Section 905(b) Reconnaissance Study

Final Report

Western Lake Huron Basin Watershed Study, Michigan

May 2012

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1. Study Authority

This Reconnaissance Study (also known as a Section 905(b) study) was prepared under the authority of Section 110 of the River and Harbor Act of 1950 (PL 81-516), as amended by Section 102 of the River and Harbor Act of 1966 (PL 89-789); according to guidance provided in Section 905(b) of the Water Resources Development Act (WRDA) 1986 (PL 99-662).

Section 110 of the River and Harbor Act of 1950, (PL 81-516) allows the Army to conduct preliminary examinations and surveys and states:

> *The Secretary of the Army is hereby authorized and directed to cause preliminary examinations and surveys to be made at the following named localities, the cost thereof to be paid from appropriations heretofore or hereafter made for such purposes:* Provided, *That no preliminary examination, survey, project, or estimate for new works other than those designated in this title or some prior Act or joint resolution shall be made:* Provided further, *That after the regular or formal reports made as required by law on any examination, survey, project, or work underway or proposed are submitted, no supplemental or additional report or estimate shall be made unless authorized by law:* Provided further, *That the Government shall not be deemed to have entered upon any project for the improvement of any waterway or harbor mentioned in this title until the project for the proposed work shall have been adopted by law:* Provided further, *That reports of surveys on beach erosion and shore protection shall include an estimate of the public interests involved, and such plan of improvement as is found justified, together with the equitable distribution of costs in each case …*

Section 110, as amended by Section 102 of the River and Harbor Act of 1966, authorizes the Army to conduct surveys of the Great Lakes. Section 102 states:

> *The Secretary of the Army is hereby authorized and directed to cause surveys to be made at the following named localities and subject to all applicable provisions of Section 110 of the River and Harbor Act of 1950:*
>
> *… Great Lakes, particularly Lake Ontario and Lake Erie, in connection with water supply, pollution abatement, navigation, flood control, hydroelectric power, and related water resources development and control.*

Section 905(b) of the Water Resources Development Act (WRDA) 1986 (PL 99-662) prescribes the basic purpose and objectives for a reconnaissance study as authorized by Section 110, as amended. Section 905(b) states:

> *Before initiating any feasibility study under subsection (a) of this section … the Secretary (of the Army) shall first perform, at Federal expense, a reconnaissance study of the water resources problem in order to identify potential solutions to such problem in sufficient detail to enable the Secretary to determine whether or not planning to develop a project should proceed to the preparation of a feasibility report. Such reconnaissance study shall include a preliminary analysis of the Federal interest, costs, benefits, and environmental impacts of such project, and an estimate of the costs of preparing the feasibility report. The duration of a reconnaissance study shall normally be no more than twelve months, but in all cases is to be limited to eighteen months.*

Detailed procedures for the development of a 905(b) study for the reconnaissance phase of a water resources study by the Corps are prescribed in Engineer Regulation (ER) 1105-2-100. The 905(b) study

for the Western Lake Huron Basin (WLHB) watershed has been developed in accordance with Section 905(b) of WRDA 1986 and associated regulations.

Funds in the amount of $490,000 were made available from fiscal year (FY) 2010 and 2011 appropriations under the Great Lakes Restoration Initiative (GLRI) to conduct the 905(b) study for the WLHB. WLHB was approached as an expanded watershed-based 905(b) study involving a very large and diverse study area (8,700 square miles) with multiple individual coastal watersheds, multiple wide-ranging issues, and multiple local political jurisdictions and potential project sponsors. The study also involved a much greater degree of agency coordination and stakeholder involvement than would normally occur in a typical 905(b) study. Eight community meetings and one agency technical meeting were held to solicit feedback on key problems and potential solutions in the study area. Hence, the study cost was substantially higher than would be expected for a traditional, more narrowly focused 905(b) study (typically $100,000 to $200,000).

2. Study Purpose

The purpose of the reconnaissance phase study is to review water resource problems and opportunities in the WLHB study area, consistent with the study authority, and to determine if there is a Federal (Corps) interest in participating in a cost-shared, feasibility phase study (or studies) to investigate and recommend plans and projects that warrant Federal participation. "Federal interest" means that a proposed project or remedy to a watershed problem or impairment falls within a Corps "mission area" (i.e., ecosystem restoration, flood risk management, commercial navigation, hydropower, or storm damage reduction). It should be noted that this study also recognizes and includes remedial actions (potential projects) for watershed impairments that do not fall under Corps authorities (Federal interest) or that may be addressed by other Federal, state, or local agencies or other stakeholder groups.

Section 110, as amended provides broad authority to address not only ecosystem restoration, but also Great Lakes water resource problems related to "traditional" Corps mission areas (e.g., navigation, flood risk management, etc.). This reconnaissance study is GLRI funded and, consistent with GLRI, focuses on restoration initiatives. Several non-restoration issues were identified in the course of preparing this study. The non-restoration issues are herein noted, however, as part of this study, those items will not be addressed for further examination.

In response to the study authority, this reconnaissance study was initiated in May 2011. Based on investigations conducted during the reconnaissance phase, this study found that there is a Federal interest in further study at various locations in the WLHB. The purposes of this Section 905(b) study are to document the basis for this finding and to establish the scope of any resultant feasibility phase. As the document that traditionally establishes the scope of a feasibility study, the Section 905(b) study will be used as the chapter of the Project Management Plan that presents the reconnaissance overview and formulation rationale.

3. Location of Study, Non-Federal Sponsor (NFS), and Congressional Districts

3.1 Location

The overall study area is the WLHB, which includes 22 counties and encompasses 20 individual watersheds in Michigan. The WLHB has a total drainage area of approximately 8,700 square miles (22,533 square kilometers; Figure 1). Overall, the area is heavily forested, sparsely populated, scenically beautiful, and economically dependent on its natural resources. Land use in the WLHB watershed

is dominated by forest and agriculture, with the principal urban/industrial areas located in Midland and Saginaw Counties. The study area is entirely within US waters and territories, but the receiving water body for the WLHB watershed, Lake Huron, is shared with Canada. Thus, this Section 905(b) study considers the binational nature of Lake Huron resources, as well as pertinent binational studies, plans, and agreements to protect and restore those resources.

Figure 1. Location of the Western Lake Huron Basin.

Funding resources for this 905(b) study required that the geographic focus be narrowed toward those areas within the WLHB with the highest probability for water resource problems directly affecting Lake Huron and, in particular, the two designated Areas of Concern (AOC), Saginaw River/Bay and the St. Marys River. These AOCs are discussed in more detail below. The following fifteen (15) counties within the WLHB (shaded areas in Figure 1) served as the principal geographic focus for this study: Chippewa,

Mackinac, Cheboygan, Presque Isle, Alpena, Alcona, Iosco, Arenac, Bay, Tuscola, Huron, Sanilac, St. Clair, Midland, and Saginaw. With the exception of Midland and Saginaw Counties, these represent the coastal counties in Michigan that directly border Lake Huron. Midland and Saginaw Counties represent a large portion of the lower Saginaw River watershed and are among the more highly urbanized areas draining into Saginaw Bay/western Lake Huron. In addition, much of the river portion of the Saginaw River and Bay AOC lies within Saginaw County.

Placing a direct focus on these fifteen coastal and near-coastal counties did not prohibit the study team from considering critical water resource problems and opportunities in the upstream portions of the WLHB watersheds that could be identified as a result of the literature review or stakeholder input during the 905(b) study. However, those problems and opportunities beyond the principal geographic focus area in the WLHB were to be considered on an exception basis, as determined by the Corps Detroit District, principally based on relative importance and compelling stakeholder input (summarized in Section 5.2).

In the WLHB study area, the two specific AOCs are the Saginaw River and Bay and the St. Marys River. Across the Great Lakes Basin, there are 43 AOCs defined by the United States-Canada Great Lakes Water Quality Agreement (Annex 2 of the 1987 Protocol) as "geographic areas that fail to meet the general or specific objectives of the agreement where such failure has caused or is likely to cause impairment of beneficial use of the area's ability to support aquatic life" (GLIN 2011). These two AOCs are briefly described below; more details on the issues in these AOCs, relative to identifying water resource problems and opportunities for this study, are presented in Section 5.3.

Saginaw River/Bay AOC. The Saginaw Bay area, in the east central portion of Michigan's Lower Peninsula, is a southwestern extension of Lake Huron. The boundaries of the Saginaw River/Bay AOC are the entire 22-mile length of the Saginaw River, beginning at the confluence of the Shiawassee and Tittabawassee Rivers, and all of Saginaw Bay (1,143 square miles, or 2,960 square kilometers), out into its interface with open Lake Huron at an imaginary line drawn between Au Sable Point and Point Aux Barques (Figure 2). This diverse area supports agriculture, manufacturing, tourism, and outdoor recreation; it also supports a variety of wildlife. Saginaw River/Bay was listed as an AOC due to contaminated sediments, fish consumption advisories, high bacteria, nutrient enrichment (e.g., phosphorus), sedimentation, degraded fisheries, and loss of significant recreation values (MDNR 1988). The AOC currently has the following ten beneficial use impairments:

- Restrictions on fish and wildlife consumption
- Eutrophication or undesirable algae
- Degradation of fish and wildlife populations
- Beach closings
- Degradation of aesthetics
- Bird or animal deformities or reproduction problems
- Degradation of benthos
- Degradation of phytoplankton and zooplankton populations
- Restriction on dredging activities
- Loss of fish and wildlife habitat

Figure 2. Location of the Saginaw Bay AOC.

St. Marys River AOC. The St. Marys River, at the border between Canada and the Upper Peninsula of Michigan, is 70 miles (112 kilometers) of waterways that connect Lake Huron to Lake Superior. The AOC, which is a "Bi-national AOC," extends from the head of the river at Whitefish Bay (Point Iroquois - Gros Cap), downstream through the St. Joseph Channel to Humburg Point on the Ontario side, and to the straits of De Tour on the Michigan side (Figure 3). Water quality, sediment, and biota impairment remain due to historical point source discharges. Contaminants of concern are oils and greases, suspended solids, metals, phenols, ammonia, bacteria, and PAHs. As a result of industrial and municipal discharges, sediments have become contaminated with toxics, such as arsenic, cadmium, chromium, copper, cyanide, and lead. The St. Marys AOC currently has the following ten beneficial use impairments:

- Restrictions on fish and wildlife consumption
- Eutrophication or undesirable algae
- Degradation of fish and wildlife populations
- Beach closings
- Fish tumors or other deformities
- Degradation of aesthetics
- Bird or animal deformities or reproduction problems

- Degradation of benthos
- Restriction on dredging activities
- Loss of fish and wildlife habitat

Figure 3. Location of the St. Marys River AOC.

In summary, this Section 905 (b) study principally focuses on addressing water resource problems and opportunities on the U.S. side of the lake in the watersheds closest to the Lake Huron shoreline or areas that drain directly into the lake. Specifically, the study area associated with this reconnaissance study includes fifteen counties in the WLHB: Chippewa, Mackinac, Cheboygan, Presque Isle, Alpena, Alcona, Iosco, Arenac, Bay, Midland, Saginaw, Tuscola, Huron, Sanilac, and St. Clair. The study area includes the entire extent of each of the two designated AOCs.

3.2 Non-Federal Sponsor (NFS)

As a key element of the process to identify and compile water resource problems and opportunities in the WLHB study area and potential measures to address them, the study team sought to engage stakeholders (as described in Section 5.2) to help identify prospective organizations, such as state agencies and local government entities, with both the qualifications and willingness to serve as NFS for a Corps study/project or for technical assistance from the Corps. Through this stakeholder involvement process and direct contact with organizations that expressed interest in supporting or participating in Corps activities to address these challenges, potential NFSs were identified and Letters of Intent to cost-share feasibility phase investigations were sought for those studies determined to be in the Federal interest. The potential NFS for each of the feasibility phase activities stemming from this 905(b) study are identified and discussed in Section 5.7 and in Table 5.

3.3 Congressional Districts

The study area lies in following US Congressional Districts (Figure 4):

Michigan 1st District – Representative Dan Benishek (R)
Michigan 4th District – Representative Dave Camp (R)
Michigan 5th District – Representative Dale Kildee (D)
Michigan 10th District – Representative Candice Miller (R)

In addition, the study area is served by both US Senators Carl Levin (D) and Debbie Stabenow (D).

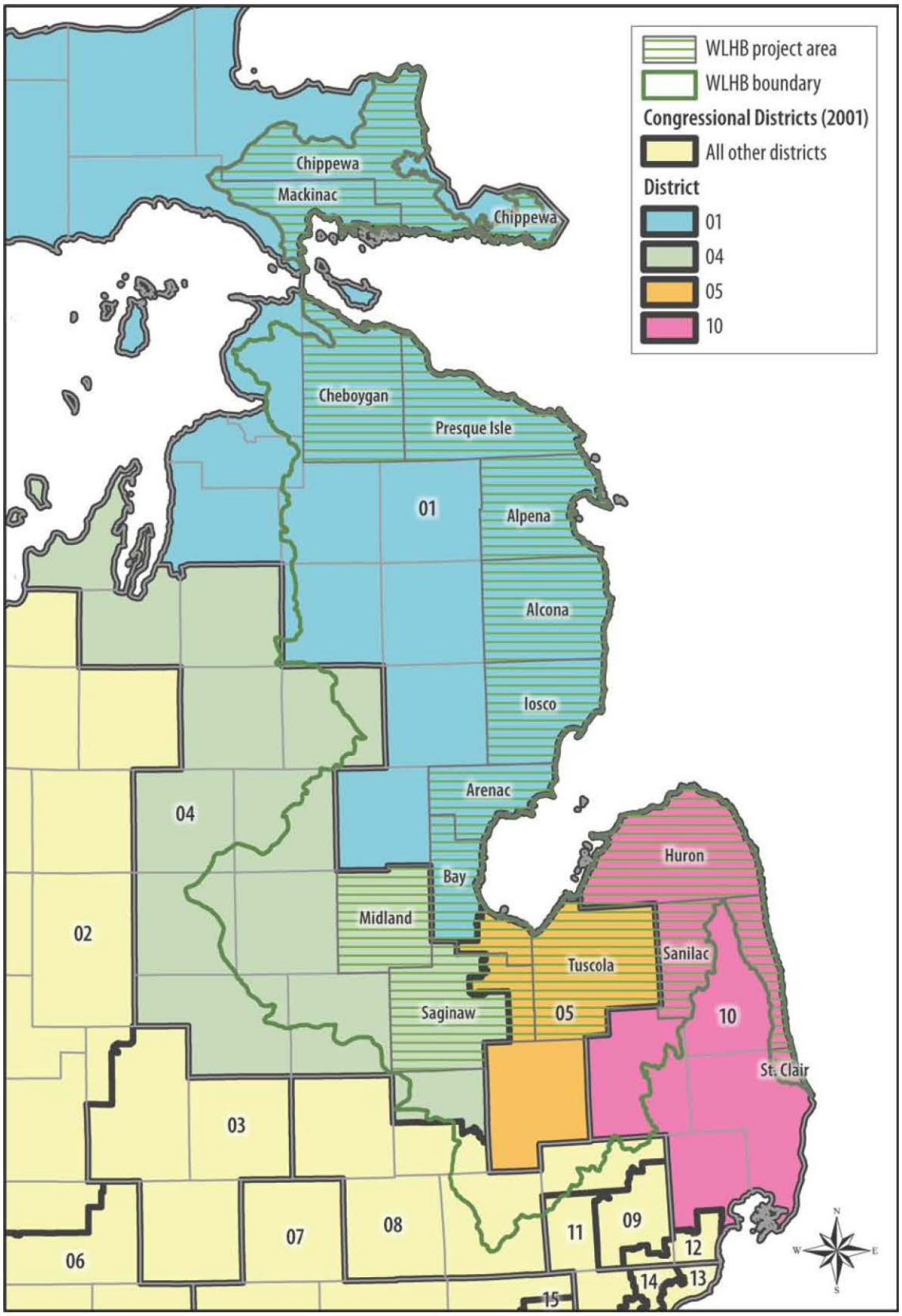

Figure 4. US Congressional Districts in the WLHB study area.

4. Prior Reports and Existing Projects

4.1 Prior Corps Reports and Existing Projects in the Study Area

The Corps has a long history of water resource and related activities in the WLHB study area. The following paragraphs briefly describe relevant prior reports and existing projects in the study area, as well as pertinent studies and projects that are underway.

4.1.1 Multipurpose Project

4.1.1.1 St. Marys River. The St. Marys River flows southeasterly between Michigan and Ontario, Canada and connects the eastern end of Lake Superior with the northern end of Lake Huron. The Federal project, which has been authorized by numerous acts between 1870 and 1986, provides for maintaining navigation channels at 27.5-28.5 feet deep in the St. Marys River and in the Lake Superior and Lake Huron approaches thereto; for constructing and operating four locks and two canals; for constructing a hydropower plant of 14,000-kilowatt capacity (45,000-kilowatt ultimate capacity); for constructing anchorage areas in the river above and below the locks; and for constructing various other works in conjunction with the project. The project also is the site of a visitor's center and park handling nearly 500,000 visitors annually (USACE Detroit District 2011a).

4.1.2 Navigation

4.1.2.1 Cheboygan Harbor. Cheboygan Harbor is at the mouth of the Cheboygan River, which empties into western Lake Huron about 16 miles southeast of the Straits of Mackinac Bridge. The project was authorized by the River and Harbor Acts of June 2, 1896; March 2, 1907; August 26, 1937; May 17, 1950; and October 21, 1964. The project provides for channel maintenance, including a turning basin and a rubble mound breakwater. Commercial docks, which are used primarily for receiving petroleum products, are along the river. Cheboygan Harbor is also the home port of the US Coast Guard's (USCG) only US heavy ice-breaking resource, the cutter *Mackinaw*, which also plays a key role in buoy tending in spring and fall. The harbor provides for the only ferry service to Bois Blanc Island. The ferry carries people, cars, trucks, commodities, and mail. Approximately four to five ferry trips are made daily from early spring through late fall (USACE Detroit District 2011b).

4.1.2.2 Alpena Harbor. Alpena Harbor is at the mouth of the Thunder Bay River, which empties into Thunder Bay, Lake Huron. The harbor is 100 miles southeast of Cheboygan Harbor, Michigan. The Thunder Bay River has its source in Montmorency and Alpena Counties, Michigan. The project was authorized by the River and Harbor Acts of September 19, 1890; March 2, 1919; September 22, 1922; August 30, 1935; and October 27, 1965. The project provides for a bay channel, an entrance channel, a river channel, a turning basin, and a breakwater. Several commercial docks, which are used primarily for receiving coal and petroleum products, are along the river. There is a cement production facility next to the outer harbor area. A municipal marina basin is about one-quarter mile southwest of the river channel mouth (USACE Detroit District 2011c).

