CRP.
- **Wetlands Reserve Program (WRP):** A voluntary conservation program that offers landowners the means and opportunity to protect, restore, and enhance wetlands on their property through perpetual easements, 30 year easements or Land Treatment Contracts. The USDA NRCS manages the program as well as provides technical and financial support to help landowners who participate in WRP.
- **The Wildlife Habitat Incentives Program (WHIP):** A voluntary program for people who want to develop or improve wildlife habitat on private lands. It provides both technical assistance and cost sharing to help establish and improve fish and wildlife habitat. WHIP emphasizes re-establishment of habitat for declining species – wetland and grassland dependent birds, amphibians, reptiles, insects and small mammals. Applications which increase wooded riparian corridors and improve habitat for state and federally listed threatened, rare and endangered aquatic species are encouraged.
- **State Acres for Wildlife Enhancement (SAFE):** Owners and operators of certain cropland in designated geographic areas may enroll eligible land in a new continuous CRP conservation practice titled SAFE, also known as CP38. FSA created SAFE to benefit high-priority state wildlife conservation objectives through the restoration of vital habitat.
- **Ohio Grassland and Wetland Complexes (SAFE):** The goal of the Ohio Grassland and Wetland Complexes SAFE project is to enroll up to 11,600 acres in CRP to benefit high priority species for Ohio, including Karner blue butterflies, frosted elfin butterflies, Henslow's sparrow, dickcissels, wood ducks, northern bobwhite quail and ring-necked pheasants.

A detailed breakdown of the status of these programs in the St. Marys River Watershed is not currently available at the time of this report.

6.7 Potential Actions

The use of best management practices to correct the effects of stream alteration must consider all impacts. Simply restoring habitat will not restore aquatic life unless sediment and nutrient loadings have also been addressed. Table 6-5 lists potential actions for the St. Marys Watershed.

Table 6-5. Fish and wildlife habitat potential actions.

Description:	Potential Sponsors	Costs Estimates	Time Frame
Aggressively promote riparian buffer, conservation and reforestation programs, and purchase land or easements on land adjacent to streams.	SWCD	$1,000,000	2010-2014
Perform a stream corridor survey and inventory of wildlife.	ODNR	$45,000	2010
Emergency streambank and shoreline projection projects.	USACE	$40,000	2010
Feasibility study of restoration projects for impacted habitat study areas.	ODNR	$10,000	2010
Implement additional conservation projects that enhance habitat leveraging both current and new NRCS sponsored programs.	NRCS	$1,000,000	2009-2014

7.0 COMMERCIAL AND RECREATIONAL NAVIGATION

7.1 Introduction

This section identifies in-stream and access issues impacting existing recreational navigation. Designated commercial navigation areas do not exist in the St. Marys River Watershed. Recreational boating activity is largely limited to small, non-motorized boats, and is addressed in detail in Chapter 5 of this report.

7.2 Navigation Characteristics

Recreational boating in the watershed is largely restricted to seasonal use boaters, and is largely limited to small, non motorized watercraft (e.g., canoes, kayaks) due to shallow depth and limited access points. (The latter are presented in Table 5-1.) Enhanced access, reduced navigation impediments (e.g., dams, log jams, shallow depths), and improvements to water quality and fish/ wildlife habitat, would likely increase demand for such activity. There is no commercial navigation activity in the watershed.

7.3 Navigation Infrastructure, Programs and Best Management Practices

Navigation infrastructure is essentially non-existent except where associated with the access sites referenced above. Existing low head dams, log jams, and shallow water depths in the St. Marys River are impediments to recreational boaters.

7.4 Existing Conditions: Issues and Concerns

Section 5.4 of this report presents problems and concerns associated with resource- based recreation, including recreational boating. No other issues or concerns were identified in available published reports.

7.5 Anticipated Conditions: Problems and Unmet Needs

Section 5.5 of this report addresses opportunities and unmet needs with regard to resource-based recreation, including recreational boating. Log jams and low head dams as noted previously are impediments to recreational boater navigation. Removal of these wherever possible will improve recreational navigation opportunities.

7.6 Past/ Ongoing Studies and Data Gaps

Ongoing studies do not exist for navigational concerns in the St. Marys. Potential studies of dam removal and log jam abatement and its impact to recreational navigation in the mainstem would be helpful.

7.7 Findings

No specific recreational navigation needs were identified in the watershed, although continued support of areas currently used for canoeing and kayaking, as well as maintenance of boater access areas, is stressed. Section 5.6 of this report provides additional detail in the broader context of resource- based recreation.

7.8 Potential Actions

Table 7-1. Commercial and recreational navigation potential actions.