4.1.2.3 Saginaw River. The Saginaw River begins at the confluence of the Tittabawassee and Shiawassee rivers southeast of Saginaw, Michigan (Saginaw County) and generally runs north through the southeast corner of Bay County before it empties into Saginaw Bay, approximately 90 miles north of Detroit. The Saginaw River channel is a Federally authorized commercial navigation project. The entire channel extends from deep water, 14 miles out in Saginaw Bay of Lake Huron at the north end of the channel, through the mouth of the Saginaw River and 22 miles upstream to Saginaw (USACE Detroit District 2011d). Project depths range from 27 feet in Saginaw Bay to 16.5 feet at the head of navigation in Saginaw.

Dredged material for the lower Saginaw River portion of the project (from deep water in Saginaw Bay to a point about 4.7 miles upstream from the mouth of the Saginaw River) is placed in the Saginaw Bay confined disposal facility (CDF). Constructed in 1978 under Section 123 of the River and Harbor Act of 1970 (PL 91-611), the CDF consists of a 284-acre site with capacity of approximately 10,000,000 cubic yards. As the Bay CDF approached its dredged material capacity in 1995, a dredged material management plan (DMMP) was conducted for the lower Saginaw River. The DMMP, approved in May 1997, included a recommendation for raising the dikes of the Bay CDF to extend its life for another 20 years. The dikes were raised in 2002 for the northern half of the facility only. Dredged material capacity of the Saginaw Bay CDF was based on the lower Saginaw River only and was not designed to include dredged material from the upper Saginaw River. The DMMP preparers also determined that it is not cost effective to transport dredged material from the upper Saginaw River to the Saginaw Bay CDF (USACE Detroit District 2005).

A Phase II DMMP study for the upper Saginaw River was completed in July 2004 (with an addendum in September 2005). The channel limits of the upper Saginaw River DMMP study are from a point 4.7 miles upstream of the entrance of the Saginaw River, upstream to the confluence of the Shiawassee River and Tittabawassee River, at Saginaw River's mile 22 in the city of Saginaw (covering about 17.3 miles of navigation channel). The DMMP study evaluated several alternatives to contain an estimated 3.1 million cubic yards of dredged material expected over 20 years. The study authors recommended development of a CDF on a 281-acre tract, known as the Zilwaukee Township site, west of the Saginaw River and approximately 11 miles upstream of its mouth (USACE Detroit District 2005). Construction of the CDF was completed in August 2007.

4.1.2.4 Recreational Harbors. There are 15 Federally authorized navigation projects in the WLHB study area that are classified as recreational harbors (Table 1 and Figure 5). These harbors for recreational watercraft often serve additional functions and provide unique benefits that further support maintenance and the continued viability of these harbors, including the following (USACE 2008):

- Harbors of refuge—The study area contains five designated harbors of refuge that provide protection for recreational craft during severe weather. Without these maintained harbors, boating accidents and casualties would likely escalate, as would the costs for USCG search and rescue operations.
- USCG facilities—USCG search and rescue stations are strategically located at two of these shallow draft recreational harbors in the WLHB study area, Tawas Bay and Harbor Beach. These facilities are not only crucial to the public safety function performed by the USCG but also contribute economically to their host communities in goods and services purchased.
- Ferry and subsistence services—Three harbors are identified as locations for ferry services, performing important transportation system functions, in addition to their recreation benefits. One harbor is classified as a subsistence harbor to island communities.

The summary of recreational harbors in the study area in Table 1 includes a matrix depicting the additional functions that these recreational channels may serve.

Figure 5. Location of recreational harbors in the WLHB.

Table 1. Corps recreational harbors in the WLHB study area, depicting other important functions and services that these harbors may provide.

Recreational Harbors in the WLHB Study Area	County (Michigan)	Harbor of Refuge	USCG Facilities	Ferry and Subsistence Services
Au Sable Harbor	Iosco	X		
Bayport Harbor	Huron			
Caseville Harbor	Caseville			
Detour Harbor	Chippewa			X
Hammond Bay Harbor	Presque Isle	X		
Harbor Beach Harbor	Huron		X	
Harrisville Harbor	Alcona			
Lexington Harbor	Sanilac			
Mackinac Island Harbor	Mackinac			X
Mackinaw City Harbor	Cheboygan			X
Point Lookout Harbor	Arenac	X		
Port Austin Harbor	Huron	X		
Port Sanilac Harbor	Sanilac	X		
Sebewaing Harbor	Huron			
Tawas Bay Harbor	Iosco		X	

4.1.2.5 Mackinac Island Harbor, Harbor Breakwater, Section 107 Study (Mackinac Island, Mackinaw County). This project site is on the south shore of Mackinac Island. The study is being prepared in accordance with Section 107, 1960 River and Harbor Act (PL86-645), as amended (Small Navigation Projects; see Section 5.6.2.1 for more information on the Section 107 program). The project would involve construction of an eastern breakwater extension to protect the inner harbor from strong southeast storm surges. Mackinac Island depends on water transportation and is accessible from the mainland of northern Michigan only across the often rough waters of Lake Huron.

A preliminary assessment and detailed draft project management plan (PMP) has been prepared for the feasibility phase study. Upon coordinating and executing a feasibility cost sharing agreement (FCSA) with the NFS, a detailed project report to evaluate the project could be initiated. However, the NFS has indicated it is not positioned to provide the required cost-share match for the feasibility phase study. As of September 2011, the project is on hold until the NFS can provide the non-Federal share for the feasibility phase study (USACE Detroit District 2011e).

4.1.2.6 Port Sanilac Breakwater, Section 111 Study (Port Sanilac, Sanilac County). Port Sanilac Harbor is in eastern Michigan on Lake Huron. The study has been performed in accordance with Section 111, River and Harbor Act of 1968 (PL 90-483), as amended (Prevention or Mitigation of Shore Damage Caused by Federal Navigation Projects; see Section 5.6.2.1 for more information on the Section 111 program). Preliminary investigations were conducted to determine if there are any possible damages to the outlying shoreline next to the harbor attributable to the Federal navigation project and, if so, what mitigation measures may be appropriate. A more detailed investigation would be required to further evaluate the conditions, but this would require non-Federal cost sharing. No additional work will be done at the harbor under this authority, and this study has been terminated (USACE Detroit District 2011f).

4.1.3 Flood Risk Management (formerly Flood Control or Flood Damage Reduction)

4.1.3.1 Saginaw River Basin Flood Control Project (Bay and Saginaw Counties). The project for flood protection, Saginaw River Basin, Michigan, was authorized by Section 203 of the Flood Control Act of 1958 (PL 85-500). The Saginaw River Basin, including its tributaries (the Tittabawassee, Shiawassee, Flint, and Cass Rivers) drains 6,260 square miles in the east-central part of Michigan and empties into Saginaw Bay. The authorized project provided for improvements in the Saginaw River Basin for flood control and other purposes and was composed of eight distinct project elements, summarized as follows:

- At Sanilac Flats, provide for major drainage improvements by channel improvements on the Middle and South Branches of the Cass River, including a short reach of East Branch. This feature of the Saginaw River Basin project was deauthorized by Section 1002 of WRDA 1986 (PL 99-662).
- At Vassar on the Cass River, provide flood protection of areas on the north and south sides of the river by channel improvement, levee construction floodwalls, modifications to Moore Drain, and related work. This feature of the Saginaw River Basin project was subsequently deauthorized, in accordance with the provisions of Section 1001(b)(2) of WRDA 1986 (PL 99-662). Section 364 of WRDA 1999 (PL 106-53) reauthorized the Cass River project at Vassar, but the project has not been constructed.
- At Frankenmuth on Cass River, provide flood protection of areas on the north side of the river by channel improvement, levee construction, and related work.
- At Flint on the Flint River, provide flood protection of areas on both sides of the main stem of the Flint River and its tributaries, Swartz and Thread Creeks, by channel improvement, bridge alterations, floodwall and levee construction, and related work. Section 329 of WRDA 1996 (PL 104-303) modified the authorized project to include design and construction of an inflatable dam on the Flint River.
- At Corunna on the Shiawassee River, provide flood protection by channel improvement, levee construction, and related work. This feature of the Saginaw River Basin project was deauthorized by Section 1002 of WRDA 1986 (PL 99-662).
- At Owosso on the Shiawassee River, provide flood protection by channel improvement. This feature of the Saginaw River Basin project was deauthorized by Section 1002 of WRDA 1986 (PL 99-662).
- At Midland on the Tittabawassee River, provide flood protection through nonstructural (permanent evacuation) measures. This project was reclassified to the inactive category on December 15, 1982.
- At Shiawassee Flats along the lower reaches of the four principal tributaries of Saginaw River, provide flood protection, including fish and wildlife areas, by channel improvement, levees, lateral reservoirs with control structures, and related work. The project included special local cooperation conditions related to providing lands for the project due to the inclusion of fish and wildlife features. Further, before any flood control features at Shiawassee Flats would be constructed, the Secretary of the Army and Secretary of the Interior would be required to agree on a plan for operating fish and wildlife areas to ensure the required degree of controlled storage of flood-waters, while preserving the maximum fish and wildlife benefits. This feature of the Saginaw River Basin project was subsequently deauthorized, in accordance with the provisions of Section 1001(b)(2) of WRDA 1986 (PL 99-662). Section 364 of WRDA 1999 (PL 106-53) reauthorized the Shiawassee Flats project, but it has not been constructed.

The authorization for each of these project elements contained explicit local cooperation requirements for project sponsors. Only the Frankenmuth and Flint portions of the project have been completed (Secretary of the Army 1991).

4.1.3.2 Cass River Flood Control Project, Section 216 Study (Frankenmuth, Saginaw County). The Corps completed the Cass River project (part of the authorized Saginaw River Basin Flood Control Project) in 1965 to protect the city of Frankenmuth, Michigan, from floods associated with the Cass River. The flood control project included the construction of flood walls and levees. Recently, the Federal Emergency Management Agency conducted studies, which prompted a revision to the flood insurance rate map for the Frankenmuth. The revised flood insurance rate maps changed the flood designation of the downtown area, which will necessitate flood proofing existing buildings and restricting future expansions in the downtown area. The Corps will conduct a Review of Completed Projects Reconnaissance Study under the authority of Section 216 of the 1970 Flood Control Act (PL 91-611). Section 216 studies review operations of completed projects, when found advisable due to changed physical, economic, or environmental conditions. The study preparers will review the effectiveness of the completed flood control project and, as appropriate, identify possible solutions to ensure the project is providing the appropriate level of flood risk management.

Corps' operation and maintenance (O&M) funding is being used in FY 2011 to initiate the reconnaissance phase study, which includes preparation of a reconnaissance report based on review of the Cass River project, a PMP, and a FCSA. Upon execution of the FCSA, the cost-shared feasibility study will be initiated using general investigations funding (USACE Detroit District 2011g).

4.1.3.3 Sebewaing Flood Control Project (Sebewaing, Huron County). Floods occurred in 1934, 1935, and 1938 in the Sebewaing River Basin, as the result of much more rapid runoff from the upper basin due to the drainage system. In Section 3 of the River and Harbor of 1941 (PL 77-228), Congress authorized the Corps to provide flood protection to Sebewaing. Construction of a 11,000-foot levee, in partnership with the Sebewaing River Inter-County Drain Commission as the local sponsor, was started in 1945 and was completed in 1948. It extended from the junction of the Columbia and State drains to the outlet at Saginaw Bay, about three-quarters of a mile downstream of the railroad bridge. The Corps is responsible for project maintenance and is undertaking a major rehabilitation/reconstruction effort to maintain the designed level of flood risk reduction.

4.1.3.4 Kawkawlin River Section 205 Flood Control Project (Bay County). The Kawkawlin River drains an irregularly shaped area of about 220 square miles in Bay, Gladwin, Midland, and Saginaw Counties in east-central Michigan and discharges into Saginaw Bay, two miles northwest of Saginaw River. The flood control project was constructed under the authority of Section 205 of the Flood Control Act of 1948 (PL 80-858; see Section 5.6.2.1). The project provides for deepening about 1.8 miles of river channel, between the river mouth and Euclid Street Bridge; adding two 45.9-foot spans to the Detroit and Mackinac Railway Bridge; placing riprap on the channel bottom through the Euclid Street Bridge, existing piers at the Henry Street Bridge and Detroit, and the Mackinac Railway Bridge; and relocating a number of utilities. WRDA of 1986 (PL 99-662) modified the flood control project on the Kawkawlin River to provide that the Federal share of the cost of O&M of the project shall be 50 percent (Secretary of the Army 1991).

It should also be noted that in the 1990s there was a congressional request to dredge the mouth of the Kawkawlin River at Bangor Township. This was a one-time O&M dredging that required a decision document to justify the project.

4.1.4 Ecosystem Restoration

4.1.4.1 Frankenmuth Dam Fish Passage, Section 506 Project (Frankenmuth, Saginaw County). This project is being pursued under Section 506 of the WRDA of 2000 (PL 106-541, as amended, Great Lakes Fisheries and Ecosystem Restoration [GLFER] Program; see Section 5.6.2.2 for more detail on the Section 506 program). The Frankenmuth Dam is on the Cass River in the City of Frankenmuth, approximately 20 miles south of Lake Huron's Saginaw Bay. The Cass River originates in Tuscola County in east-central Michigan near Cass City. The Cass River's watershed encompasses 848 square miles and lies within the Saginaw Bay watershed. The concrete Frankenmuth Dam is approximately 240 feet long with a structural height of 14 feet and was built in the 1850s to supply water to a local mill. Although walleye and lake sturgeon are the species targeted by the Michigan Department of Natural Resources (MDNR) and the Partnership for the Saginaw Bay Watershed, a fish passage at the Frankenmuth Dam would also increase habitat connectivity for a variety of other species, including white sucker, white bass, smallmouth bass, channel catfish, northern pike, and steelhead. Connecting river habitat for these species would benefit the overall diversity of Cass River and Saginaw Bay watershed species. The non-Federal partner is the City of Frankenmuth.

A preliminary restoration plan has been approved and a concept design has been completed. Existing funds are being used to complete the feasibility-level planning and design, to prepare an environmental assessment, and to obtain project review and approval. Upon feasibility phase approval, detailed design will begin. Provided that a suitable design can be completed, a contract for construction could be awarded using FY 2013 Great Lakes Restoration Initiative (GLRI) funds. Current working estimate for the project is $3,100,000.

4.1.4.2 St. Marys River Habitat Restoration, Section 506 Project (Sault Ste. Marie, Chippewa County). Past modifications to incorporate commercial shipping in the St. Marys River have greatly altered its aquatic habitat. The area adjacent to Neebish Island was once a valuable rapid habitat used as a spawning area for fish. Without this project the area would continue to be unproductive as a spawning area. In the west project site, old building foundations could be removed, a channel could be excavated, and a culvert could be installed to allow water to flow behind the existing rock piles over the natural rock-rubble/cobble substrate. The east project site would require modifying the eastern remnants of the upper dam. A portion of the upper dam could be removed, and culverts could be placed under the roadway. A channel could then be excavated to allow water to flow behind the existing rock piles over the natural rock rubble/cobble substrate. The goal of this project is to restore water flow over the rock-rubble/cobble substrate to provide critical habitat for a number of fish and invertebrate species. The non-Federal partner is Michigan Department of Natural Resources (MDNR), Fisheries Division, Northern Lake Huron Management Unit.

In November 2003, the Corps Great Lakes and Ohio River Division (LRD) office approved a Section 1135 preliminary restoration plan (see Section 5.6.2.1). The project is being pursued under the GLFER authority. FY 2010 Energy and Water Development Appropriations Act funds were used to reevaluate the project. Initial hydraulic modeling indicated that only limited benefits may result from the creation of additional habitat areas. As a result, further coordination with the State of Michigan is being pursued. The estimated cost of the project was originally envisioned to be about $2,500,000 in 2011.

4.1.4.3 Thunder Bay Reef Restoration, Estuary Restoration Act of 2000 Project (Alpena, Alpena County). The proposed project is being pursued under the authority of the Estuary Restoration Act of 2000 (PL 106-457; see Section 5.6.2.2 for more detail on this authority). The project site is in Thunder Bay on the western shore of Lake Huron, next to Alpena in Alpena County. Cement kiln dust waste, a by-product of cement production, was historically stockpiled on the adjacent shoreline and was disposed of on the bottomlands of Lake Huron beginning in the 1950s. It is estimated that the cement kiln dust pile

has altered approximately 80 acres of shoreline and lake bottom, including areas of reef. Removal of the submerged cement kiln dust is not an option because it appears to have partially hardened into a contiguous mass, the removal costs are prohibitive, and there is concern about some of the material becoming resuspended during a removal operation. The plan for restoration was to add cobble/rubble material on top of or next to the impacted area to replicate natural reef conditions. The Michigan Department of Environmental Quality (MDEQ) partnered with the Federal government to construct this project in 2011.

4.1.4.4 Flint River Flood Control Project, Section 216 Study (Flint, Genesee County). Upstream of the principal focus area for this WLHB study, another study is underway. This feasibility study is under the authority of Section 216 of the Flood Control Act of 1970 (Review of Completed Projects). The purpose is to review the Flint River project (completed in 1966) for opportunities to restore the Flint River ecosystem and nurture a sustainable environment in the project area. The Flint River is in the Saginaw River/Bay watershed. The focus area for this study is the Flint River, between North Grand Traverse Street and North Chevrolet Avenue in downtown Flint. The existing project consists of concrete lined along the river bottom and banks, which have affected the natural ecosystem. FY 2010 GLRI funds were used to complete the reconnaissance report. The report was approved by Great Lake & Ohio River Division. Currently, the Sponsor does not have funding to execute the cost-share agreement for the feasibility study. The NFS is the City of Flint, Michigan (USACE, Detroit District 2011i).

4.1.5 Other Corps Studies

4.1.5.1 Saginaw River Shoreline Protection. Section 105 of WRDA of 1990 (PL 101-640) authorized the Secretary (of the Army) to undertake a project for shoreline protection along the Saginaw River in Bay City, Michigan, at a total estimated cost of $6,105,000. A reconnaissance study was completed in August 1992 to determine the feasibility of implementing stream bank erosion and flood protection measures at eight sites along the Saginaw River at Bay City. The study was terminated in FY 1993 because of an absence of significant erosion or stream bank problems or substantial damage to public structures, roads or other facilities (USACE, Detroit District 1993).

4.1.5.2 Sebewaing River Sediment Transport Modeling Study, Section 516(e) Study (Great Lakes Tributary Modeling Program). In December 2007, the Corps, Detroit District, completed a study for the Sebewaing River Basin, in accordance with Section 516(e) of the WRDA of 1996 (PL 104-303). The study's purpose was to provide tools for local communities and basin stakeholders to facilitate soil conservation and sedimentation reduction, with the goal of reducing sedimentation in Federal harbors and AOCs, eventually leading to removal of their impaired status. The Sebewaing River Sediment Transport Study had four objectives to meet this goal: (1) develop a geographic information system (GIS) of watershed features affecting sediment delivery and transport; (2) develop a watershed sediment budget; (3) conduct a riparian buffer analysis using GIS to identify and prioritize potential riparian areas for implementing sedimentation reduction best management practices; (4) provide support for numerical model development and analysis (USACE Detroit District 2007).

4.1.5.3 Saginaw River and Bay Sediment Transport Modeling Studies, Section 516(e) Study (Great Lakes Tributary Modeling Program). These models, completed in1999 and 2000, have been used to evaluate the feasibility of using sediment traps to reduce navigational dredging of the Saginaw River.

4.2 Relevant Reports and Projects by Others

In addition to the Corps projects conducted in the WLHB, there are numerous agencies and organizations working within the WLHB at various scales to identify challenges and potential solutions. For developing

the WLHB watershed reconnaissance study, the Corps has compiled a list of reports and projects in the WLHB developed by other agencies and organizations (see Appendix A). Some of these reports look at Lake Huron from a binational perspective, which exceeds the scope of the WLHB watershed reconnaissance study but still provides information on the study area. Other reports examine issues and solutions at a subwatershed scale. Brief overviews of several key reports developed by other agencies and organizations compiled for the WLHB watershed reconnaissance study are provided below.

Lake Huron Binational Partnership 2008-2010 Action Plan. Since 2002, the Lake Huron Binational Partnership has coordinated lakewide environmental activities. The Partnership consists of the EPA, Environment Canada (EC), MDEQ, and Ontario's Ministries of the Environment and Natural Resources. Although the EPA's Great Lakes National Program Office categorizes the Partnership's Action Plan as a Lakewide Management Plan, the partnership states that it is different because of its focus on priority areas (e.g., AOCs) and on-the-ground activities. The purposes of the action plan are to provide information on environmental trends, to identify priority issues, and to promote actions for implementation over the next two years. It also tracks progress on issues related to the past action plan period. Chapter 8 of the action plan identifies high-priority actions for the 2008-2010 management cycle, including a description of the action, the associated responsible party, and the status (ongoing, completed, new).

State of the Lakes Ecosystem Conference (SOLEC). This is a biennial conference hosted by the EPA and EC in response to the binational Great Lakes Water Quality Agreement. The 2008 SOLEC focused on the nearshore environment. The presentation on Lake Huron made during this conference provided an overview of the current conditions and trends, with a particular focus on Lake Huron's beaches. The presenters addressed the issue of muck that covers the shoreline in the Saginaw Bay area and some shoreline areas in Ontario, as well as bacterial contamination. The most recent SOLEC occurred in October 2011.

The Sweetwater Sea: An International Biodiversity Conservation Strategy for Lake Huron. The strategy, released in 2010, is the product of a two-year planning process that involved more than 100 agencies and organizations from around the Lake Huron basin. The many goals of this process included developing shared strategies for protecting important areas and addressing threats, promoting coordination of biodiversity conservation, and providing a framework to support measuring, managing, and reporting biodiversity conservation. The strategy includes a representative group of Lake Huron's biodiversity features, an inventory and ranking of threats to Lake Huron's biodiversity, identification of priority biodiversity conservation areas for implementation, and suggested next steps to implement recommendations.

Environmental Objectives for Lake Huron: A Report of the Environmental Objectives Working Group of the Lake Huron Technical Committee, Great Lakes Fisheries Commission. This 2007 document was developed in response to a directive contained in the Great Lakes Fisheries Commission's A Joint Strategic Plan for Management of Great Lakes Fisheries. The directive required all lake committees to develop fish community objectives (FCOs) and environmental objectives (EOs) for each lake. EOs are intended to describe the biological, chemical, and physical needs of desired fish communities. This document contains the EOs for Lake Huron, including Georgian Bay and North Channel. It summarizes the major impediments to achieving the Lake Huron FCOs. Challenges to developing quantifiable endpoints for environmental conditions include such factors as a lack of information and an incomplete knowledge of environment/fish community relationships. This document provides an overview of the Lake Huron FCOs and the process for developing the EOs. The four EOs presented in the document address spawning and nursery habitat, shoreline processes, food web structure and exotics, and water quality.

The Michigan Department of Environmental Quality Biennial Remedial Action Plan Update for Michigan's Portion of the St. Marys River Area of Concern. Every two years, MDEQ prepares brief status reports on recent remedial actions and assessments in AOCs in the form of remedial action plan (RAP) updates. As of March 2012, MDEQ completed the most recent update for the St. Marys River AOC RAP. The original RAP was prepared in 1992, with previous updates in 2003, 2007, and 2009. According to these RAP documents, 10 of 14 beneficial uses were impaired in the St. Marys River AOC. RAP updates track progress toward removing beneficial use impairments (BUIs). The assessment conducted for the 2007 St. Marys AOC RAP update showed that the 10 beneficial uses remain impaired.

The Michigan Department of Environmental Quality Biennial Remedial Action Plan Update for the Saginaw River/Bay Area of Concern. As described above, MDEQ prepares brief status reports on recent remedial actions and assessments in AOCs in the form of RAP updates. In 2008, MDEQ prepared a RAP update for the Saginaw River/Bay AOC. The original RAP for the Saginaw River/Bay AOC was prepared in 1988, with updates in 1995, 2000, 2002, 2008, and most recently March 2012. Currently, there currently are 10 BUIs identified for the Saginaw River/Bay. As a result of the 2008 RAP update, two of the original 12 BUIs (tainting of fish and wildlife flavor, and restrictions on drinking water consumption or taste and odor problems) have been removed.

GLRI-Funded Projects. In addition to the WLHB 905 (b) study, the GLRI has funded a number a projects in the WLHB study area aimed at restoration of the Great Lakes ecosystem. These projects address one or more of the five urgent issues in the Great Lakes, as outlined in the GLRI action plan, which covers fiscal years 2010 through 2014. Those issues are:

- Cleaning up toxics and areas of concern
- Combating invasive species
- Promoting nearshore health by protecting watersheds from polluted runoff
- Restoring wetlands and other habitats
- Tracking progress and working with strategic partners

Ongoing GLRI-funded projects are summarized in Table 2. This list is based upon a query of the GLRI web site (http://greatlakesrestoration.us/) and includes GLRI projects in the WLHB area funded in FYs 2010 and 2011. This list is intended to present a representative list of other restoration activities being pursued in the WLHB study area under the GLRI. Some of the projects are site-specific, and others have a more regionally-based scope. The list is fairly comprehensive but does not capture some restoration-related activities in WLHB that may be funded under a variety of other programs.

Table 2. GLRI-Funded Projects, FY 2010 and 2011 (GLRI 2011)

Project Name	Lead Organization	Problem Addressed	Project Location	Designated AOC
Enhanced St. Marys River Sea Lamprey Control	Great Lakes Fishery Commission	Invasive species	St. Marys River	St. Marys River
St. Marys River Fishery Habitat Restoration	Corps (see Section 4.1.4.2)	Habitat restoration	St. Marys River	St. Marys River
Tribal Capacity Building – Sault Ste. Marie Tribe	Sault Ste. Marie Tribe of Chippewa Indians	Strategic partnerships	NA	St. Marys River
Sustainable Approach for Wetland Diversity	Loyola University of Chicago/Buffalo Niagara Riverkeeper	Invasive species	Michigan Upper Peninsula	St. Marys River watershed
Eurasian Watermilfoil Strategic Biological Control Program	Les Cheneaux Watershed Council	Invasive species	Michigan Upper Peninsula	St. Marys River watershed
Early Detection and Treatment of Great Lakes Phragmites	Michigan State University	Invasive species	NE Lower Michigan	NA
Silver Creek Culvert Replacement on Beach Grove Hwy	US Fish and Wildlife Service	Habitat restoration	Ocqueoc River watershed, Michigan	NA
Silver Creek Culvert Replacement on Church Hwy	US Fish and Wildlife Service	Habitat restoration	Ocqueoc River watershed, Michigan	NA
Miller Creek Dam Removal	US Fish and Wildlife Service	Habitat restoration	Hillman, Michigan	NA
Lake Huron Lake Trout and Lake Sturgeon Restoration	US Fish and Wildlife Service	Habitat restoration	Alpena, Michigan	NA
Upper Great Lakes Stream Connectivity and Habitat Initiative	US Fish and Wildlife Service	Habitat restoration	Various	NA
AuSable River Fish Passage Barrier Inventory and Assessment	US Fish and Wildlife Service	Habitat restoration	AuSable River watershed, Michigan	NA
Rifle River Watershed Nonpoint Implementation Project	Huron Pines	Sediment & nutrient management	Rifle River watershed, Michigan	Saginaw River/Bay watershed
Tribal Capacity Building – Saginaw Chippewa Tribe	Saginaw Chippewa Indian Tribe	Strategic partnerships	NA	Saginaw River/Bay
Saginaw Bay/Lake Huron Land Policy Project	Michigan State University	Strategic partnerships	Various	Saginaw River/Bay watershed
Nayanquing Point Coastal Wetland Project	Ducks Unlimited, Inc.	Habitat restoration	Saginaw Bay	Saginaw River/Bay
Innovative Phragmites Control Strategic – Great Lakes	US Geological Survey	Invasive species	NA	NA
Van Hove Coastal Wetland Restoration	Ducks Unlimited, Inc.	Habitat restoration	Saginaw Bay	Saginaw River/Bay
Sebewaing River Watershed, Sediment Reduction	Michigan Department of Agriculture and Rural	Sediment management/habitat	Huron County, Saginaw Bay	Saginaw River/Bay

Project Name	Lead Organization	Problem Addressed	Project Location	Designated AOC
	Development	restoration		watershed
Pigeon River Corridor Sediment Reduction Project	Pigeon River Intercounty Drainage Board	Sediment management	Pigeon River/Saginaw Bay	Saginaw River/Bay watershed
Joint Venture – Shiawassee Flats Floodplain	Ducks Unlimited, Inc.	Habitat restoration	Saginaw County	Saginaw River/Bay watershed
Shiawassee Flats Wildlife and Fish Habitat Restoration	US Fish and Wildlife Service	Habitat restoration	Shiawassee River	Saginaw River/Bay watershed
Fish Passage at Frankenmuth Dam	City of Frankenmuth/Corps (see Section 4.1.4.1)	Habitat restoration	Frankenmuth, Michigan	Saginaw River/Bay watershed
Flint River Section 216 Study	Corps (see Section 4.1.4.4)	Habitat restoration	Flint, Michigan	Saginaw River/Bay watershed
Swartz Creek Watershed Sediment Reduction	Michigan Department of Agriculture and Rural Development	Sediment management		Saginaw River/Bay watershed

NA – Not applicable

5. Plan Formulation

During a study, six planning steps that are set forth in the Water Resource Council's Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies (Principles and Guidelines) are repeated to focus the planning effort and eventually to select and recommend a plan (project) for implementation. The six planning steps are 1) specify problems and opportunities, 2) inventory and forecast conditions, 3) formulate alternative plans, 4) evaluate effects of alternative plans, 5) compare alternative plans, and 6) select recommended plan. The iterations of the planning steps typically differ in the emphasis that is placed on each of the steps. In the early iterations, those conducted during the reconnaissance phase, the step of specifying problems and opportunities is emphasized. However, the other steps are not ignored because the initial screening of preliminary plans that results from the other steps is very important to the scoping of the follow-on feasibility phase studies. The subparagraphs that follow present the results of the initial iterations of the planning steps that were conducted during the reconnaissance study. This information will be refined in future iterations of the planning steps that will be accomplished during the feasibility phase.

5.1 National Objectives

The national or Federal objective of water and related land resources planning is to contribute to National Economic Development (NED) consistent with protecting the nation's environment, in accordance with national environmental statutes, applicable executive orders, and other Federal planning requirements. Contributions to NED are increases in the net value of the national output of goods and services, expressed in monetary units. These contributions are the direct net benefits that accrue in the project area and the rest of the nation.

A second national objective for water and related land resources planning (national ecosystem restoration [NER]) has been established in response to legislation and administration policy, beginning with the WRDA of 1986 and subsequent WRDAs. The Corps' objective in ecosystem restoration planning is to

contribute to NER, whose outputs are increases in the net quantity and quality of desired ecosystem resources. Measurement of NER is based on changes in ecological resource quality as a function of improvement in habitat quality and quantity and is expressed quantitatively in physical units or indexes (but not monetary units). These net changes are measured in the project area and in the rest of the nation. Single purpose ecosystem restoration plans are formulated and evaluated in terms of their net contributions to increases in ecosystem value (NER outputs), expressed in nonmonetary units. By policy, the plan that provides the greatest NED or NER benefits, as determined during the evaluation process, is the default recommended plan for implementation.

Multipurpose plans that include both traditional water resource project outputs (e.g., navigation and flood risk management) and ecosystem restoration shall contribute to both NED and NER outputs. In this latter case, a plan that trades off NED and NER benefits to maximize the sum of net contributions to NED and NER is usually recommended (ER-1105-2-100).

This Section 905(b) study identifies water resource problems and opportunities for which cost-effective solutions can be developed to meet one or both of these national objectives.

5.2 Agency and Public Involvement

Extensive public participation was undertaken as part of the 905(b) study. The purposes of the effort were 1) to obtain a current understanding of the most pressing issues facing the WLHB, 2) to allow the public to voice opinions, 3) to determine existing partnerships and foster the development of new ones, 4) to fill in gaps in the literature regarding ongoing projects, 5) to identify local projects, and 6) to initiate the process of determining local cost-share partners to undertake feasibility studies.

Nine meetings were conducted in July and August 2011. Announcements went out six weeks to a month before the meetings through a variety of vehicles, including local newspapers, the Great Lakes Information Network (GLIN) list-serve, and website postings (see Appendix B for a copy of the meeting announcement and other information relevant to the public meetings). A project website (http://www.lre.usace.army.mil/_kd/go.cfm?destination=Page&Pge_ID=2417) was also established to allow citizens who could not attend a public meeting to obtain information on the project.

The initial meeting was held in Bay City with technical stakeholders that work in the project area, including such agencies as the Michigan Office of the Great Lakes, US Fish and Wildlife Service (USFWS), Natural Resource Conservation Service (NRCS), MDEQ, and MDNR; tribal representatives; and key academic experts. Subsequent community-based meetings were held in Sault Ste. Marie, Cheboygan, Alpena, East Tawas, Bay City, Midland, Port Austin, and Port Sanilac. In all, about 180 people attended these community-based meetings, with attendees ranging from county officials (e.g., Drain Commissioners), mayors, congressional staff members, nonprofit community and environmental organizations, agricultural and business representatives, and interested citizens. A list of participants can be found in Appendix B.

In some cases, stakeholders came to the meetings prepared to share specific recommendations to address water resource problems they deemed important to the local communities. These recommendations were captured along with those identified during the review of existing reports and studies. (A general overview of stakeholder input on problems and opportunities in the WLHB is provided at the end of Section 5.3.) The detailed list of identified projects is in Section 5.7, presented and organized on the basis of a preliminary screening process to determine if those problems/opportunities can be addressed under an existing Corps authority/program (i.e., Federal Interest), by way of a more detailed cost-shared Corps feasibility study, referred to another agency for assistance, or eliminated from further consideration.

5.3 Problems and Opportunities

This section describes the needs in the WLHB watershed in the context of problems and opportunities that can be addressed through water and related land resource management. For an effective planning process, it is essential to be able to describe both the existing conditions relative to each identified problem or opportunity as well as the expected future conditions. It begins with a broad overview of the problems, and concludes by describing the method that the study used to narrow the list of projects developed to address the issues (opportunities).

Watershed Conceptual Model

The factors affecting the health of the WLHB are varied and complex. One way to understand the interrelationship of these factors is to craft a conceptual model. The conceptual model designed for the WLHB (Figure 6.) presents a summary of the sources of stressors, impacts, and impairments identified through the watershed reconnaissance study process as high priorities. This conceptual model does not seek to characterize every factor at play in the WLHB, but those that were identified by a range of stakeholders through community meetings and existing literature. There are other conceptual models for Lake Huron that capture the complexity of this basin. For example, the 2010 Sweetwater Sea Technical Report presents seven conceptual models that focus on critical threats to biodiversity addressed in that report (i.e., invasive species; housing and urban development/shoreline alterations; climate change; dams and barriers; agricultural nonpoint source (NPS) pollution; urban and rural NPS pollution, and forestry NPS pollution). Many of the factors addressed in the Sweetwater Sea Technical Report were also identified through the WLHB watershed reconnaissance study. The goal of this conceptual model is to show at a high level how these factors interrelate, focusing on the stressors raised by the specific group of stakeholders participating in the process that raised a broad set of problems and concerns.