Description:	Potential Sponsors	Costs Estimates	Time Frame
Study impact of log jam removal on recreational boating opportunities.	County Engineer	$50,000	2010
Evaluate dam removal opportunities.	ODNR	$40,000	2011
Develop a water trail with additional recreational access.	BMYP	$25,000	2010-2014
Increase the number of access points for canoeing and kayaking.		$25,000	2012-2014
Perform hydraulics/hydrology studies.		$0	

8.0 WATERSHED PRIORITIZATION

Prioritizing potential actions in various categories (i.e., flood damage reduction, water quality, resource- based recreation, fish and wildlife habitat, commercial and recreational navigation) is a critical step as the planning process moves into the implementation phase. Individual actions are typically interdependent, with each one affecting- and being affected by- the others. A strategic approach to their timing, sequence and pairing can have implications for overall plan effectiveness and cost efficiency. It is also necessary in accommodating budgetary realities and other resource constraints that may require actions to be undertaken over an extended period.

By its very nature, the prioritization process must be stakeholder driven, and solicit the support and involvement of local decision makers, opinion leaders and other interested parties. The process must be a flexible and iterative one, recognizing that stakeholder preferences (i.e., priorities) can and do evolve over time as interests, needs and circumstances change.

The Executive Summary of this report offers a consolidated list of potential actions for the St. Marys Watershed, and additional detail is provided in Sections 3-7. This list provides the basis for a prioritization process with the following components:

- *Assemble a local leadership team*, comprised of decision makers and opinion leaders, to assist the Corps of Engineers and WLEB Partnership in soliciting community input on restoration, protection and sustainable use priorities within the watershed.
- *Develop evaluation criteria and a ranking methodology* for the potential actions identified in the report. Such criteria might include significance of the problem, implications for human health and safety, availability of a sponsoring agency/ organization and/ or anticipated benefits.
- *Conduct a public workshop at the local watershed level* to apply the evaluation criteria and rank priority actions.
- *Conduct a public workshop at the Western Lake Erie Basin level* to prioritize potential actions and ensure their consistency with the priorities at the individual watershed levels. The WLEB Partnership is ideally suited for this task.

Finally, the existing conditions, opportunities and unmet needs that have led to the status of each watershed have to be evaluated as a whole to assess how each contributes to the overall water quality status of Maumee Bay and the Western Lake Erie Basin. Data gaps that exit for information from each watershed must in part be filled with an eye to solving the overall problems in the basin. The findings of each report, and the potential actions, should be prioritized in order to reap the maximum benefit of water quality protection for the Western Lake Erie Basin.

Collectively, these actions will provide the basis for a detailed Implementation Plan that provides a “blueprint” to guide the actions of the many partners (See Section 10).

9.0 PLAN INTEGRATION: RELATIONSHIP TO OTHER WATERSHED PLANS

The St. Marys River Watershed is one of 10 areas included in the Western Lake Erie Basin (WLEB) project. Each watershed assessment is unique, as it is based upon the input of local stakeholders and the findings/ recommendations of past and ongoing studies specific to that watershed. At the same time, it is important to recognize that each watershed is inextricably linked to others within the WLEB. The status of water and related natural resources in one watershed (e.g., quality, quantity, usage, management strategies) both affects and is affected by the status of those resources in other watersheds. In some instances, problems, needs and opportunities will be distinctly different from one watershed to the next. In other instances, they may be shared among multiple watersheds or throughout the entire WLEB. Thus, plan integration is essential in providing a meaningful set of priority potential actions at the watershed and Basin-wide levels. It is also critically important to ensure that the selection, sequencing and timing of potential actions is accomplished strategically, and in a manner that ensures timely, efficient and cost- effective implementation.

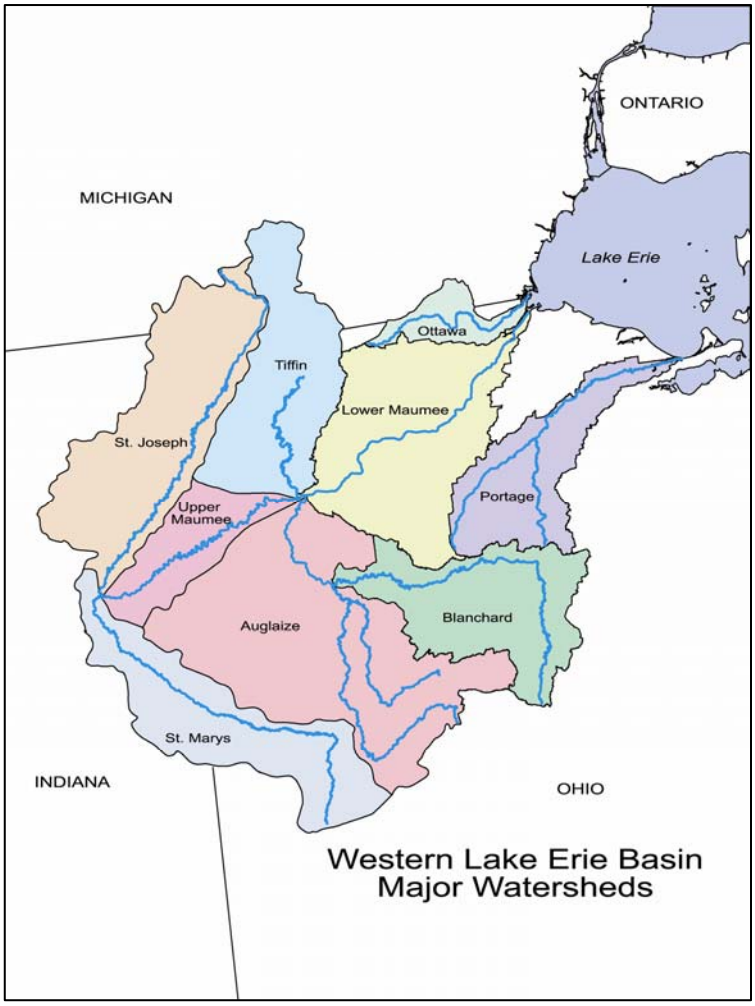


Figure 9-1. Western Lake Erie Basin major watersheds.