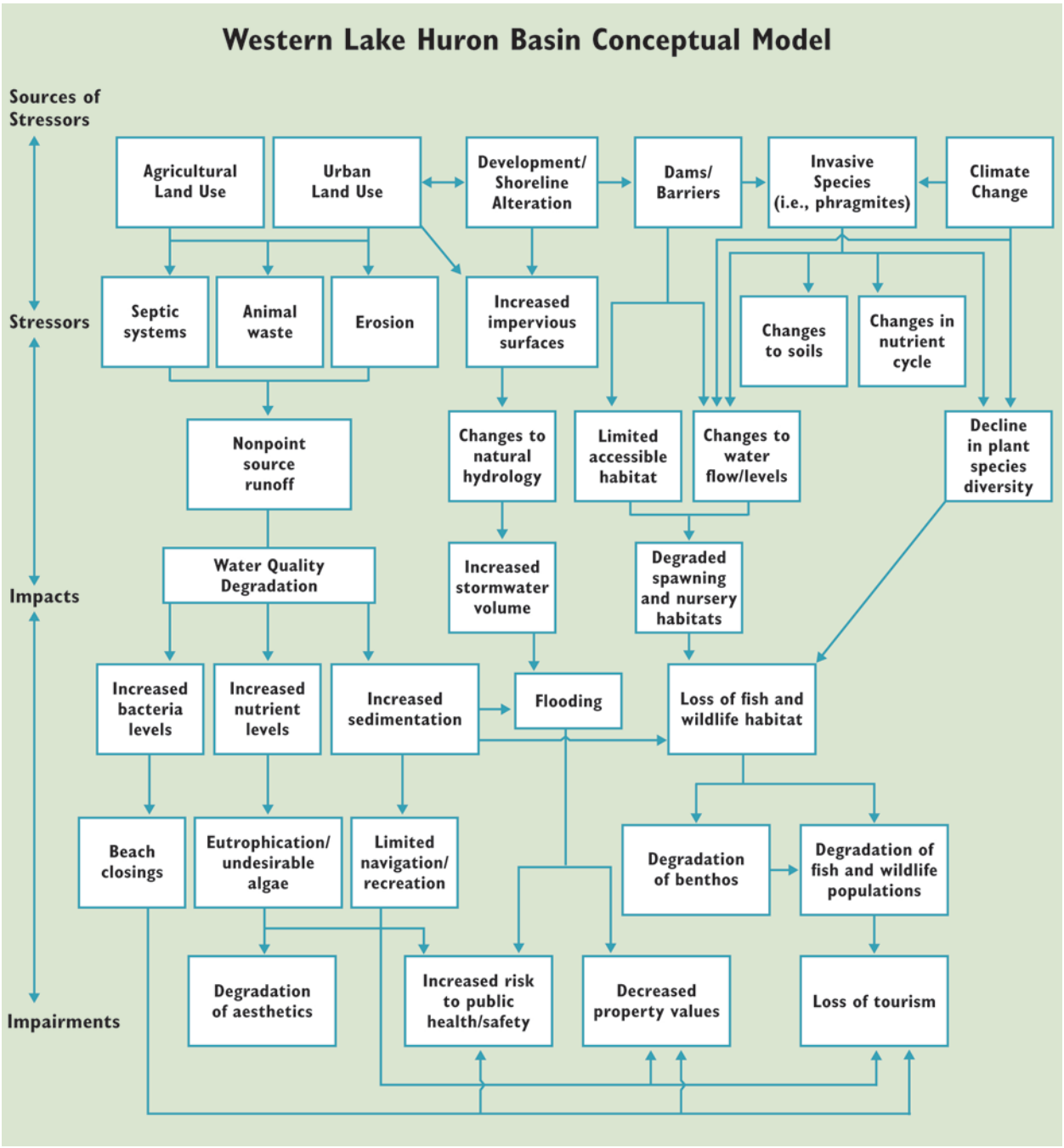

Figure 6. WLHB watershed conceptual model.

The top row of the model below presents six sources of stressors identified through the WLHB watershed reconnaissance study process. These sources are agricultural land use, urban land use, development and shoreline alteration, dams and barriers, invasive species, and climate change. These sources lead to stressors linked to physical changes in the WLHB, such as increased imperviousness, channelization, hardening of shoreline, and modifications to natural hydrology due to dams. Physical changes lead to a series of impacts related to water quality and quantity, as well as habitat quality and quantity. A combination of physical, chemical, and biological changes in the WLHB leads to a wide range of impairments. The identified impairments relate to the environmental health of the WLHB, as well as the socioeconomic health of the basin. Both types of impairments are of concern to WLHB stakeholders.

The problems have largely been summarized from information collected at the public involvement meetings and from The Nature Conservancy's *Sweetwater Sea: Technical Report* (SWS; The Nature Conservancy [TNC] 2010). Participants in the SWS identified the following problems, in ranked order, as major threats to the long-term health and viability of Lake Huron:

- Nonnative invasive aquatic and terrestrial species
- Housing and urban development, shoreline alteration
- Climate change
- Dams and barriers
- Agriculture, urban and rural, and forestry NPS pollution, resulting in bacterial contamination, algal blooms and fouling

For each problem, the existing conditions and the expected future conditions have been summarized from the SWS report and are described.

Invasive Nonnative Aquatic and Terrestrial Species

Aquatic invasive species currently established and of management concern are species such as sea lamprey (*Petromyzon marinus*), zebra and quagga mussels (*Dreissena* spp.), round and tubenose gobies (*Neogobius* spp.), ruffe (*Gymnocephalus cernuus*), spiny water flea (*Bythotrephes longimanus*) as well as wetland plant species, including Eurasian water milfoil (*Myriophyllum spicatum*), purple loosestrife, and phragmites (LHBP 2008). Terrestrial invasive species, besides the wetland species listed above, that are established and of management concern include spotted knapweed (*Centaurea maculosa Lam*), common buckthorn (*Rhamnus cathartica*), sweet clover (*Melilotus alba*), soapwort (*Saponaria officinalis*), oxeye daisy (*Chrysanthemum leucanthemum*), lawn prunella (*Prunella vulgaris*), Canada bluegrass (*Poacompressa*), common St. John's wort (*Hypericum perforatum*), and emerald ash borer (*Agrilus planipennis Fairmair*). Invasive species are expected to continue to enter the Great Lakes (Ricciardi 2006), so additional attention needs to be directed toward species with a high risk for future introduction. Some of these high risk species have been identified, such as hydrilla (*Hydrilla verticillata*), Asian bighead (*Hypophthalmichthys nobilis*), and silver carp (*Hypophthalmichthys molitrix*; International Joint Commission 2009; US EPA 2008).

Aquatic and terrestrial invasive species negatively impact all biodiversity features (LHBP 2008). For nearshore zone and open water ecosystem features, invasive species impacts include physical changes in habitat (e.g., changes in invasive coastal wetland plants as spawning or rearing habitat, zebra mussel shells changing the character of spawning reef substrate), changes in water chemistry (e.g., nutrient cycling), and food web disruptions. These changes result in uncertainties for future fisheries management and have implications for native species restoration (TNC 2010). Impacts on coastal wetlands and coastal terrestrial systems features are largely habitat alterations, especially where invasive plants may compete with, crowd out, and displace native plant community assemblages. These impacts also include food web changes and changes in soil and water chemistry. Coastal habitat changes and food web disruptions

caused by invasive species have profound implications for native migratory fish and birds that rely on these coastal habitats for critical—and vulnerable—life-history stages. These include spawning and juvenile nursery habitat for fish and nesting and stopover habitats for birds. Finally, similar to coastal habitats, islands often have unique plant communities and assemblages that are compromised by the threat of invasive species.

It is generally recognized that preventing new introductions is economically and ecologically preferable to managing species after they have been introduced to Lake Huron. This is a challenge in that the suite of vectors and pathways of introduction for new species (and spread of species once introduced) are both diverse and many. While some vectors differ for aquatic and terrestrial species, in some cases their pathways overlap, such as with plant nurseries where terrestrial and aquatic plants are raised and sold. This challenge is exacerbated by the multiple audiences (decision makers, industries, and end-users) that are linked to the decisions and demands that accompany each vector and pathway. Aquatic invasive species continue to arrive in the Great Lakes at an estimated rate of one every eight months (Great Lakes Regional Collaboration 2005).

Eradicating established invasive species is not typically a realistic or feasible option (TNC 2010). The TNC (2010) recommends that efforts should primarily deal with preventing intrabasin movement of established species, increasing effectiveness of current control efforts where management tools and programs exist, researching and developing new tools and strategies for dealing with established invasive species, and mitigating impacts on native biodiversity.

Urban Development and Shoreline Alterations

The threat of housing and urban development was rated very high in its potential impact on migrating birds, coastal terrestrial systems, coastal wetlands, and the nearshore zone (indeed, SWS participants deemed this threat as the most significant for nearshore zone biodiversity; TNC 2010). This is due in large part because there is very little undeveloped shoreline left in areas of high recreation value. Residential development is most dense in the southern portions of the basin and where road densities are generally high, but many other northern shoreline areas are at risk for additional shoreline development. Of particular concern are the continued loss, fragmentation, and potential degradation to the high quality and sensitive coastal wetlands of Saginaw Bay. There is also a general loss of breeding and staging areas for migratory birds due to encroachment on wetlands, and the nearshore zone and coastal wetland habitat has been fragmented or lost.

In contrast, the threat of shoreline alterations to coastal wetland and terrestrial and nearshore zone features is medium. TNC predicts that future shoreline alterations are likely to negatively impact 11 to 30 percent of coastal wetlands, while terrestrial and nearshore zone features are anticipated to be moderately to seriously degraded or reduced throughout their entire range (TNC 2010). Furthermore, it is assumed that the effects can technically be reversed and the features restored (TNC 2010). Although it may not be practical or affordable to restore natural conditions, with a commitment of necessary resources, the nearshore zone and coastal terrestrial systems features could likely be restored and the threat reversed.

One goal recommended by the TNC is that future management of urban development should harmonize shoreline land use planning, policy, enforcement, ecosystem processes, and biodiversity conservation among multijurisdictional agencies. This will result in less impervious surface, better stormwater management, and increased restoration and preservation of sensitive areas. Additionally, the TNC recommends that cumulative and distant environmental impacts be considered when regulating nearshore and coastal development. The current gap in information regarding the impacts of development and fragmentation of shorelines should also be closed. By extension, public information and understanding of the value of shoreline habitat will be more prevalent.

Climate Change

Global climate change is expected to lead to six major types of changes in Lake Huron: (1) increased annual averages in air and surface water temperatures (with greater extremes in hottest temperatures), (2) increased duration of the stratified (thermocline) period, (3) changes in the direction and strength of wind and water currents, (4) flashier precipitation (increases in the intensity of storms and drier periods in between), (5) decreased ice cover/greater water surface evaporation/larger lake effect snow events, and (6) changes in lake levels (TNC 2010). Also of importance to be considered are changes in plant, fish and wildlife community composition and distribution within the basin. Clearly, these factors interact with one another, further complicating our ability to anticipate climate change trends and impacts, making this a serious, albeit uncertain, threat. The risk and uncertainty to project performance and sustainability attributable to potential climate change impacts is now required to be addressed in the feasibility phase report for each particular study location.

The TNC concluded that opportunities and associated strategies for managing for climate change generally fall into two categories: direct impacts of climate change on biodiversity features and indirect impacts of climate change on biodiversity features by exacerbating other critical threats. These indirect impacts are likely to be some of the more promising areas for climate change adaptation strategy development. This is because we often have tools and methods in place to help abate these threats, and we may most easily be able to redouble those efforts as these threats become more pronounced due to climate change. For example, actions such as those that lead to shifts in land use or increases in water extraction could lead to increased stress on lake ecosystems. Also, one key threat to the health and biodiversity of the Great Lakes is the conveyance of pollutants, nutrients, and sediments into nearshore zones during storms. We already know that to restore many Great Lakes habitats, we need to reduce these kinds of inputs and that much of our infrastructure (e.g., that for stormwater and sewage) and farm practices need to be improved. Climate change increases the urgency of these needs.

In contrast, it is often more challenging to address climate change's direct effects, although we can certainly help ensure that ecosystems are as connected and resilient as possible so that species can move and remain viable under current and future climate conditions.

Dams and Barriers

Dams and barriers are hydropower dams, lowhead dams, road-stream, crossing/culverts, and water-control structures (e.g., locks and dikes). Dams and barriers pose the greatest threat to native migratory fish. The extent and irreversibility of this threat were considered high, while severity was ranked very high. For sturgeon, walleye, and mollusks, tributary habitats are a limiting factor to increasing population (Fielder et al. 2008). Most of the historic spawning areas for sturgeon are currently blocked by dams (Liskauskas et al. 2007). The Lake Huron Binational Partnership identified dams as "the single most important impediment to recovery of lake sturgeon" (LHBP 2008).

Dams and barriers were also ranked as a high threat to the nearshore zone. This zone is greatly affected by riverine inputs of nutrients and sediments, and dams and barriers alter the delivery (both timing and quantity) of these inputs. In addition, most Great Lakes river-spawning fish spend the remaining stages of their lives in the nearshore zone (Liskauskas et al. 2007); as a result, vastly suppressed populations of these species can result in broad shifts in nearshore zone community structure and food web interactions, due to lack of access to spawning habitat (Liskauskas et al. 2007). The extent and severity of this threat were ranked as high, and irreversibility was considered medium.

Similar to the observed impacts in the nearshore zone, but to a lesser degree, some coastal wetlands are sustained by riverine inputs of sediments. Hence, dams and barriers were ranked as a low threat to coastal

wetlands. The severity and irreversibility were considered high for the impact of dams and barriers on coastal wetlands, but scope was low or limited.

The TNC report summarized two major contributing and conflicting factors driving threats from dams: pressures or influence to keep, install, and repair dams and barriers and pressures to remove or reduce effects of dams and barriers. In both cases, there is a lack of information in support of strategic and coordinated management of dams and barriers.

Maintaining dams and barriers or building new ones serve several societal and resource management needs, as follows:

- Controlling nonnative aquatic invasive species
- Generating hydropower
- Maintaining local values (which encompasses aesthetics, recreation, and water takings/diversion)
- Controlling upstream movement of toxics (perceived/potential risk to humans and birds, primarily by contaminated fish moving upstream to uncontaminated areas)

Maintaining dams and barriers in some instances is a management tool to control populations and spread of nonnative aquatic invasive species. It is motivated by current fisheries management needs, sport and commercial fisheries interests, and the needs of threatened and endangered species. Hydropower generation is driven by existing industry and the power grid as well as new pressures to pursue carbon-neutral forms of power generation.

Conversely, there are several reasons to remove or mitigate the negative impacts of dams and barriers:

- Fisheries management for economically important species and listed species
- Ecological restoration and ecosystem services
- Liability associated with dam failure (public safety, ecosystem impacts)
- Inappropriately installed and placed barriers.

In the future, dams will have to be managed by balancing these two major sets of needs.

Agriculture, Urban and Rural, and Forestry (NPS) Pollution

In the Western Lake Huron Basin, NPS pollution most commonly results from sediment, nutrients, or chemicals, such as pesticides, antibiotics, or hormones (TNC 2010). Altered hydrologic conditions play a major role in contributing to high loadings of these pollutants and can directly cause NPS impacts, particularly at river mouths or on migratory fishes. Each of these pollutants is further compounded by altered hydrologic regimes in the basin, which generally increases the rate and volume of water transported downstream, and can play a major role in driving pollutant loadings. Altered hydrology from NPS sources also directly impacts biodiversity features. Factors contributing to increased sedimentation, nutrient pollution, altered hydrology, and other chemical pollution were divided into agricultural, urban/rural, and forestry sources.

NPS pollution poses the greatest threat to nearshore zone and coastal wetland features. For these biodiversity features, scope, severity, and irreversibility were all considered high. NPS pollution is clearly a major result of increased residential, urban, and agricultural land uses, leading to declines of biological integrity in the nearshore zone and coastal wetlands (Lougheed et al. 2001; Uzarski et al. 2005; Niemi et al. 2009).

While NPS pollution also impacts native migratory fish, it represents a more moderate threat to dams and barriers (TNC 2010). For example, walleye recovery in Saginaw Bay depends on access to spawning habitat that is unavailable above dams; however, much of that habitat is also impaired by sedimentation. Accordingly, addressing NPS sediment delivery to Saginaw Bay tributaries is also important to native migratory fish (MDNR 2009). Altered hydrology is particularly important as a direct stressor to native migratory fish since they spawn in rivers where the timing, extent, and variability of streamflow can greatly alter spawning habitat conditions.

Finally, NPS pollution also poses some threat to the Lake Huron open water ecosystem and some coastal terrestrial systems habitats. If agricultural and urban land uses expanded substantially, there is a risk that Lake Huron open water ecosystem nutrient regimes and food web structure could be impacted. However, currently NPS pollution impacts on the Lake Huron open water ecosystem are minimal (Dobiesz et al. 2005; EC and EPA 2007). Most coastal terrestrial communities are not appreciably threatened by NPS pollution; for those that are, such as coastal fens, NPS pollution can pose a substantial threat, resulting in habitat loss from sedimentation or altered community structure from nutrients (Detenbeck et al. 1999; Cohen and Kost 2008).

Agricultural NPS pollution results primarily from incompatible agricultural management practices and incompatible ditching and tiling, which are driven by large-scale socioeconomic factors (TNC 2010). More specifically, agricultural row crops have generally moved toward larger fields without fencerows or riparian vegetation and without seasonal vegetation cover (e.g., pasture or cover crops; TNC 2010). This has resulted in decreased water infiltration and increased runoff, as well as higher wind erosion and greater amounts of sediment and nutrients washing into streams. Additionally, one conclusion of the TNC study was that high density livestock has increasingly become an issue locally (e.g., Saginaw Bay, along Michigan's "thumb") because the waste is often applied to fields adjacent to waterways at incompatible concentrations or at times that are susceptible to high runoff. In the future more wide-spread adoption of best management practices to minimize impacts from these sources will be needed.

The TNC report also concluded that urban and rural NPS pollution results primarily from inputs from concentrations of septic systems, lawn fertilization, construction, impervious surfaces, and land drainage. Septic systems become significant problems when they occur at high concentrations and when they are in disrepair. Given the prevalence of homes with septic systems along much of Lake Huron, septic systems are often an important local source of nutrients and other pollutants. Lawn fertilization may also be a significant source of phosphorus at some locations. Application of pesticides and herbicides in residential and agricultural areas also can contribute to NPS pollution. Like agriculture, urban land uses result in wetland drainage and ditching, which decreases assimilation capacity that wetlands normally provide and increases transport of pollutants to Lake Huron. Construction projects often contribute large amounts of sediment to streams. The resulting urban development (parking lots, structures, roads) increases impervious surfaces, which reduces infiltration and increases runoff, further altering hydrology and increasing the efficiency of transporting pollutants downstream.

Poorly planned urban development into rural and undeveloped areas, particularly prior to prohibitions of combined sewer systems, is a significant cause of urban development related environmental problems (TNC 2010). Pollution from combined sewer overflows (CSOs) and sanitary sewer overflows is considered point-source pollution and so was not addressed as part of NPS pollution. CSOs and sanitary sewer overflows contribute to localized pollution in Lake Huron, including as a potential major source of bacterial contamination (LHBP 2008). But even in problem areas, nonpoint sources contribute most to nutrient pollution (Saginaw Bay Coastal Initiative 2009; He and DeMarchi 2010). Widespread programs aimed at addressing all of these sources will need to be implemented in the future.

According to the TNC, forestry NPS pollution comes from incompatible practices that result in significant base soil exposure or compaction. This leads to increased sedimentation or runoff (or both) into

tributaries. Examples are large clear-cuts, significant forest clearing in or near riparian areas, excessive soil disturbance from heavy equipment use or from dragging logs on slopes or in riparian areas, and poorly designed stream crossings. Better implementation of forestry best management practices that minimize these impacts will largely address forestry NPS sources.