Under the leadership of the USACE and NRCS, the WLEB Partnership will be developing a unified and comprehensive Watershed Management Report that "rolls" up the findings of the individual watershed assessments. This will form the basis for a Report to Congress that includes a set of explicit recommendations for measures to address both local and basin-wide problems and unmet needs associated with flood control, water quality, resource- based recreation, fish and wildlife habitat, and recreational and commercial navigation. These measures may include specific programs and projects; additional studies to address data and information gaps; and/ or applied research and demonstration initiatives to evaluate scientific and engineering solutions to identified problems.

10. PLAN IMPLEMENTATION

The 10 watershed assessments associated with this project, as well as the consolidated Report to Congress, will provide guidance to an array of public and non-governmental entities with a role and responsibility for the restoration, protection and sustainable use of the water and related natural resources of the Western Lake Erie Basin. Specific approaches to plan implementation will be a function of 1) the nature of potential actions as prioritized at the individual watershed and Western Lake Erie Basin level; and 2) the requirements and procedures associated with the various prospective sponsors of such actions.

As is evident from this report, the range of potential actions goes well beyond the authority or scope of the Corps of Engineers or any other individual agency/ organization. Leadership (and partnerships) will be required of various federal, state, regional and local governments; academic institutions; foundations; private sector interests; and others with a commitment to the future of the WLEB. Funding sources for implementation will vary as well, and could include a broad range of traditional (e.g., federal, state, and local government funding, foundations) and non-traditional sources (e.g., conservancy districts, utilities, assessments, mitigation banks, in-lieu fees).

At the conclusion of the prioritization process, an Implementation Strategy must be developed (at the Western Lake Erie Basin level) to provide the blueprint needed to harmonize the work of multiple entities, each with distinct project requirements, timeframes and funding sources. A “capital improvements” inventory offering a detailed descriptive listing of recommended projects, costs, sponsors, authorities and related information will be an invaluable component of the Implementation Strategy.

The strategy for securing federal projects will be dictated by the nature of the potential action, and whether that action can be implemented under existing authority or will require authorization by the Congress. Implementation for other projects will be accomplished via partnerships among local, state and federal entities and/or by specific sponsors.

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APPENDICES

(subject to change, additional appendices can be added depending upon the needs of individual watershed assessments, some redundancy here but did not want to change without further discussion with USACE project manager.)

A. **List of Acronyms**
B. Project Scope of Work
C. Task and Activity Timeline
D. Project Team and Contributing Authors
F. Watershed Conceptual Model

Appendix A. List of Acronyms

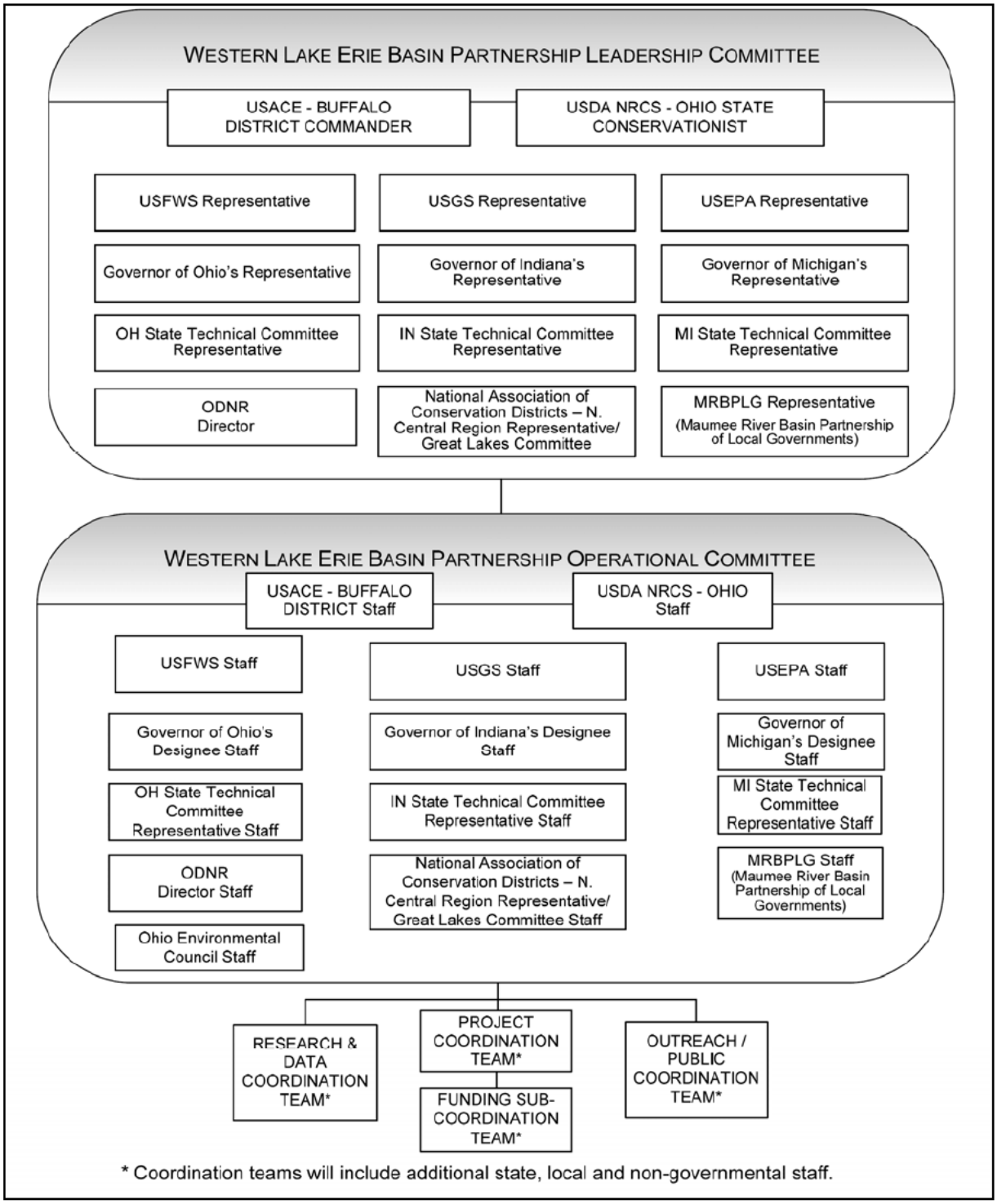
(requires editing)

A/E	*Architect/Engineer*
Am. River	*American Rivers Organization*
AMP	*Ambient Monitoring Program*
AR	*Army Regulation*
ARS USDA	*Agricultural Research Service*
ASLF	*Atlantic States Legal Foundation*
BMP	*Best Management Practice*
CAP	*Conservation Action Project*
CEFMS	*Corps of Engineers Financial Management System*
CELRB	*Corps of Engineers Lakes and Rivers – Buffalo*
CELRBM	*Corps of Engineers Lakes and Rivers – Buffalo Memorandum*
CELRD	*Corps of Engineers Lakes and Rivers Division*
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act*
CFR	*Code of Federal Regulation*
CHRP	*Comprehensive Habitat Restoration Plan*
CSO	*Combined Sewer Overflow*
CW	*Civil Works*
CWE	*Current Working Estimate*
CWP	*Center for Watershed Protection*
CX	*Center of Expertise*
DDE-PM	*Deputy District Engineer for Project Management*
DE	*District Engineer*
DFARS	*Defense Federal Acquisition Regulation Supplement*
DOD	*Department of Defense*
DQLL	*Design Quality Lessons Learned*
DU	*Ducks Unlimited*
EA	*Environmental Assessment*
EFARS	*Engineer Federal Acquisition Regulation Supplement*
EIS	*Environmental Impact Statement*
EPA	*Environmental Protection Agency*
ER	*Engineer Regulation*
Evt. Defense	*Environmental Defense, Center for Conservation Initiatives*
FAR	*Federal Acquisition Regulation*
FEMA	*Federal Emergency Management Agency*
FOIA	*Freedom of Information Act*
FS	*Feasibility Study*
FSA USDA	*Farm Service Agency*
FY	*Fiscal Year*
GIS	*Geographic Information System*
HAB	*Habitat*
HUC	*Hydrologic Unit Code*
HYG	*Hydrogeologic*

IDEM	*Indiana Dept of Environmental Management*
IFG	*Inland Fisher Guide*
IRM	*Interim Remedial Measure*
ISDA	*Indiana State Dept. of Agriculture*
ITR	*Independent Technical Review*
JOYCE	*The Joyce Foundation*
MAWI	*Multi-scale Assessment of Watershed Integrity*
MCP	*Management & Coordination*
MDA	*Michigan Dept. of Agriculture*
MDEQ	*Michigan Dept. of Environmental Quality*
MIPR	*Military Inter-agency Purchase Request*
MOA	*Memorandum of Agreement*
MOU	*Memorandum of Understanding*
MRBPLG	*Maumee River Basin Partnership of Local Governments*
MVRCD	*Maumee Valley Resource Conservation and Development*
NACD	*National Association of Conservation Districts*
NEC	*National Economic Council*
NEPA	*National Environmental Policy Act*
NFPA	*National Fire Protection Association*
NGO	*Non Governmental Organizations*
NPS	*Non-point Source*
NRCS USDA	*Natural Resources Conservation Service*
NRDA	*National Resource Damage Assessment*
NTP	*Notice to Proceed*
O&M	*Operations & Maintenance*
ODA	*Ohio Dept. of Agriculture*
ODH	*Ohio Dept. of Health*
ODNR	*Ohio Department of Natural Resources*
ODOD	*Ohio Dept. of Development.*
ODOT	*Ohio Dept. of Transportation*
OEC	*Ohio Environmental Council*
OEPA	*Ohio Environmental Protection Agency*
OEPA	*Ohio Environmental Protection Agency*
OLEC	*Ohio Lake Erie Commission*
OSHA	*Occupational Safety and Health Administration*
OSU	*The Ohio State University*
PCB	*polychlorinated biphenyl*
PDT	*Project Delivery Team*
PEIS	*Programmatic Environmental Impact Statement*
PGL	*Policy Guidance Letter*
PL	*Public Law*
PLA	*Project Labor Agreement*
PM	*Project Manager*
PMBP	*Project Management Business Process*
PMP	*Project Management Plan*