Finally, the TNC (2010) recognized that there are a number of "emerging chemical issues," and this indicates that we might be underestimating their impacts on aquatic ecosystems and communities. These chemicals include pesticides, pharmaceuticals, hormones, and other organic contaminants (Kolpin et al. 2002). While these chemicals are clearly having some impacts (Jobling et al. 1998; Hayes et al. 2003; Blazer et al. 2007), there is currently a paucity of information on the extent of the problem, both in terms of distribution of areas with significant concentrations and the ecological/biological impacts. Much work is needed in the Great Lakes before determining the relative influence and contributing factors for these emerging chemical issues.

Applicability of the Great Lakes Water Quality Agreement – AOCs and RAPs

As indicated earlier in this report, the WLHB study area is in the purview of the Great Lakes Program (led by the EPA) and the Binational Great Lakes Water Quality Agreement, which call for RAPs to restore and protect beneficial uses of Great Lakes resources within designated AOCs (IJC 2011).

Table 3 presents the 14 BUIs in the Great Lakes that are identified in the Binational Agreement and depicts those that are applicable to the two AOCs in the WLHB study area.

Table 3. Great Lakes Water Quality Agreement BUIs applicable to the Saginaw River/Bay AOC and St. Marys River AOC.

Great Lakes Areas of Concern BUIs	Saginaw River and Bay AOC	St. Marys River AOC
Restrictions on fish and wildlife consumption	X	X
Tainting of fish and wildlife flavor	X*	
Degradation of fish and wildlife populations	X	X
Fish tumors and other deformities		X
Bird or animal deformities or reproduction problems	X	X
Degradation of benthos	X	X
Restrictions on dredging	X	X
Eutrophication or undesirable algae	X	X
Restrictions on drinking water consumption or taste and odor problems	X*	
Beach closings	X	X
Degradation of aesthetics	X	X
Added costs to agriculture or industry		
Degradation of phytoplankton and zooplankton populations	X	
Loss of fish and wildlife habitat	X	X

* BUI has been removed

Contaminated sediments, fish consumption advisories, degraded fisheries, and loss of significant recreational values was the major reasons for the Saginaw River and Bay AOC designation. These problems were mainly caused by high amounts of soil erosion, excessive nutrients (e.g., phosphorus and nitrogen) entering the water, and contaminated sediments. Saginaw River and Bay priorities have included remediation of sediment contaminated with polychlorinated biphenyls, nonpoint pollution control, wetland restoration, and habitat restoration (EPA 2011b).

In the St. Marys River AOC, beaches have been periodically closed due to elevated bacteria levels. Aesthetic degradation has also occurred due to oil slicks and floating algae scum. The St. Marys rapids

spawning habitat is reduced but is still productive. Significant loss of fish and wildlife habitat has occurred along both sides of the river as a result of shoreline alteration, industrialization, urbanization, agricultural impacts, and shipping. Initially, priorities for the St. Marys River AOC included restoring urban tributaries on both sides of the border, cleaning up the Cannelton Tannery Superfund site, controlling sea lampreys, eliminating combined sewer overflows, and forming a strategy for contending with contaminated sediments (EPA 2011a). The Cannelton Tannery site has been cleaned up, and sea lamprey issues are no longer being addressed under the AOC program.

Opportunities

The main goals of the Section 905(b) study are to determine if water resources problems and opportunities in the WLHB warrant Federal participation in a feasibility study and to define the Federal (Corps) interest. Another aspect of the opportunities identification process is to see where additional improvements could be made, "above and beyond" meeting the basic management of an identified problem (impairment). The method used to fulfill these goals combined a literature review with extensive public outreach. The rationale for this approach was that the literature would document the current conditions (2000 to present) and would have developed actions to address the identified problems, while public outreach would fill in the gaps (e.g., ongoing studies and literature that was missed), as well as update the project team about changes in the watershed. Furthermore, public outreach helped the team to better understand local priorities and to identify potential local cost-share sponsors. The following paragraphs elaborate on each of the method sections.

With a study area of over 8,700 square miles and more than twenty subwatersheds and two AOCs, the volume of literature was large (over 1,200 documents). Therefore, the study team decided to focus only on those documents that contain action items targeted at addressing problems. The remaining ninety or so documents fell into two categories: 1) multicounty documents, such as the Sweet Water Sea (TNC 2010) and the Lake Huron Binational Partnership 2008-2010 action plan, and 2) smaller-scale papers, such as the Au Sable River Assessment (Zorn et al. 2001) and the Kawkawlin River Watershed Management Plan (2011). These were reviewed prior to the community meetings to understand the scope and nature of previous work in the study area.

WLHB Stakeholder Input on Problems and Opportunities (2011)

Public outreach, as described in Section 5.2, was designed to elicit site-specific information on local problems as well as projects thought to be able to address them. Stakeholders were organized into small groups and given a 2.5- by 5-foot map of their local area. They were asked to write directly on the map and to discuss the issues and projects among themselves. A project team member was at each table, facilitating the stakeholder discussions and recording relevant information to supplement the notes on each map. Information collected from the meetings was transcribed into notes and used to compile a list of potential projects (see Section 5.7 for details).

Through the process of WLHB stakeholder meetings in July and August 2011, some overarching water resource problems and needs consistently surfaced from agencies and stakeholders across the WLHB study area. These expressed problems, and needs were generally consistent with those documented from the existing and ongoing studies and plans in the Great Lakes area, and specifically in the WLHB study area, as summarized in the preceding paragraphs. In summary, the specific problems and opportunities of concern to WLHB stakeholders that tend to persist across the entire study area are as follows:

- **Invasive species, most particularly phragmites, across the entire study area.** Agencies and stakeholders said that these species are significantly displacing important fish and wildlife habitats and impacting views and aesthetic values along the coast and in near-coastal waterways.

Agencies and stakeholders are seeking to develop effective strategies for managing and controlling these destructive invasive species.

- **Erosion and sedimentation issues in inland waterways and coastal watersheds.** These issues are generally the result of poor land management practices on agricultural and urban lands. Erosion and sedimentation have impacted the habitat value and water quality in streams and waterways and has resulted in excessive delivery of sediment into Saginaw Bay and western Lake Huron. One of the most persistent areas of concern identified by agencies and stakeholders is the problem of muck deposits in nearshore areas across the WLHB. These deposits generate concerns about water quality as well as aesthetic and recreational impacts associated with the use of beaches.

- **Loss of fish habitat and declining fisheries.** In addition to erosion/sedimentation impacts on fish habitat, loss of stream connectivity, barriers to fish movement, degraded water quality, and loss of wetlands along streams and along the coast have had significant negative impacts on aquatic species.

- **Navigation restrictions.** Across the study area, numerous concerns were expressed by stakeholders that harbors are in need of maintenance dredging. In addition, the configuration of protective structures at several harbors is perceived to be the source or cause of circulation, sedimentation, and water quality problems in or down drift of the harbors.

- **Contaminated sediments.** Concerns persist about the impact of contaminated sediments, both inside and outside of navigation channels across the study area, particularly in the lower Saginaw River watershed.

- **Need for technical guidance and planning assistance.** In many cases, agencies and stakeholders were interested in various types of assistance with water resource challenges to help them make better resource management decisions on a day-to-day basis. The technical guidance/planning assistance needs were mapping and GIS support; development of resource management plans and strategies; development of model ordinances and guidelines for decision makers; modeling and other technical assessment tools and methods; and training (e.g., effective stream crossing techniques and best management practice implementation).

The specific list of problem areas and study/project opportunities presented below in Section 5.7 include potential solutions where applicable, as developed from the literature review and stakeholder outreach. The list was compiled and screened to determine those that would not fit applicable Corps authorities, those that could be addressed by Corps small project and technical assistance authorities, and those that may be eligible and more appropriate for detailed general investigations feasibility level study. That screening process also is described in Section 5.7.

5.4 Planning Goals and Objectives

The study authority, as amended, enables consideration of a broad array of potential water challenges in the WLHB study area. The WLHB basin is large and highly diverse from a land use, geographic, and demographic perspective. Further, a wide array of water resource problems and opportunities has already been identified in the basin as a result of numerous previous and ongoing studies and planning efforts. Consequently, the list of potential problems and opportunities compiled for consideration under the Corps program in this reconnaissance study is extensive. The national objectives of NED and NER are general statements and are not specific enough for direct use in plan formulation. Planning goals were established

to provide a basis for screening the problems and opportunities to help identify those that would be appropriate for feasibility level investigations.

The overarching planning goal for the WLHB 905(b) study is to identify and recommend water resource projects, consistent with Corps water resource authorities and priority mission areas, which will restore ecological function in aquatic habitats and support economic well-being in Western Lake Huron Basin watersheds and adjacent areas of Lake Huron. A secondary goal is to insure that projects identified in this study complement and leverage GLRI goals and funding and the RAPs for the St. Marys River and Saginaw River and Bay AOCs. Planning objectives for this 905(b) study were defined as follows:

- Reestablish more naturally functioning hydrologic and geomorphic conditions in WLHB watersheds with critical erosion and sedimentation problems to conserve aquatic resources, reduce sediment loads to Lake Huron, and reduce nutrient and bacteria (and other pollutant) loading in watersheds and Lake Huron.
- Reduce shoreline erosion along Lake Huron that may be impacting important aquatic resources and habitats and existing infrastructure.
- Restore or improve aquatic and wetland habitat conditions where critical losses have occurred or are expected to occur in the future.
- Restore conditions to improve fish passage and movement within WLHB watersheds.
- Contribute to delisting pertinent BUI in the Saginaw Bay AOC and the St. Marys River AOC, s.
- Address appropriate channel improvement needs and long-term dredged material management planning needs within the WLHB study area.
- Reduce flood risk in areas prone to flood damages within the WLHB study area.
- Reduce the effects of invasive species on aquatic habitats and their functions in the study area.

Upon narrowing the field of problems and opportunities down to one or more specific study proposals that fit within Corps authorities and that warrant detailed feasibility level investigations, site-specific or watershed-specific planning objectives will be developed. These planning objectives will represent desired positive changes in the without-project conditions, relative to the affected resources.

5.5 Planning Constraints

Unlike planning objectives that represent desired positive changes, planning constraints represent restrictions that should not be violated during the formulation, evaluation, and selection of detailed plans. The planning constraints identified herein represent general constraints or limitations on the formulation of plans to address the problems and opportunities identified in this 905(b) study. As specific feasibility level study proposals are developed, planning constraints will be refined and augmented to more directly reflect conditions at the study site(s) or within the pertinent watershed being investigated. The general planning constraints identified in this 905(b) study are as follows:

- Plans for ecosystem restoration will not induce flooding or exacerbate flooding conditions in the study area.
- Plan for ecosystem restoration will avoid adversely affecting navigation activities and associated infrastructure in the study area.
- Plans will be consistent with overarching plans and strategies associated with the GLRI.
- Plans will be consistent with RAPs for the Saginaw River and Bay AOC and the St. Marys AOC.
- Plans will be consistent with the goals, objectives, and provisions of various state natural resource related plans, including the Michigan Coastal Management Program.

- Plans will be consistent and compatible with local land use plans, zoning ordinances, and pertinent watershed management plans.

5.6 Measures to Address Identified Planning Goals and Objectives

5.6.1 Management Measures

For feasibility level investigations, a management measure is a feature or activity at a site, which addresses one or more planning objectives. A wide variety of measures are considered, some of which will not be determined to be feasible due to technical, economic, or environmental constraints. Each measure is assessed and a determination made regarding whether it should be retained in the formulation of alternative plans. A general description of the measures considered in this Section 905(b) study is presented below, and results of the evaluation of these measures are presented in subsequent sections of the report.

No Action. The Corps is required to consider the option of "No (Federal) Action" as one of the alternatives in order to comply with the requirements of the National Environmental Policy Act. No Action is the most likely condition expected to exist in the future and assumes that no project would be implemented by the Federal government to achieve the planning objectives. Under No Action, conditions for most of the problems identified in the WLHB study area would be expected to decline further over time. No other planned Federal involvement would be expected. Without Federal government participation, activities already planned and funded by local interests may be implemented, but projects could be delayed or reduced in scope as a result. These activities by local interests would become part of the "Without Project Condition," which forms the basis from which all other alternative plans are compared and evaluated.

Nonstructural. A number of nonstructural measures may be considered for the study area to address the planning objectives. These nonstructural measures may include studies, modeling, monitoring, and related efforts (short of a full-blown feasibility level study) that provide technical information and management plans and strategies to assist Federal, state, and local decision makers in protecting and restoring important ecosystems, reducing flooding risk, or producing other tangible benefits. More specifically, these measures may include watershed studies and management plans, stream modeling, biological surveys and studies, baseline sampling and long-term monitoring, and pilot studies for sediment remediation and habitat restoration. These studies may be performed independently by other entities (e.g., Federal, state, or local government, nongovernment organization, etc.) or in partnership with the Corps under several standing Corps authorities to provide technical assistance (see Section 5.6.2).

For ecosystem restoration projects developed using a watershed-based approach, a variety of nonstructural measures may be implemented separately, or in concert with certain structural measures, to restore or improve ecological function. Potential nonstructural measures may include implementation of a wide variety of best management practices on the landscape (e.g., drain tile disablement, filter strips, no-till farming, bio-swales, and rain gardens), removal and treatment of invasive species to establish natural conditions, restrictive zoning and ordinances, and acquisition of fee interest in lands or easements to protect critical natural areas in the watershed. Implementation of such features as restrictive zoning and ordinances as well as land acquisition for habitat protection could contribute to ecosystem protection and restoration objectives but would not generally be eligible for Federal participation. NFS's could implement these types of measures in conjunction with Corps ecosystem restoration projects.

The Corps role in ecosystem restoration is achieved by modifying hydrologic and hydraulic conditions in order to produce restoration outputs (or benefits). Any non-structural measures explicitly for water quality purposes that are incorporated into a Corps ecosystem restoration project must be essential to the successful ecological function and performance of the restoration project to be eligible for Federal

participation. Implementing stand-alone measures solely for water pollution abatement purposes would not be consistent with Corps ecosystem restoration policies. Water quality improvement may also occur as a secondary or incidental benefit of a Corps ecosystem restoration project.

For flood and coastal storm risk management projects, potential nonstructural measures may include relocation of structures and critical infrastructure, flood proofing, restrictive zoning and ordinances, and evacuation planning.

Structural. Numerous opportunities may exist to implement structural measures to address problems and opportunities in the study area. Such opportunities will be fully evaluated during feasibility level investigations determined to be appropriate as a result of this Section 905(b) study. These include coastal and shoreline protection and restoration features, stream bank stabilization and erosion control features, wetland and aquatic habitat restoration features, structural measures to reduce flood risk, and navigation improvements.

For ecosystem restoration projects in a wide variety of degraded aquatic habitats and adjacent areas within the WLHB study area, measures that would be minimally intrusive or bioengineered and would tend to more closely mimic natural hydrologic and geomorphic processes are preferred. However, more intrusive, engineering measures may be appropriate for highly impacted and deteriorated stream or shoreline conditions in order to stabilize and manage erosion/sedimentation processes to enable recovery and promote restoration of ecological function. Removal of in-stream structures, such as dams and weirs, may be a preferred approach for restoration of more natural conditions but may not be practicable in all cases nor supported by local stakeholders.

Potential structural measures may include upstream detention/retention/infiltration trenches, in-stream structures (e.g., riffles, cross veins) for grade control/sediment management and aquatic habitat improvement, environmentally compatible bank protection and stabilization structures, sediment removal by mechanical excavation or dredging, off-stream sediment retention structures, new or modified water control structures for water level management for fish and wildlife habitat improvement, fish ladders and other structural modifications to improve fish passage, barriers to exotic species passage upstream, and modified or retrofitted structures to improve water circulation and water quality. With all potential structural measures, planting of native vegetation may be incorporated to more quickly and effectively reestablish native plant communities and restore ecological function and to discourage colonization by invasive plant species.

For flood risk management projects, potential structural measures include channel improvements, flood retention/storage areas, levees, and flow diversion structures and bypass channels. For coastal storm risk management projects, various potential structural measures to reduce storm impacts include shoreline stabilization structures, replenishment of shoreline sediments, and nearshore breakwaters.

Separable Features. Separable project features are single purpose components of a plan designed to address a specific management objective that could be implemented in conjunction with, but not integral to, the recommended project plan. For example, recreation features could comprise a separable element of a plan, but navigation, ecosystem restoration, or flood risk management features could also be separable elements. These separable elements can be implemented as part of the Federal project if they are cost-effective and are determined to be in the Federal Interest. A “locally preferred plan” could include such separable features that may not be in the Federal Interest but might otherwise be acceptable to the Corps, provided the NFS agrees to fund the full cost of the separable project features. Recreation facilities are among the most common separable features and may include such components as boardwalks, observation platforms, dredging for recreational boating, or extra sand for recreation purposes. In some circumstances, limited recreation facilities may be eligible for Federal cost-sharing as part of a project, with structural features addressing ecosystem restoration, flooding, and navigation needs.

Additional Measures for Complete Alternatives. Additional management measures could be developed and combined with other measures to create alternative plans that more completely address one or more of the planning objectives of the feasibility study. Such secondary features to make an alternative more complete or functional could include specific dredging methods and improved interior drainage features.

5.6.2 Other Applicable Corps Water Resource Authorities/Programs

In addition to pursuing traditional feasibility level studies under its General Investigations program for larger scale and more complex and costly water resource challenges, the Corps has a number of specific authorities to address problems and opportunities with smaller projects at a more localized scale or to provide technical assistance to states, tribes, local governments, and environmental organizations.

5.6.2.1 Continuing Authorities Program (CAP). The CAP provides the Corps with the authorities to address water resource problems that are more limited in scope in partnership with local sponsors without the need to obtain specific congressional authorization for each project. Use of these authorities, where appropriate, would decrease the amount of time required to budget, develop, and approve a potential project for construction. Under the CAP, the Corps is authorized to construct small projects within specific Federal funding limits. The range of potential management measures to address flood risk management or ecosystem restoration problems and opportunities under the CAP would be the same as those described in Section 5.6.1 for feasibility level studies under the General Investigations program. The total cost of a CAP project (including studies, design, and construction) would be shared among the Federal government and a non-Federal sponsor. Each of these authorities and programs have specific and unique procedures and criteria related to such matters as cost-sharing percentages, credit for in-kind services, and Federal funding limits. The various project authorities under the CAP are summarized briefly below (and in Table 4). A more detailed description of each authority is provided at the following link on the Corps Detroit District web site: http://www.lre.usace.army.mil/_kd/go.cfm?destination=Page&Pge_ID=1409.