POC	*Point of Contact*
PORT	*Toledo-Lucas County Port Authority*
PR&C	*Purchase Request & Commitment*
QCP	*Quality Control Plan*
RI	*Remedial Investigation*
RTS	*Regional Technical Specialist*
SBA	*Small Business Administration*
SCORP	*Statewide Comprehensive Outdoor Recreation Plan*
SHPO	*State Historic Preservation Office*
SJWI	*Saint Joe Watershed Initiative*
SOP	*Standard Operating Procedure*
SOW	*Scope of Work*
SVA	*Stream Visual Assessment*
SWCD	*Soil and Water Conservation District(s)*
TMACOG	*Toledo Metropolitan Council of Governments*
TNC	*The Nature Conservancy*
USACE	*U.S. Army Corps of Engineers*
USC	*United States Code*
USDA	*United States Department of Agriculture*
USEPA	*U.S. Environmental Protection Agency*
USFWS	*U.S. Fish and Wildlife Service*
USGS	*U.S. Geological Survey*
UT	*University of Toledo*
VTC	*Video Teleconferencing*
WLEBS	*Western Lake Erie Basin Study*
WRDA	*Water Resources Development Act*

APPENDIX B-1. WLEB PARTNERSHIP



Appendix B-2. Roles and Responsibilities of WLEB Partnership

WLEB Functional Elements	Purpose	Functions
Leadership Committee	➢ Establish and maintain the mission of the Western Lake Erie Basin Partnership. ➢ Set goals, assess performance, and report progress on the watershed improvement effort. ➢ Allocate available resources for Partnership requirements. ➢ Provide ongoing public outreach on the watershed improvement effort. ➢ Provide ongoing senior-level coordination among Partnership member agencies and non-member agencies.	➢ Review progress, address issues requiring senior level coordination, and resolve issues brought forward by the standing Coordination Teams. ➢ Publish on an annual basis a report on the overall watershed improvement progress and status of the Partnership. The USACE and NRCS shall be responsible for preparing the draft report, coordinating the draft report, and issuing the final report. ➢ The report shall publish watershed improvement requirements, funds status, project progress, outreach activities, leadership decisions, and open issues. The standing Coordination Teams shall provide input for the report. ➢ Sponsor and conduct an annual Partnership Meeting for all Partners, Advisors, ➢ Coordinators and Participants. ➢ Review and approve all final actions of the standing Coordination Teams. ➢ Select and approve standing Coordinators who represent interested and involved organizations that sign the member agreement.
Operational Coordination Team	➢ Coordinate the day-to-day activities of the Partnership, prepare for Leadership Committee meetings, and prepare recommendations to the Leadership Committee for evaluation. ➢ At least annually, the Advisors shall evaluate and make recommendations to the Leadership Committee as to whether or not there are additional State, Federal, local agencies, or non-government organizations (NGOs) that can bring additional resources (i.e., funding, people, facilities, material, or equipment) to Partnership activities.	➢
Project Coordination Team	➢ Serve as the Partnership's technical center of expertise on specific projects. ➢ Investigate and provide technical recommendations to the Operational and ➢ Leadership Committees as directed. ➢ Provide input for a comprehensive project database and schedule for the entire ➢ Watershed improvement effort. Monitor	➢ Develop and maintain a comprehensive project database. ➢ Develop and maintain a comprehensive project schedule. ➢ Seek input about potential projects from State, Federal, Local agencies or non-government organizations (NGOs) and identify opportunities for project

WLEB Functional Elements	Purpose	Functions
	projects' program and progress and provide data for status reports showing metrics based progress. ➢ Identify and prioritize projects required for watershed improvement.	➢ coordination. ➢ Provide project definition packages to the Funding Sub-Coordination Team. ➢ Make recommendations to the Leadership Committee. ➢ Develop operating procedures to be approved by the Leadership Committee. ➢ Other duties as assigned by the Leadership Committee.
Funding Sub-Coordination Team	Track existing funding (amount and source) for the Partnership and the watershed improvement effort. - Identify and recommend potential funding sources for watershed improvement projects. - Develop a funding strategy for Partnership projects. - Make recommendations to the Project Coordination Team and Operational Committee.	
Outreach Coordination Team	Enhance public knowledge and understanding of the Partnership and the status of the watershed improvement effort. - Provide a single point of contact for the public to address watershed improvement needs, desires, and issues.	Develop and maintain the Partnership web site and/or other media to provide continuous updates on the watershed improvement effort. - Identify and pursue opportunities for public participation and education in the watershed improvement effort. - Seek, accept, and coordinate public input and responses, as necessary. - Make recommendations to the Leadership Committee. - Develop operating procedures to be approved by the Leadership Committee. - Other duties as assigned by the Leadership Committee.
Research and Data Coordination Team	Synthesize the existing available data into a format useable for watershed analysis across three States: Indiana, Michigan, and Ohio. - Identify gaps in the existing data, prioritize data and research needs, and work within existing authorities and available funding to improve understanding of the Western Lake Erie Basin.	

Appendix B-3. USACE Continuing Authorities Program (CAP).

CAP Authority	Description	Federal Maximum $
Aquatic Ecosystem Restoration (Section 206, Water Resources Development Act of 1996)	This provides for planning, design, and construction of aquatic ecosystem restoration and protection projects, when it is found that the project will improve the quality of the environment, is in the public interest and is cost effective	**$5,000,000**
Beach Erosion Control (Section 103, River and Harbor Act of 1962, as amended)	The Corps of Engineers may construct beach restoration and protection projects not specifically authorized by Congress.	**$2,000,000**
Ecosystem Restoration in Connection with Dredging (Section 204, Water Resources Development Act of 1992)	The Corps of Engineers may carry out projects for the protection, restoration, and creation of aquatic and ecologically related habitats, including wetlands, in connection with dredging for construction, operation, or maintenance of an authorized Federal navigation project.	N/A
Emergency Streambank and Shoreline Erosion Protection (Section 14, Flood Control Act of 1946, as amended)	This provides protection from streambank or shoreline erosion to public facilities by the construction or repair of protection works.	**$1,000,000**
Flood Control (Section 205, Flood Control Act of 1948, as amended)	This provides the same complete project and adequate degree of protection as would be provided under specific Congressional authorization	**$5,000,000**
Mitigation of Shore Erosion Damage due to Federal Navigation (Section 111, River and Harbor Act of 1968, as amended)	The Corps of Engineers is authorized to investigate, study and construct projects for the prevention or mitigation of shore damage attributable to Federal navigation works. The study will address structural or nonstructural measures to reduce erosion-type damage by shoreline stabilization	**$2,000,000**
Navigation (Section 107, River and Harbor Act of 1960, as amended)	Small Navigation Projects. This authorizes construction, operation and maintenance of small river and harbor improvement projects.	**$4,000,000**
Project Modifications for Improving the Quality of the Environment (Section 1135(b), Water Resources Development Act of 1986, as amended)	This provides for constructing environmental restoration projects where a USACE project contributed to the degradation of the environment.	**$5,000,000**
Snagging and Clearing for Flood Control (Section 208, Flood Control Act of 1954, as amended)	the Corps of Engineers is authorized under this Act to allot up to $500,000 on any single tributary during any fiscal year for the removal of accumulated snags and other debris, and for the clearing or channel excavation and improvement with limited embankment construction by use of materials from the channel excavation	**$500,000**

Appendix C. Project Team and Contributing Authors

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Appendix E. Summary of Upper Maumee River Watershed Potential Actions

Description	Potential Sponsors	Cost Estimate	Time Frame
Section 3. Flood Damage Reduction, Water Supply, Sedimentation, and Bank Erosion			
Construct reservoir upstream of Decatur and Fort Wayne to alleviate flooding.	Maumee River Basin Commission	$50,000,000	2014+
Acquire all residential structures in floodplain	Maumee River Basin Commission	$16,600,000	2010-2014
Water Treatment Plant	Rockford	$2,500,000	2009
Support implementation of additional conservation practices in watershed to reduce sediment loads and erosion by increasing payments to offset gains in price of commodity crops.	NRCS	$2,000,000	2010-2014
Limit additional development and restore flood retention capabilities of floodplains.	Counties	$1,000,000	2010-2014
Continue acquisition of structures along Junk Ditch to maintain overflow path capacity.	Maumee River Basin Commission	$1,000,000	2010-2014
Update floodplain maps and establish base flood elevations.	FEMA	$600,000	2010-2014
Clear log jams, junk, debris from streams and ditches.	Counties	$500,000	2010-2014
Continue Stream Obstruction Removal Program - Special Area of Concern, Section between Adams/Allen County Line and I-469 & Annual Reconnaissance	Maumee River Basin Commission	$325,000	2010-2014
Construct larger on-site detention ponds for future development.	County Engineer	$200,000	2010-2014