- **Section 205, Flood Control Act of 1948, as amended (Small Flood Risk Management Projects).** This authorizes the Corps to plan, design, and construct structural and nonstructural flood damage reduction (flood risk management) projects in partnership with non-Federal government agencies, such as cities, counties, special authorities, and units of state government. Projects are planned and designed under this authority to provide the same complete flood risk management project that would be provided under specific congressional authorizations. The maximum Federal cost for planning, designing, and constructing any one project is $7 million. Each project must be economically justified, environmentally sound, and technically feasible. Flood risk management projects are not limited to any particular type of improvement. Levee and channel modifications are examples of flood risk management projects constructed using the Section 205 authority.

- **Section 14, Flood Control Act of 1946, as amended (Emergency Streambank and Shoreline Protection).** This authorizes the Corps to study, design, and construct emergency stream bank and shoreline works to protect public structures and infrastructure, such as streets, bridges, schools, water and sewer lines, National Register sites, and churches, from damage or loss by natural erosion. The Federal cost limit on Section 14 projects is $1.5 million at any one site, including all study, design, and construction expenditures.

- **Section 208, Flood Control Act of 1954, as amended (Snagging and Clearing for Flood Control).** This provides authority for the Corps for channel clearing and excavation, with limited embankment construction by the use of materials from the clearing operation to reduce nuisance flood damages caused by debris and minor shoaling of rivers. The maximum Federal cost for the

project development and construction is $500,000, and each project must be economically justified, environmentally sound, and feasible.

- **Section 107, River and Harbor Act of 1960, as amended (Small Navigation Projects).** This provides authority for the Corps to develop and construct small navigation projects. The Corps adopts a project for construction after detailed investigation clearly shows the engineering feasibility and economic justification of the improvement. Each project is limited to a Federal cost of not more than $7 million. This Federal cost limitation includes all project-related costs for feasibility studies, planning, engineering, construction, supervision, and administration. The Federal project can provide only general navigation facilities, including a safe entrance channel protected by breakwaters or jetties if necessary, anchorage basin, turning basin, and a major access channel leading to the anchorage basin or locally provided berthing area.

- **Section 103, River and Harbor Act of 1962 (Hurricane and Storm Damage Reduction).** This authorizes the Corps to study, design, and construct small coastal storm damage reduction projects, in partnership with non-Federal government agencies, such as cities, counties, special authorities, and units of state government. Projects are planned and designed under this authority to provide the same complete storm damage reduction project that would be provided under specific congressional authorizations. The maximum Federal cost for planning, design, and construction of any one project is $5 million. Each project must be economically justified, environmentally sound, and technically feasible. Hurricane and storm damage reduction projects are not limited to any particular type of improvement. Beach nourishment (structural) and flood proofing (nonstructural) are examples of storm damage reduction projects constructed under the Section 103 authority.

- **Section 111, River and Harbor Act of 1968 (Prevention or Mitigation of Damages caused by Federal Navigation Work).** This provides authority for the Corps to develop and construct projects for prevention or mitigation of damages caused by Federal navigation work. This applies to both publicly and privately owned shores along the coastline of the United States. Each project is limited to a Federal cost of not more than $5 million. This authority cannot be used to construct works for preventing or mitigating shore damage caused by riverbank erosion or vessel-generated wave wash, nor can it be used to prevent or mitigate shore damage caused by non-Federal navigation projects.

- **Section 1135, Water Resources Development Act of 1986, as amended (Project Modifications for Improvement to the Environment).** Under the authority provided by this law, the Corps may review and modify structures and operations of water resources projects constructed by the Corps for the purpose of improving the quality of the environment when such modifications are determined to be feasible. Projects must be in the public interest, cost effective, and limited to $5 million in Federal cost.

- **Section 204, Water Resources Development Act of 1992, as amended (Ecosystem Restoration Projects in Connection with Dredging).** This provides authority for the Corps to plan, design, and build projects to protect, restore, and create aquatic and ecologically related habitats in connection with dredging of authorized Federal navigation projects. Typically, these projects involve the beneficial use of dredged material from navigation channels to improve or create wetlands or waterfowl/shorebird nesting habitats.

- **Section 206, Water Resources Development Act of 1996, as amended (Aquatic Ecosystem Restoration).** Under the authority provided by this section, the Corps may plan, design, and build projects to restore aquatic ecosystems for fish and wildlife. Projects must improve the quality of

the environment, be in the public interest, demonstrate cost effectiveness, and not exceed $5 million in Federal cost. Recreation projects, if justified, may be included in the total project, but they may not increase the Federal share of the total project by more than 10 percent. Additionally, projects should not be formulated for recreation, and recreation should not detract from ecosystem benefits.

Table 4. USACE Continuing Authorities Program

Authority	Type of Project	Cost Share Federal/Non-Federal	Federal Project Limit
Section 205, 1948 Flood Control Act, as amended	Small flood damage reduction projects (formerly flood control)	65%/35%	$7,000,000
Section 14, 1946 Flood Control Act, as amended	Emergency stream bank and shoreline protection	65%/35%	$1,500,000
Section 208, 1954 Flood Control Act, as amended	Snagging and clearing for flood control	65%/35%	$500,000
Section 107, 1960 River and Harbor Act, as amended	Small navigation projects	Varies by depth	$7,000,000
Section 103, 1962 River and Harbor Act, as amended	Small hurricane and storm damage reduction projects (beach erosion)	65%/35%	$5,000,000
Section 111, 1968 River and Harbor Act, as amended	Mitigation of shore damage attributable to navigation works	Costs are shared in the same manner as the project causing the erosion/shoaling.	$5,000,000
Section 1135, 1986 Water Resources Development Act, as amended	Project modifications for improvements to the environment	75%/25%	$5,000,000
Section 204, 1992 Water Resources Development Act, as amended	Ecosystem restoration projects in connection with dredging	75%/25%	$5,000,000
Section 206, 1996 Water Resources Development Act, as amended	Small aquatic ecosystem restoration projects	65%/35%	$5,000,000

5.6.2.2 Corps Project/Technical Assistance Authorities. The Corps has a number of other special project and technical assistance authorities that may be available to address water resource problems and opportunities in the WLHB study area. As with the CAP, each of these authorities and programs has specific and unique procedures and criteria related to such matters as cost sharing percentages, credit for in-kind services, and Federal funding limits. These special project/technical assistance authorities are enumerated and briefly described below; a more detailed description of each authority is provided at the following link on the Corps Detroit District web site: http://www.lre.usace.army.mil/_kd/go.cfm?destination=Page&Pge_ID=1409 .

- **Section 22, Water Resources Development Act of 1974, as amended (Planning Assistance to States).** This provides authority for the Corps to assist the states, local governments, and other non-Federal entities in preparing comprehensive plans for the development, use, and conservation of water and related land resources. Section 208 of the Water Resources Development Act of 1992 amended WRDA 1974 to include Native American tribes in the program, in accordance with the same provisions that apply to the states. The Planning Assistance to States Program is funded annually by Congress. Federal allotments for each state or Tribe from the nationwide appropriation are limited to $500,000 annually but typically are much less. Individual studies, of

which there may be more than one per state or tribe per year, generally cost $25,000 to $75,000. These studies are cost shared on a 50 percent Federal/50 percent non-Federal basis.

- **Section 206, Flood Control Act of 1960 (PL 86-645), as amended (Floodplain Management Services [FPMS]).** The FPMS Program was developed by the Corps specifically to address the need of people who live and work in the floodplain to know about the flood hazard and the actions that they can take to reduce property damage and to prevent the loss of life caused by flooding. Its objective is to foster public understanding of the options for dealing with flood hazards and to promote prudent use and management of the nation's floodplains. The FPMS Program provides the full range of technical services and planning guidance that is needed to support effective floodplain management.
  - **General Technical Services.** The program develops or interprets site-specific data on obstructions to flood flows, flood formation, and timing and the extent, duration, and frequency of flooding. It also provides information on natural and cultural floodplain resources of note and flood loss potentials before and after the use of floodplain management measures.
  - **General Planning Guidance.** On a larger scale, the program provides assistance and guidance in the form of special studies on all aspects of floodplain management planning, including the possible impacts of off-floodplain land use changes on the physical, socioeconomic, and environmental conditions of the floodplain. This can range from helping a community identify present or future floodplain areas and related problems, to a broad assessment of which of the various remedial measures can be effectively used.

- **Section 506, Water Resources Development Act of 2000 (Great Lakes Fishery and Ecosystem Restoration Program).** This authorizes the Corps to participate in planning, engineering, design, and construction of projects to restore degraded ecosystem structure, function, and dynamic processes to a more natural condition. Such projects include the removal of low head dams as a way to improve water quality and fish and wildlife habitat. Projects require partnering with a non-Federal sponsor, which may be a public agency, state or local government, private interest, or nonprofit environmental organization. Generally, projects for study are selected and endorsed by an integrated panel of Federal and non-Federal Great Lakes ecosystem restoration experts.

- **Estuary Restoration Act (ERA) of 2000 (PL 106-457, Title I), as amended.** The purposes of the ERA are to promote the restoration of estuary habitat, to develop a National Estuary Habitat Restoration Strategy for creating and maintaining effective partnerships within the Federal government and with the private sector, to provide Federal assistance for and promote efficient financing of estuary habitat restoration projects, and to develop and enhance monitoring, data sharing, and research capabilities. Estuaries under the ERA include the Great Lakes. The ERA affects 30 states, the District of Columbia, Puerto Rico, Northern Mariana Islands, Virgin Islands, American Samoa, and Guam.

  The ERA authorizes a program under which the Secretary of the Army can carry out projects and provide technical assistance to meet the restoration goal. Costs of projects funded under the ERA must be shared with non-Federal parties. Non-Federal responsibilities and project selection criteria are discussed in the ERA. The ERA established an Estuary Habitat Restoration Council, chaired by the Secretary of the Army, which consists of representatives of the National Oceanic and Atmospheric Administration, the EPA, the USFWS, the Department of Agriculture, and the Department of Army. There may also be one ex officio member appointed by the President. Funding is authorized to be appropriated to all of the Restoration Council member agencies for

implementing projects. The Council's overall responsibilities are soliciting, evaluating, reviewing, and recommending project proposals for funding, developing a national strategy, reviewing the effectiveness of the strategy and providing advice on development of databases, monitoring standards, and producing reports required under the ERA. The Secretary of the Army may delegate projects with a Federal cost of less than $1 million to one of the other Council members to implement with its appropriated funds or other funds available to the agency.

- **Section 203, Water Resources Development Act of 2000, as amended (Tribal Partnership Program).** This provides authority for the Corps, in cooperation with Indian tribes and heads of other Federal agencies, to study and determine the feasibility of carrying out projects that will substantially benefit Indian tribes. The Tribal Partnership Program provides an opportunity to assist with water resources projects that address economic, environmental, and cultural resource needs through studies that may include flood damage reduction, environmental restoration, and protection and preservation of natural and cultural resources. On request, the Corps will cooperate with tribes to study water resources projects and such other projects as determined appropriate, primarily located on tribal lands.

- **Section 312, Water Resources Development Act of 1990, as amended in 1996 (Environmental Dredging).** Congress provided the Corps with the authority to remove contaminated sediments outside the boundaries of Federal navigation channels as part of the operation and maintenance on a navigation project. All environmental dredging is to be taken in consultation with the EPA.

  Contaminated sediments have been identified as a significant environmental problem in the Great Lakes and have been linked to the impairment of beneficial uses of Great Lakes waters at every one of the AOCs designated in the Great Lakes Water Quality Agreement. While 5 sites in the Great Lakes, including Saginaw River in the WLHB, have been identified for priority consideration, contaminated sediments have been dredged for environmental remediation at more than 30 Great Lakes sites under the Section 312 authority. At many other sites with contaminated sediments, remediation has become stalled for lack of funding, resources, or other reasons. Restriction to navigation dredging is one of the use impairments identified in the Great Lakes Water Quality Agreement. About half of the 4 million cubic yards of sediments dredged annually by the Corps from Federal navigation harbors and channels are contaminated. In many cases, environmental remediation of contaminated sediment has been considered or implemented inside or next to Federal navigation channels.

  The environmental dredging authority requires a cost-sharing partner, which may be a state, local, or tribal government. The cost-sharing formula for this authority is condition specific. If the removal of contaminated sediments outside the Federal navigation channel will reduce future costs for maintenance of the Federal navigation channel, dredging may be conducted at full Federal cost. If not, and the benefits from dredging outside the Federal channel are environmental, dredging (along with transportation and treatment) are cost-shared at 65 percent Federal and 35 percent non-Federal. In all cases, the costs for disposal are cost-shared at 65 percent Federal and 35 percent non-Federal. Congress directed that annual funding for this authority not exceed $20 million Corps-wide (USACE LRD 2011).

- **Section 401(a), Water Resources Development Act of 1990, as amended (Great Lakes Remedial Action Plans).** Section 401(a) is intended to provide technical support to states and local organizations in the development and implementation of RAPs at Great Lakes AOCs. A RAP is developed in three stages: Stage I identifies and assesses use impairments and identifies the sources of the stresses from all media in the AOC; Stage II identifies proposed remedial actions and their method of implementation; and Stage III documents evidence that uses have been restored. It is important to note that, in practice, these stages often overlap and that the RAPs often become iterative documents, representing the current state of knowledge, planning, and remedial activity in the AOC.

- **Section 516(e), Water Resources Development Act of 1996 (Great Lakes Tributary Modeling Program).** This authority enables the Corps to develop sediment transport models for tributaries to the Great Lakes that discharge to Federal navigation channels or AOCs. These models are being developed to assist state and local resource agencies in evaluating alternatives for soil conservation and nonpoint source pollution prevention in the tributary watersheds. The ultimate goal of this program is to support state and local measures that will reduce the loading of sediments and pollutants to tributaries, thereby reducing the need for and costs of navigation dredging and promoting actions for delisting Great Lakes AOCs.

- **Section 729 Water Resources Development Act of 1986, as amended (Watershed Planning).** This authority enables the Corps to conduct watershed planning and preparing watershed plans. Watershed planning addresses problems, needs and opportunities within a watershed or regional context; strives to achieve integrated water resources management (IRWM); and, results in general, non-project specific, holistic plans or strategies to address those watershed needs. Watershed plans may recommend programs, and the initiation of site-specific project implementation studies. Note that this authority has historically received low limits of appropriated funds since authorized

5.7 Preliminary Screening of Problems/Opportunities and Potential Solutions for Further Feasibility Level Investigations

Information from the literature review and the public meetings was compiled and compared to narrow down the list of problems and opportunities and potential solutions to a manageable number. Each problem/opportunity on the list was considered for potential applicability to the 905(b) study authority and to other pertinent Corps authorities and programs. Unique identifying numbers were assigned to each potential project opportunity referenced to the specific public meeting during which the opportunity was first identified and/or discussed [Technical Stakeholder Meeting for agencies, NGOs, and academia (TS); community meetings at Sault Ste. Marie (SSM), Cheboygan (Che), Alpena (Alp), East Tawas (Taw), Bay City (BC), Midland (Mid), Port Austin (PA), or Port Sanilac (PS)]. Potential studies and projects to address the identified water resource problems and opportunities in the WLHB study area were evaluated and grouped into three tiers, based on their relevance to Corps authorities (i.e., Federal interest) and the nature of the measures most likely needed to address the problem/opportunity (e.g., project construction, watershed plan/study, planning assistance, and technical assistance). The primary outcome of this process was to identify studies and projects that would be in the Federal interest and implementable under Corps authorities. The three tiers are generally described as follows:

Tier 1 – implementable under an existing Corps authority and would likely involve constructed measures;

Tier 2 – implementable under an existing Corps authority and does not involve construction; and

Tier 3 – implementable by other organizations (eliminated from further screening and consideration herein). The results for each of the three tiers are discussed in more detail in the following paragraphs.

Tier 1: Measures implementable under an existing Corps' authority and likely to involve constructed features. These measures are those that would fit one or more of Corps' priority mission areas (navigation, flood risk management, and ecosystem restoration) and could be pursued under one of the following authorities: (1) a General Investigation Feasibility Study, in accordance with the authority for this 905 (b) study (Section 102, RHA of 1966); (2) Section 216 of the Flood Control Act of 1970 (Review of Completed Projects); or (3) one of the Corps' Continuing Authorities (see Section 5.6.2.1 above). Those study/project opportunities are presented in Table 5. In addition, a high percentage of these opportunities address one or more of the five GLRI focus areas and lie within the watersheds of either the St. Marys River AOC or Saginaw River and Bay AOC. For each of these opportunities, strong public and agency support was demonstrated in the technical stakeholders meeting in Bay City or one or more of the community stakeholders meetings held throughout the study area. Further, prospective NFSs either have already been identified and have confirmed their interest or are being sought for each opportunity presented in Table 5.

The 12 potential studies/projects identified in Table 5, with two exceptions, could be accomplished by way of the Corps Continuing Authorities Program. The table indicates which of the Continuing Authorities would be most applicable to each project. In some cases, more than one of those authorities may potentially apply. The most appropriate authority in those cases would be determined by the Corps at the initiation of the study, in consultation with the NFS. The two exceptions in Table 5 are: (1) a potential General Investigations Study to address coastal and tributary stream erosion and sedimentation issues in Eastern Sanilac County, Michigan (Project No. PS-4) and (2) a potential General Investigations Study to address ecosystem restoration and flood risk management issues in the Kawkawlin River watershed in Bay, Midland, and Gladwin Counties, Michigan. These potential studies are discussed in more detail in Section 5.9.

Implementation of opportunities identified in Table 5 depends on a number of factors, including commitment from a non-Federal entity that can meet the requirements to serve as an NFS, the timing and availability of Federal funding, and the timing and availability of non-Federal cost-share funding.

Detailed fact sheets on each Tier 1 study/project opportunity identified in Table 5 are included in Appendix C.

Tier 2: Measures implementable under an existing Corps' authority which does not involve construction. Tier 2 measures would generally be consistent with and at least indirectly support one or more of the Corps' priority mission areas and could be implemented under an existing Corps authority, but they would not be expected to lead to a project for construction. These measures include such activities as watershed management planning; water quality, hydrologic, and hydraulic modeling and preparation of implementation plans; installation of gauge stations and other field data collection; delisting of BUIs; and various other types of planning and technical assistance. As such, these measures will be pursued individually outside of this reconnaissance study process, using such Corps authorities and programs as Section 22 (Planning Assistance to States), Section 516 (Great Lakes Tributary Modeling Program), Floodplain Management Services, or the Corps' RAP authority. The Section 22 program requires non-Federal cost sharing, and the other program activities do not require it. Tier 2 opportunities are presented in Table 6. As discussed in Section 5.6.2.2, annual funding for the Section 22 program is limited. State agency or local government requests for assistance for Section 22 planning assistance must be addressed to the designated Corps Detroit District Section 22 coordinator and coordinated through the state coordinator for the Corps' planning assistance program in MDNR.