Description	Potential Sponsors	Cost Estimate	Time Frame
Section 3. Flood Damage Reduction, Water Supply, Sedimentation, and Bank Erosion			
Complete Houk Ditch/Trier Ditch overflow evaluation to determine feasibility of designating path as an Impact Area and recommended measures.	Maumee River Basin Commission	$200,000	2010-2011
Continue to identify and provide cost-share match to landowners (agriculture) to compensate them for land conversion programs (floods, riparian areas, etc.)	Maumee River Basin Commission	$150,000	2010-2014
Adopt flood plain, stormwater policies/ordinances/public education.	Ohio Environmental Education Fund	$115,000	2009-2013
Prepare inventory of culverts causing historic flooding and target them for retrofitting.	Counties	$100,000	2010
Enhance data and mapping of flood prone areas outside the floodplain. Development of floodplain maps for local streams not on FIRMs or county maps.	Counties	$100,000	2010-2014
Update/complete Flood Hazard mapping for St. Mary Watershed: IN	Maumee River Basin Commission	$100,000	2010
Yost Levee Removal /Bypass Channel evaluation.	Maumee River Basin Commission	$100,000	2012-2012
Install/operate river gage on Main Street Bridge to calibrate River Hydraulic Model.	Maumee River Basin Commission	$97,500	
Conduct comprehensive inventory and assessment of rural drainage system to better understand this important “drainage infrastructure” and better management maintenance practices to reduce sediment loadings and aquatic habitat.	County Engineer	$75,000	2011

Description	Potential Sponsors	Cost Estimate	Time Frame
Section 3. Flood Damage Reduction, Water Supply, Sedimentation, and Bank Erosion			
Establish post-flood damage assessment protocol.	Maumee River Basin Commission	$75,000	2011
Incorporate stream restoration and protection into drainage projects.	County Engineer	$50,000	2009-2014
Build collaborative relationships with Ohio communities and the State of Ohio to develop more restrictive standards as they apply to floodplain and stormwater management.	Maumee River Basin Commission	$50,000	2010
Evaluate feasibility of nonstructural tools to reduce or eliminate stream maintenance (woody debris removal)	Maumee River Basin Commission	$50,000	2010-2014
Maintain Junk Ditch/Little River overflow floodplain to assure land use changes do not significantly decrease flow, complete evaluation/Master Plan Update.	Maumee River Basin Commission	$50,000	2010
Identify areas for restoration of natural hydrology and flow characteristics to also benefit flood mitigation.	SWCD	$50,000	2010
Establish cost estimates and schedules for implementing nonstructural flood mitigation recommendations presented in County Natural Disaster Mitigation Plans.	County EMAs	$40,000	2012
Increase freeboard for structures along the St. Marys River corridor	Maumee River Basin Commission	$40,000	2010-2014
Conduct drainage feasibility study on the Fairfield Ditch area.	USACE	$40,000	2010-2012
Implement education programs on improved ditch maintenance program – not striping/spraying.	SWCD	$25,000	2010

Description	Potential Sponsors	Cost Estimate	Time Frame
Section 3. Flood Damage Reduction, Water Supply, Sedimentation, and Bank Erosion			
Analyze repetitive flood properties and identify feasible mitigation options.	FEMA	$20,000	2012
Develop program to educate building owners in flood hazard areas (including behind levees) to obtain flood insurance to close gap between insured structures and number of structures in the flood hazard area.	Maumee River Basin Commission	$15,000	2010
Promote Wetland Reservoir Subsurface Irrigation Systems as a method of providing seasonal floodplain storage by "temporarily" plugging drainage tiles in late fall after crops have been harvested and then removing said plug several weeks prior to spring planting season. This dual use of property could provide water quality benefits, wildlife habitat, and stormwater runoff detention.	Maumee River Basin Commission	$10,000	2010
Expand distribution of MRBC newsletter to targeted audiences.	Maumee River Basin Commission	$5,000	2010-2014
Purchase homes for demolition along Winchester Road and place levees to compensate for the 100-yr flood elevation.	Fort Wayne	$0	2012
Update Northwest Ohio water Supply Plan.	ODNR	$0	2010-2011
Section 4. Water quality			
Improve hazardous waste cleanup programs by providing resources; establish a cleanup fund for sites which impact public health; establish a grant fund for local communities to clean sites, perform cleanups and attract federal matching funds; take full advantage of the Water Pollution Control loan fund.	OEPA	$5,000,000	2009-2014

Description	Potential Sponsors	Cost Estimate	Time Frame
Section 4. Water quality			
Wastewater Treatment Plant	Rockford	$3,500,000	2009
Provide incentives for agricultural BMPs to reduce surface sediment transport to streams.	NRCS	$3,000,000	2010-2014
Establish and preserve riparian habitat.	SWCD	$2,000,000	2010-2014
Repair areas of streambank erosion.	NRCS	$1,000,000	2010-2014
Increase the percentage of agricultural acreage in the watershed under conservation tillage practices – sponsors.	ODNR	$1,000,000	2010-2014
Develop comprehensive nutrient management plans for all livestock farms regardless of size.	OEPA	$1,000,000	2010-2014
Establish a wetland bank (costs recouped through selling credits).	SWCD	$1,000,000	2010
Expand demonstration projects and research for alternative CSO controls such as rain gardens, bioretention, etc.	OEPA	$600,000	2010-2014
Conduct public outreach on private land management, conservation practices and water quality.	SWCD	$500,000	2010-20143
Develop selective, low impact debris-dam (log jam) removal strategy/program.	County Engineer	$250,000	2010-2014
Provide funding for watershed coordinator.	All	$200,000	2010-2014
Identify all brownfields in the Western Lake Erie Basin. Prioritize Brownfields in the WLEB.	OEPA	$150,000	2009
Implement laws and rules for new permitting requirements and operation of private home septic systems. (i.e., permits to install, operational assessments, funding mechanisms at both state and local levels to cover costs of sewage disposal program activities, public education concerning operation and maintenance).	County Commissioners	$100,000	2009