A high percentage of these Tier 2 opportunities address one or more of the five GLRI focus areas and lie within the watersheds of either the St. Marys River AOC or Saginaw River and Bay AOC, as indicated in Table 6. For each of these opportunities, strong public and agency support was demonstrated in the technical stakeholders meeting in Bay City and one or more of the community stakeholders meetings held throughout the study area. Further, prospective NFSs either have already been identified and have confirmed their interest or are being sought for each opportunity presented in Table 6. Each of these Tier 2 planning or technical assistance opportunities will be pursued independently of this 905(b) study in accordance with the applicable Corps authorities and cost sharing provisions.

As indicated for Tier 1 projects, implementation of Tier 2 opportunities identified in Table 6 depends on a number of factors, including firm commitment from a non-Federal entity that can meet the requirements to serve as an NFS (if required), the timing and availability of Federal funding, and the timing and availability of non-Federal cost-share funding (if required).

Tier 3: Measures Screened from Further Consideration under the WLHB Study / Implementable by Other Organizations. During the screening process, Tier 3 measures were those that generally had merit with respect to various environmental issues in the study area but: (1) were not consistent with the Corps' mission areas, (2) did not fit one or more of the Corps' study/project authorities, (3) fit one of the Corps authorities but had insufficient stakeholder interest and no potential NFS, or (4) would likely be implemented more efficiently by another organization. Consequently, these opportunities were screened from further consideration and analysis in this reconnaissance study. These opportunities, identified in Table 7, generally would be more appropriately pursued through the programs of other Federal, state, or local government entities or through nongovernmental organizations. As noted in Table 7, many of the proposed study/project opportunities would be consistent with GLRI focus areas, and several would occur in the watershed of the St. Marys River AOC or the Saginaw River and Bay AOC or would directly benefit one of these AOCs.

Table 5. WLHB Proposed Study/Project Opportunities

Tier 1 (Implementable under a Corps' authority – likely to involve constructed measures)

Project #*	Project/Study Opportunities	Potential Non-Federal Sponsor(s)	Applicability to Corps' Mission Areas	Within an AOC?	Support GRLI Focus Areas?	Stakeholder Support?	Applicable Authority/Program
SSM – 5	*Ashmun Creek and Bay Ecosystem Restoration, Sault Ste. Marie, Michigan* The potential project involves ecosystem restoration in the 2,558-acre Ashmun Creek watershed and potentially in Ashmun Bay along the St. Marys River. The project may involve measures to address erosion, bank failure, and high levels of sedimentation along Ashmun Creek and within the watershed in order to restore productive aquatic and riparian habitat and associated ecosystem function. The degradation in the watershed is a result of poor land and storm water management practices, extensive land development in the upper portion, and stream channel instability. The resulting impacts from these problems include loss of stream habitat for fish and wildlife, degraded water quality, and excessive sediment loading to Ashmun Bay.	City of Sault Ste. Marie Chippewa-Ottawa Resource Authority	Ecosystem restoration	Tributary to St. Marys River AOC	Nearshore health and nonpoint source pollution Sediment management Habitat restoration	Yes Chippewa / East Mackinac Conservation District Chippewa County Health Dept. Sault Tribe of Chippewa Indians Bay Mills Indian Community Lake Superior State Univ.	USACE – Section 206 program (Ecosystem Restoration)
Che-2	*Thunder Bay River Ecosystem Restoration* The potential project would involve improving water quality and fish and wildlife habitat in the Thunder Bay River Watershed, Thunder Bay, and Lake Huron by reducing sedimentation, reconnecting important habitat, and decreasing nutrient loading in the Thunder Bay River Watershed. The project would restore and protect the unique cultural and ecological features of the watershed and Thunder Bay by reestablishing habitat connectivity, restoring productive stream and riparian habitat, and implementing appropriate habitat restoration measures in Thunder Bay. It is estimated that nearly 200 tons of sediment enters the watershed annually from human induced sources such as road/stream crossings and eroding streambanks.	Huron Pines, Inc. (Letter of interest to USACE dated 11/14/2011 - see Appendix C)	Ecosystem restoration	No	Habitat restoration Nearshore health and nonpoint source pollution	Yes Local road commissions NE Michigan Council of Governments (NEMCOG) USFWS Sea Grant Local conservation partners	USACE – Section 206 program (Ecosystem Restoration) or USACE – Section 506 (GLFER)

Project #*	Project/Study Opportunities	Potential Non-Federal Sponsor(s)	Applicability to Corps' Mission Areas	Within an AOC?	Support GRLI Focus Areas?	Stakeholder Support?	Applicable Authority/Program
Che-5	*Trout River Dam Rebuild/Replacement, Presque Isle County, Rogers Township, Michigan* At present, the Trout River Dam is in a highly deteriorated condition. There are some problems with leakage around the dam and tree roots that affect the structure, but failure is not deemed to be imminent. The Trout River is a designated trout stream by Michigan DNR, and downstream of the dam is excellent trout and salmon habitat. Eventual dam failure would likely release a huge sediment load that would smother fish spawning habitat and aquatic insects which fish need for food, resulting in reduced trout and salmon survival. The USFWS Sea Lamprey Control program does not want the dam to be removed or fail because it would make sea lamprey treatment much more difficult and expensive. A 1997 study estimated that, if the Trout River Dam was removed or failed, the cost to treat the river would more than triple, and the extent of stream requiring treatment would be eight times greater than at present. Other opportunities to benefit fish and wildlife by replacing or rehabilitating the Trout River Dam include: retrofitting the dam with a structure to release water from a lower level in the pool, providing cooler water downstream to improve trout habitat and decrease sediment retention in the pond; adding a water level control mechanism to manage pool levels to benefit waterfowl (feeding and nesting); installing a lamprey free fish ladder on the dam to allow more trout and salmon to move upstream and spawn, thus increasing the populations of those fishes in the river and the Great Lakes over time.	Presque Isle Conservation District (Letter of interest to USACE dated 11/09/2011 – see Appendix C)	Ecosystem restoration	No	Habitat restoration Nearshore health and nonpoint source pollution Invasive species management	Yes Presque Isle County Trout Unlimited USFWS GLFC	USACE – Section 206 program (Ecosystem Restoration) or USACE – Section 506 (GLFER)

Project #*	Project/Study Opportunities	Potential Non-Federal Sponsor(s)	Applicability to Corps' Mission Areas	Within an AOC?	Support GRLI Focus Areas?	Stakeholder Support?	Applicable Authority/Program
Alp – 6	*Alpena Township Flooding, Alpena, Michigan* The potential project would involve measures to address flooding problems in Alpena Township (Fletcher Creek and adjacent watershed areas). Flooding events occurred in April 1998 and April 2011, causing damages to residences, businesses, roads, and other infrastructure. The Fletcher Creek watershed itself is relatively small (approximately 654 acres). There is strong evidence that, under larger flood events, water spills over from the Genschaw Drain Watershed into the Fletcher Creek watershed and exacerbates flooding problems. The limestone bedrock geology in the area also complicates flooding conditions, impeding water infiltration over much of the area while other areas have bedrock cracks at the surface (called swallow holes) that drain large amounts of surface runoff into the subsurface aquifer. The total watershed area affected by flooding conditions in Alpena Township watersheds is about 9.5 square miles.	Alpena Township (Letter of interest to USACE dated 11/08/2011– see Appendix C)	Flood risk management	No	Not directly	Yes Alpena County Drain Commission City of Alpena, Michigan NEMCOG	USACE – Section 205 program (Small Flood Control)
Taw-6	*Rifle River Watershed Restoration, Arenac and Ogemaw Counties, Michigan* The potential project would involve measures to address sediment and nutrient loading in the Rifle River Watershed in Arenac and Ogemaw Counties, Michigan for purposes of restoring productive aquatic and riparian habitats, and the associated ecological function of those habitats, to the watershed. Specific measures may include improvements along streambanks and at road/stream crossings, as well as implementation of best management practices at high priority sites in the watershed that would have the greatest positive impact on watershed resources. Huron Pines, Inc. recently completed a comprehensive resource inventory in the Rifle River Watershed to identify the most current threats to water	Huron Pines, Inc. (Letter of interest to USACE dated 11/14/2011– see Appendix C)	Ecosystem restoration	Tributary to Saginaw River/Bay AOC	Nearshore health and nonpoint source pollution/ Habitat restoration Sediment management	Yes County road commissions County drain commissions Rifle River Watershed Restoration Committee Saginaw Bay Land Conservancy Saginaw Bay RC&D	USACE – Section 206 program or USACE – Section 506 (GLFER) program (fisheries and fish habitat only)

Project #*	Project/Study Opportunities	Potential Non-Federal Sponsor(s)	Applicability to Corps' Mission Areas	Within an AOC?	Support GRLI Focus Areas?	Stakeholder Support?	Applicable Authority/Program
	quality and wildlife habitat. The Rifle River drains a watershed of 396 square miles into Saginaw Bay, an EPA-designated AOC, and the mainstream has no large dams. Efforts to reduce sediment and nutrient loading in the river and its tributaries would have a positive impact on the overall water quality of Saginaw Bay and Western Lake Huron. The potential project would protect the high quality waters and ecological integrity of the Rifle River Watershed while maintaining the economic and cultural fabric of the communities that are dependent upon the health of these resources.					USFWS Trout Unlimited (Mershon Chapter) Local watershed groups	
BC- 1	*Saganing River/Creek Watershed (Arenac County, Michigan) Ecosystem Restoration* The potential project would involve actions to restore the aquatic ecosystem in the Saganing River/Creek watershed. . Feasibility level studies would consider measures to reestablish hydrologic conditions in the watershed that would support viable and productive aquatic and riparian habitats in the watershed, which are presently highly degraded for a variety of reasons. Aquatic habitat quality in the watershed has substantially declined and the system no longer supports a viable fishery. Stream has erosion / sedimentation issues and potential over drainage. • No/minimal flow at points in the watershed at times (potential overdrainage) • High sedimentation (total dissolve solids and total suspended solids) • Loss of beneficial aquatic plant life • DO below water quality standards (WQS) • Proposed development near the shoreline • No wastewater infrastructure • Potential septic problem in the area	Saginaw Chippewa Tribe Saginaw Bay Land Conservancy (Letter of interest requested from prospective partner(s)	Ecosystem restoration	Tributary to Saginaw River/Bay AOC	Nearshore health and nonpoint source pollution/ Habitat restoration	Yes Arenac County Saginaw Bay Land Conservancy	USACE – Section 206 program or USACE – Section 203 program (Tribal partnership Program) or USACE – Section 506 (GLFER) program (fisheries and fish habitat only)
BC – 4	*Kawkawlin River Watershed, Bay, Midland, and Gladwin Counties*	Bay County Drain Commission	Ecosystem restoration	Tributary to Saginaw	Nearshore health and	Yes	USACE – General Investigations Feasibility

Project #*	Project/Study Opportunities	Potential Non-Federal Sponsor(s)	Applicability to Corps' Mission Areas	Within an AOC?	Support GRLI Focus Areas?	Stakeholder Support?	Applicable Authority/Program
	The potential project would address ecosystem and water quality problems experienced in a portion of the Kawkawlin River watershed due to excessive sedimentation. The potential project area within this 225 square mile watershed would focus on the area just above the confluence of the North Branch and South Branch at 8 Mile Road downstream to North Euclid Road. . Feasibility level studies would focus on identification and evaluation of measures that would restore the quality and functionality of stream and riparian habitats in the Kawkawlin River and across the watershed. The Kawkawlin River watershed has experienced low flow to dry conditions in the summer and is plagued by excessive sedimentation issues, leading to backwater flooding of private property including agricultural lands during higher flow conditions. Excessive erosion and sedimentation has led to highly degraded wetland and aquatic habitat conditions in the watershed and decline of important fisheries. The proposed project in this stretch of the Kawkawlin River is not related to or dependent on an existing Corps Section 205 project in the Kawkawlin River, authorized in 1948, that occurred further downstream.	Bangor Township	Flood risk management	River/Bay AOC	nonpoint source pollution Habitat restoration Invasive species Sediment management	Michigan DEQ Midland County Drain Commission Kawkawlin River Watershed Property Owners Association Saginaw Basin Land Conservancy Saginaw Bay WIN Bay County Farm Bureau Local communities	Study, under authority of Section 102, RHA of 1966 or USACE – General Investigations, under the authority of Section 729, WRDA of 1986 (Watershed Planning) The ultimate direction and scope of the study would be determined in conjunction with willing NFS(s) (TBD)

Project #*	Project/Study Opportunities	Potential Non-Federal Sponsor(s)	Applicability to Corps' Mission Areas	Within an AOC?	Support GRLI Focus Areas?	Stakeholder Support?	Applicable Authority/Program
PA-4	*Downtown Caseville Ecosystem Restoration Project* The potential project involves restoration of an old oxbow of the Pigeon River in downtown Caseville, Michigan, immediately adjacent to the federally authorized Caseville Harbor project. The oxbow was originally bypassed in the mid-1800's to improve the efficiency of logging operations and to prevent logs and ice from lodging in the curves of the oxbow. Habitat in the old oxbow has become highly degraded over time by erosion and sedimentation, lack of circulation and flow, and the presence of invasive species (phragmites). The proposed project would involve restoration of several acres of aquatic habitat for spawning and nursery areas, support the baitfish holding capacity of the Caseville Harbor area, improve habitat for other wildlife, and improve public access and use of the restored area. The project would reestablish a healthy freshwater ecosystem, promote natural hydrologic functions, and add to the aesthetic and recreational values in downtown Caseville.	City of Caseville (Letter of interest to USACE dated 11/14/2011– see Appendix C)	Ecosystem restoration	Tributary to Saginaw River/Bay AOC	Habitat restoration Invasive species Nearshore health and nonpoint source pollution	Yes Huron County Huron Conservation District Pigeon River Intercounty Drainage Board Huron County Building and Zoning Department Caseville Downtown Development Authority and Chamber of Commerce	USACE – Section 206 program (Ecosystem Restoration) or USACE – Section 1135 program (may apply if impact resulted from construction or operation of the adjacent Caseville Harbor, or if the Caseville Harbor project could be modified to achieve desired environmental benefits) or USACE – Section 506 (GLFER) program

Project #*	Project/Study Opportunities	Potential Non-Federal Sponsor(s)	Applicability to Corps' Mission Areas	Within an AOC?	Support GRLI Focus Areas?	Stakeholder Support?	Applicable Authority/Program
PS-1	*Lexington Harbor Environmental Restoration, Michigan* Environmental problems being experienced in the harbor include: sedimentation; poor water quality; poor water circulation and flushing, and invasive species (phragmites and watermilfoil)). Village officials offered the following characterization of the problems in the harbor: "The build-up of sediment, contaminants, algae and invasive species is evident in the constant need of dredging and the use of frequent chemical applications to keep Lexington Harbor functional. The closing of the south harbor wall has trapped much of the flow, along with sand infiltration from the north wall." Based upon the general characterization of the problems, it appears that they could be related to the harbor features as they were constructed or potentially could be improved by modifying the harbor features in a manner that would not adversely impact the authorized purpose or function of the harbor. The feasibility level study would identify appropriate water quality and habitat-based metrics to evaluate alternative solutions and recommend a proposed course of action.	Village of Lexington	Ecosystem restoration	No	Nearshore health and nonpoint source pollution Habitat restoration	Yes Port Authority Sanilac County Michigan Waterways Commission	USACE – Section 1135 (Project Modifications for Improvement of the Environment)

Project #*	Project/Study Opportunities	Potential Non-Federal Sponsor(s)	Applicability to Corps' Mission Areas	Within an AOC?	Support GRLI Focus Areas?	Stakeholder Support?	Applicable Authority/Program
PS-3	*Doe Creek Watershed (St. Clair County) Ecosystem Restoration* The potential project would involve measures to address erosion, bank failure, and high levels of sedimentation along Doe Creek and tributaries in St. Clair County, Michigan. The principal purpose of the project would be to restore productive aquatic and riparian habitats, and the associated ecological function, within Doe Creek and the overall watershed. The degradation is a result of poor land management and storm water management practices in the watershed and stream channel instability. The resulting impacts from these problems include loss of stream habitat for fish and wildlife, damage to roads and culverts, and excessive sediment loading to Lake Huron.	St. Clair County, Office of Drain Commissioner (Letter of interest to USACE dated 11/09/2011– see Appendix C)	Ecosystem restoration	No	Habitat restoration Sediment management Nearshore health and nonpoint source pollution Invasive species	Yes Thumb Land Conservancy NRCS Michigan DNR Fisheries	USACE – Section 206 Program Ecosystem Restoration)
PS-4	*Eastern Sanilac County Coastal Watersheds, Michigan* The Eastern Sanilac County Coastal Watersheds encompass approximately 114,560 acres of predominately agricultural land located on the eastern edge of the "thumb" area of Michigan along about 40 miles of coastline. The potential project area has a series of small tributaries feeding into Lake Huron. Beaches at the outlets of the watersheds are used by residents and are important for tourism. There are significant erosion problems along the coast of Lake Huron in the project area. Additionally, these tributary streams are experiencing significant erosion and sedimentation issues as they near the coast. These issues pose a major threat to Michigan Highway 25 and the associated infrastructure along the highway. Erosion is causing loss of fish and wildlife habitat and is resulting in heavy sediment deposition into Lake Huron.	Michigan DEQ Michigan Dept. of Transportation	Coastal erosion and storm risk management Ecosystem restoration	No	Nearshore health and nonpoint source pollution Habitat restoration	Yes Sanilac County Road Commission Sanilac County Drain Commission Sanilac County Conservation District	USACE – General Investigations Feasibility Study, under authority of Section 102, RHA of 1966 or USACE – General Investigations, under the authority of Section 729, WRDA of 1986 (Watershed Planning) The ultimate direction and scope of the study would be determined in conjunction with willing NFS(s) (TBD)

Project #*	Project/Study Opportunities	Potential Non-Federal Sponsor(s)	Applicability to Corps' Mission Areas	Within an AOC?	Support GRLI Focus Areas?	Stakeholder Support?	Applicable Authority/Program
TS – 8	*Spaulding Drain (Ambrose Road) Ecosystem Restoration, Saginaw County, Michigan* The opportunity involves stream stabilization and ecosystem restoration of about one-half mile of the Spaulding Drain that parallels Ambrose Road. Restoration may involve measures to address erosion, bank failure, and high levels of sedimentation along the Spaulding Drain. This section of the drain is immediately upstream of the Shiawassee National Wildlife Refuge (SNWR). The edge of the drain abuts the road along this section, which has contributed to stream channel instability. The impacts from this problem include loss of stream habitat for fish and wildlife, degraded water quality, and excessive sediment loading to the SNWR, Saginaw River, and eventually to Lake Huron. Because of the stream channel instability, the future integrity of Ambrose Road in this reach of stream is questionable. The potential restoration project has strong local support.	Saginaw County Drain Commission Saginaw County Road Commission	Ecosystem restoration Steam bank protection	Tributary to Saginaw River/Bay AOC	Habitat restoration	Yes Shiawassee National Wildlife Refuge Saginaw County Conservation District	USACE – Section 206 program (Ecosystem Restoration) USACE – Section 14 (Emergency Stream bank and Shoreline Protection) may be applicable regarding potential loss of Ambrose Road due to stream instability and erosion.