Description	Potential Sponsors	Cost Estimate	Time Frame
Section 4. Water quality			
Encourage and assist with development of HSTS plans to mitigate bacteria and nutrients from reaching streams.	County Health Department	$100,000	2010
Survey watershed for sources of stream bank erosion, and stabilize these areas in a holistic manner.	Maumee River Basin Commission	$75,000	2010-2014
Conduct inventory of riparian corridors to maximize water quality and quantity benefits.	Maumee River Basin Commission	$75,000	2011
Complete Rapid Watershed Assessment to determine conservation practice needs and cost estimates.	NRCS	$60,000	2009
Develop strategy to implement BMPs on farms with less than 1,000 animals.	NRCS	$50,000	2009
Promote demonstration projects for innovative conservation tillage and cover crop practice.	NRCS	$45,000	2010
Prioritize funding for implementation of soil conservation projects and research into new conservation practices.	NRCS	$45,000	2010
Evaluate need for more detailed water quality data collection and analysis after WLEB study completed.	Maumee River Basin Commission	$35,000	2010
Perform water quality study.	Maumee River Basin Commission	$25,000	2010-2012
Promote in-stream channel measures that increase flow and aeration.	ODNR	$25,000	2010-2014
Increase the number of farms doing soil sampling and precision nutrient (fertilizer) application.	OEPA	$25,000	2010-2014
Precision application of fertilizer/ manure to reduce excess nitrate runoff.	OEPA	$25,000	2010-2014

Description	Potential Sponsors	Cost Estimate	Time Frame
Section 4. Water quality			
Sponsor research to assess performance of individual streams.	OEPA	$25,000	2009-2014
Integrate existing local requirements (e.g., stormwater plans, CSO plans, CAFO management plans) to provide a comprehensive approach to water quality improvements.	OEPA	$25,000	2010-2014
Implement Corridor Protection Ordinances.	NRCS	$10,000	2010
Develop regulations for Agricultural Erosion Control Practices.	NRCS	$10,000	2010
Education.	All	$0	2010-2014
Mandate no floodplain filling or development in the floodplain/buffer area; buy adjacent land or easements on adjacent land.	Maumee River Basin Commission	$0	2010-2014
Implement Conservation Tillage Programs.	NRCS	$0	2010-2015
Require all CSO sources to develop, and subsequently implement, long term control plans or a CSO elimination strategy.	USEPA	$0	Ongoing/ continuous
Section 5. Resource-Based Recreation			
Expand and connect an already extensive trail system via planning and construction.	Park Districts	$4,000,000	
Expand and protect parks along the St. Marys River, in the interest of protecting floodplains, via measures such as conservation easements, the wetland reserve program and the CREP program.	NRCS	$1,000,000	2010-2014
Establish recreational pathways along filter strips serving as greenways.	Park Districts	$100,000	

Description	Potential Sponsors	Cost Estimate	Time Frame
Section 5. Resource-Based Recreation			
Formulate non-structural flood damage and ecosystem restoration projects to provide recreational opportunities.	USACE	$75,000	
Determine the feasibility of clear and snag projects to deepen stretches of the river to increase historical tours via canoe.	Maumee River Basin Commission	$40,000	
Restore historical docks and places along the river.	The Historical Center, Ft. Wayne	$20,000	
Clear and snag logs blocking access/canoeing opportunities	Maumee River Basin Commission	$0	2010
Section 6. Fish and Wildlife Habitat			
Aggressively promote riparian buffer, conservation and reforestation programs, and purchase land or easements on land adjacent to streams.	SWCD	$1,000,000	2010-2014
Perform a stream corridor survey and inventory of wildlife.	ODNR	$45,000	2010
Emergency streambank and shoreline projection projects.	USACE	$40,000	2010
Feasibility study of restoration projects for impacted habitat study areas.	ODNR	$10,000	2010
Implement additional conservation projects that enhance habitat leveraging both current and new NRCS sponsored programs.	NRCS	$1,000,000	2009-2014
Section 7. Commercial and Recreational Navigation			
Study impact of log jam removal on recreational boating opportunities.	County Engineer	$50,000	2010
Evaluate dam removal opportunities.	ODNR	$40,000	2011
Develop a water trail with additional recreational access.	BMYP	$25,000	2010-2014
Increase the number of access points for canoeing and kayaking.		$25,000	2012-2014
Perform hydraulics/hydrology studies.		$0	