*Project numbers assigned based on the meeting in which they were proposed: SSM – Sault Ste. Marie; Che – Cheboygan; Alp – Alpena; Taw – East Tawas; BC – Bay City; Mid – Midland; PA – Port Austin; PS – Port Sanilac; TS – Technical Stakeholder Meeting

Table 6. WLHB Proposed Study/Project Opportunities

Tier 2 (Implementable under an existing Corps authority – would not involve construction)

Project #*	Project/Study Opportunities	Likely Partner(s)	Applicability to Corps' Mission Areas	Within an AOC?	Support GRLI Focus Areas?	Stakeholder Support?	Applicable Authority/Program
SSM-1	Planning assistance • Regional Master Plan • Ordinance template to protect waterways • Chippewa and Mackinac Counties	Eastern Upper Peninsula Regional Planning and Development Commission (EUPRPD)	Technical assistance - supports ecosystem protection and restoration	St. Marys River AOC watershed	Nearshore health and nonpoint source pollution Habitat restoration	Yes	USACE – Section 22 program (planning assistance)
SSM-2	Septic systems • Unified Sanitary code to address SS • Cedarville Area – north of Les Cheneaux Island • Needed basinwide	EUPRPD Les Cheneaux Islands Watershed (Council) County Health Department	Technical assistance - supports ecosystem protection and restoration	St. Marys River AOC watershed	Nearshore health and nonpoint source pollution Habitat protection and restoration	Yes	USACE – Section 22 program (planning assistance) EPA - GLRI
Alp-1	Water quality in Thunder Bay • *E. coli*, muck, and algae. Water is "tanic" • Stormwater from Alpena a problem • IDEP has not been undertaken • City Manager noted that a stormwater management master plan may be helpful	City of Alpena	Technical assistance - supports ecosystem protection and restoration	No	Nearshore health and nonpoint source pollution Habitat protection and restoration	Yes	USACE – Section 22 program (planning assistance) EPA – GLRI
Alp-2	Watershed management plan for small tributaries that drain to Lake Huron • Karst terrain • Lots of sedimentation deposited in nearshore areas. • Karst Conservancy program could be a partner	NEMCOG MDNR	Technical assistance - supports ecosystem protection and restoration	No	Nearshore health and nonpoint source pollution Habitat protection and restoration	Yes	USACE – Section 22 program (planning assistance) EPA – GLRI

Project #*	Project/Study Opportunities	Likely Partner(s)	Applicability to Corps' Mission Areas	Within an AOC?	Support GRLI Focus Areas?	Stakeholder Support?	Applicable Authority/Program
Alp-5	River mouth classification along the coastline • Identifying each mouth's structure and function • Document alterations that have occurred • 1st step in goal of better management of river mouths for fisheries and human activities.	MDNR	Technical assistance - supports ecosystem protection and restoration	Could be applicable to St. Marys and Saginaw River/Bay watersheds	Nearshore health and nonpoint source pollution Habitat restoration	Yes	USACE - Section 22 program (planning assistance)
Taw-1	Excessive sand and sediment in lake and Tawas River • Needs both source controls and dredging • Possible drain • Watermilfoil issues also.	Drain Commissioner Saginaw Bay RC&D	Technical assistance - supports ecosystem protection and restoration	Saginaw River/Bay watershed	Nearshore health and nonpoint source pollution Habitat restoration	Yes	USACE – Section 516 study or USACE – Section 22 program (planning assistance) or EPA - GLRI
Taw-2	Au Gres River flooding • At the mouth • Unclear of specific project	Saginaw Bay RC&D Huron Pines RC&D Saginaw Bay WIN	Supports flood risk management	Tributary to Saginaw River/Bay AOC	Not directly	Yes	USACE - Section 22 program (planning assistance) or USACE – FPMS program
Taw-3	Tawas Harbor shoreline • Need study to determine best course of action • Sand from the Tawas River scours shoreline	No local sponsor identified	Technical assistance	Saginaw River/Bay watershed	Nearshore health and nonpoint source pollution	Yes	USACE – Section 22 program (planning assistance),
BC – 2	Septic System Revolving fund • Two-step process: 1) identification and 2) remediation and education • Currently there is a small fund in Bay County ($40K) • Desire to expand to other counties (Huron, Arenac, Tuscola) • Involves changes to ordinances and mapping	Bay County Health Dept. (BCHD) Bay County Environmental Affairs and Community Development Dept. Other county health departments	Supports ecosystem protection and restoration	Saginaw River/Bay watershed	Nearshore health and nonpoint source pollution Habitat protection and restoration	Yes	USACE – Section 22 program (planning assistance) could provide technical assistance and guidance development in support of a revolving fund program.

Project #*	Project/Study Opportunities	Likely Partner(s)	Applicability to Corps' Mission Areas	Within an AOC?	Support GRLI Focus Areas?	Stakeholder Support?	Applicable Authority/Program
BC – 7	Phragmites management • Focus on coordination / prioritization / mapping • Identified in numerous places • Throughout shoreline • Along Cheboyganing Creek (Portsmouth Township) • Saginaw Basin Land Conservancy submitted a GLRI grant to do technical mapping • Risk Assessment and Removal study submitted to GLRI, but not funded (unclear if this is related to the Saginaw Basin Land Conservancy GLRI grant application mentioned above; appeared on two different maps/groups)	Ducks Unlimited The Nature Conservancy Saginaw Bay WIN Saginaw Basin Land Conservancy	Supports ecosystem protection and restoration	Saginaw River/Bay watershed	Invasive species Habitat restoration	Yes	USACE – Section 22 program (planning assistance)
BC-14	Saginaw River/Bay Watershed Area of Concern (AOC) Technical Report Findings Synthesis The potential project would involve developing a summary of findings from the extensive collection of technical studies and reports on the Saginaw River/Bay watershed AOC. The goal would be to provide watershed stakeholders at all levels with easy access to the findings of these studies to ensure a common understanding of the outcomes of research and to help establish generally accepted trends on watershed health, including the AOC BUIs. The product of this synthesis effort could support the development of watershed health indicators, similar to those used for the SOLEC. Indicators could demonstrate trends over time for a variety of parameters (e.g., phosphorus and sediment) and help illustrate restoration progress related to BUIs and other watershed goals. This effort could help with watershed education and outreach efforts and assist stakeholders in identifying and coordinating future research needs that build on existing research, avoid duplication of effort, and target	Bay County Environmental Affairs and Community Development Dept.	Supports ecosystem protection and restoration	Saginaw River/Bay AOC	Nearshore health and nonpoint source pollution Habitat protection and restoration	Yes Federal and state resource agencies Local governments Numerous recreation and conservation organizations	USACE – Section 22 program (planning assistance) or EPA - GLRI NOTE: MDEQ (AOC Program) would be consulted before initiating this project or a project with a similar scope of work. MDEQ is currently considering performing a coordinated study along these lines for Saginaw Bay and Western Lake Erie.

Project #*	Project/Study Opportunities	Likely Partner(s)	Applicability to Corps' Mission Areas	Within an AOC?	Support GRLI Focus Areas?	Stakeholder Support?	Applicable Authority/Program
	limited resources. As new reports and studies become available, the format established through this project could be used to develop new abstracts and update indicators. The project could also illustrate where reports and studies might contain conflicting results, allowing watershed stakeholders to discuss the merits of each study and determine which set of findings should be used when discussing the health of the Saginaw River/Bay watershed. An initial effort could focus on technical reports and studies related to phosphorus and sediment to establish a process and a template for presenting findings and creating associated indicators to present trends.						
Mid-1	Culvert design study • Mollusk eggs are deposited at the mouth of perched culverts and they do not survive. • It is thought that bottomless culverts could solve problem • Need to study design options	Drain Commissioners MDEQ/MDNR Saginaw Bay WIN	Supports ecosystem restoration	Could be applicable to St. Marys River and Saginaw River/Bay watersheds	Habitat protection and restoration	Yes Central Michigan University	USACE – Section 22 program (planning assistance)
Mid-2	Salt River hydrologic study • There have been major hydrological changes to the Salt River • Steve Kahl – Director of the Shiawassee National Wildlife Preserve might have hydrologic studies of area, including the Salt River • Ecosystem and flood reduction	Drain Commissioner Saginaw Bay RC&D	Supports ecosystem protection and restoration	Tributary to Saginaw River/Bay AOC	Nearshore health and nonpoint source pollution Habitat restoration	Yes Shiawassee National Wildlife Refuge	USACE – Section 22 (planning assistance) program
Mid-3	Snake Creek flooding • Largest source of flooding in the Midland area • New FIS maps with new baseline flood elevations are available • Sanford Lake dam is in area • Ecosystem and flood reduction study needed	Drain Commissioner Saginaw Bay RC&D	Supports flood risk management	Tributary to Saginaw River/Bay AOC	Not directly	Yes	USACE – Section 22 (planning assistance) program USACE – FPMS program

Project #*	Project/Study Opportunities	Likely Partner(s)	Applicability to Corps' Mission Areas	Within an AOC?	Support GRLI Focus Areas?	Stakeholder Support?	Applicable Authority/Program
PA-1	Port Austin Harbor hydrologic study • Break wall is connected to mainland by rock wall • Residents maintain rock wall, which prevents flow into bay and results in stagnant water, milfoil and accumulated pollutants • Need hydraulic study to determine best solution	Village of Port Austin Port Authority	Technical assistance – water quality and circulation, habitat protection	Saginaw River/Bay AOC	Nearshore health and nonpoint source pollution	Yes Huron County Local home owner groups	USACE – Section 22 (planning assistance) Planning assistance could lead to a potential USACE – Section 1135 project (Project Modifications for Improvement of the Environment). Presently, local stakeholder interest is high, but no willing NFS could be identified.
PA-2	Small port dredging • Sebewaing, Caseville, Bay Port, Port Hope all need dredging • Sources of sediment, mostly from agricultural , need to be addressed • Sebewaing - Section 516 study already done • Need congressional authorization to dredge harbor	Local communities or county governments	Supports navigation/ecosystem restoration	Saginaw River/Bay watershed	Nearshore health and nonpoint source pollution Habitat restoration	Yes	USACE – O&M harbor maintenance (recreational harbor) USACE – Section 516 (might be applicable to look at sediment source(s) at Federal harbors other than Sebewaing Harbor)
TS-2	Mining – Presque Isle • Stone Pour Inc. mines a quarry that results in the drop of the water level in Lake Essau (through groundwater depletion), which in turn lowers the level of Grand Lake. • There is an agreement that all the water they harvest from their operation will be returned to Lake Esau, but it is not legally binding once the mine closes. • Need to find long-term solution. The State and an East Coast University own mineral rights.	State Lake level program	Technical assistance	No	Not directly	Yes	USACE – Section 22 program (planning assistance)

Project #*	Project/Study Opportunities	Likely Partner(s)	Applicability to Corps' Mission Areas	Within an AOC?	Support GRLI Focus Areas?	Stakeholder Support?	Applicable Authority/Program
TS-6	O&M maintenance manual for drains • Designed to improve water quality of local waterways • Stakeholders documented problems with Huron County Drain Commission approach to drain maintenance in the Pinnebog watershed (photos provided by stakeholders) • Ditch maintenance (referred to as "dredging" by stakeholders) leads to substantial erosion and sedimentation • Stakeholders want to see an improved method for drain maintenance that does not cause excessive sedimentation • Need for changes to ordinances • Need for Drainage Commission education	Michigan Association of County Drain Commissioners County Drain Commissioners	Technical assistance - supports ecosystem protection and restoration	Applicable to St. Marys and Saginaw River/Bay watersheds	Nearshore health and nonpoint source pollution Habitat restoration	Yes	USACE – Section 22 program (planning assistance)
TS – 7	Modeling support • Expand Section 516 program to model sediment transport in more tributaries in the basin • Update the 516 models for the Saginaw and Sebewaing Rivers • Assess impact of sediment loading on Saginaw Bay	Counties	Supports ecosystem protection and restoration	Saginaw River/Bay watersheds	Nearshore health and nonpoint source pollution Habitat restoration	Yes	USACE - Section 516 Study

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Table 7. WLHB Proposed Study/Project Opportunities

Tier 3 (Implementable by other organizations/eliminated from further consideration for Corps implementation)

Project #*	Project/Study Opportunities	Likely Partner(s)	Applicability to Corps' Mission Areas	Within an AOC?	Support GRLI Focus Areas?	Stakeholder Support?	Applicable Authority/Program
SSM-3	Repair road stream crossings • Sediment was identified as a major concern • Conservation District has inventoried	Conservation District Road Commission	None	St. Marys River watersheds	Nearshore health and nonpoint source pollution Habitat restoration	Yes	NRCS programs
SSM-4	Stormwater master plan • St. Marys River *E. coli* study • SSM needs stormwater master plan	City of Sault Ste. Marie	None	St. Marys River watersheds	Nearshore health and nonpoint source pollution Habitat protection and restoration	Yes	GLRI Potential MDEQ project
Che-1	Develop port into commercial center • Need dredging from 21 feet to 23 feet to accommodate larger freighters • US Oil has indicated interest in using the port • Currently considered a low-use waterway (less than 100,000 tons annually) for O&M dredging purposes	Cheboygan Port Authority City of Cheboygan	Navigation	No	No	Yes	Corps is authorized to perform maintenance dredging of the existing channel. Maintenance dredging is not presently performed due to low waterway use. No basis for further study of channel improvements at this time.
Che-2	Repair road stream crossings • Huron Pines RC&D has inventory and priority • Road Commissioner is willing	Huron Pines RC&D Road Commissions	None	No	Nearshore health and nonpoint source pollution Habitat protection and restoration	Yes	Specific implementation of these improvements more appropriately conducted by Road Commissions and Huron Pines RC&D

Project #*	Project/Study Opportunities	Likely Partner(s)	Applicability to Corps' Mission Areas	Within an AOC?	Support GRLI Focus Areas?	Stakeholder Support?	Applicable Authority/Program
Che-3	Fish passage near paper mill dam, Cheboygan River, Cheboygan, Michigan • Prior restoration activities provided by the GLFC under the Section 506 program (not conducted by USACE). • Additional restoration opportunities may exist to fully complete the project.	Tip of the Mitt, Great Lakes Fishery Commission	Ecosystem restoration	No	Habitat restoration	Yes	Study may qualify for Corps participation under the Section 206 program (Ecosystem Restoration) or the Section 506 program (GLFER). However, strong stakeholder support and a willing NFS were not identified.
Che-4	Ocqueoc River breakwall construction • Reduce sedimentation impacting recreation resources	MDNR	None	No	Nearshore health and nonpoint source pollution	Yes	MDNR resources
Alp-3	Phragmites control • Thunder Bay Mouth, Black River, Phelan Creek • Need way to address problem on an ongoing basis • HP RC&D – Americorp Program – treated 80 sites • Likely need to expand existing program	Huron Pines RC&D	None	No	Invasive species	Yes	EPA - GLRI
Alp-4	Van Etten Creek (Nonattainment for nutrients) • Look in the Watershed Management Plan for actions to address problem	Huron Pines RC&D	None	No	Nearshore health and nonpoint source pollution	Yes Van Etten Watershed Coalition	EPA - GLRI
BC – 3	Saginaw Bay/Channel toxin removal • Need Corps' assistance on pier/navigational issues • Other sources of funding and a local sponsor are available • Install sediment traps Tittabawassee/Saginaw Rivers • Goal is to catch migrating dioxins and other toxics before entering Saginaw Bay/Lake Huron	TBD	Ecosystem restoration	Saginaw River/Bay AOC	Contaminated sediments	Yes	Dioxin issues are the subject of long standing litigation. The issues will be addressed by way of the eventual settlement process. This issue may be partially addressed through the GLRI program (EPA) Corps has conducted modeling for potential sediment traps in Saginaw River for contaminated sediments in recent years. Section 312, WRDA 1990, as amended (environmental

Project #*	Project/Study Opportunities	Likely Partner(s)	Applicability to Corps' Mission Areas	Within an AOC?	Support GRLI Focus Areas?	Stakeholder Support?	Applicable Authority/Program
							dredging) provides authority for the Corps to conduct environmental dredging outside the authorized navigation channel. However, the program is not generally funded, and no willing NFS is likely to step forward.
BC – 5	Bay City State Recreation Area Ecosystem Restoration Project, Bay City, Michigan The State Recreation Area is an important natural system and highly utilized public recreation area near an urban center (Bay City). The values and functions of the natural system (Tobico Marsh and Lagoon, and the surrounding watershed and coastal area) have been impacted by the activities of others in the watershed and conditions in Saginaw Bay. Habitat restoration/protection opportunities may include: managing water levels in the marsh; improving aquatic habitat conditions; collecting additional biological data and increasing the diversity of vegetation; maintaining an open channel from the marsh to Tobico Lagoon and Saginaw Bay for fish migration, and addressing invasive plant species (phragmites) issues.	MDNR (Parks and Recreation Division)	Ecosystem restoration	Saginaw River/Bay watershed	Habitat restoration Nearshore health, and nonpoint source pollution Invasive species	Yes Bay County Drain Commission Bay Co. Envr Affairs and Community Development Dept. Bangor Township USFWS Friends of Bay City State Recreation Area Save Our Shoreline	EPA – GLRI Potential opportunity was reviewed for applicability to the USACE Section 206 program (Ecosystem Restoration) or USACE – Section 506 (GLFER) program. MDNR could not determine the scope of issues they might be willing to address or whether they would be willing to serve as NFS for any studies. Therefore, potential project was eliminated from consideration by the Corps at this time. Work could be pursued at a future date under GLRI or Corps Continuing Authorities Program.
BC – 8	Wet weather issues • Stormwater master plans for non-MS4 communities	Local communities	None	Saginaw River/Baywatersheds	Nearshore health and nonpoint source pollution	Yes	EPA – GLRI

Project #*	Project/Study Opportunities	Likely Partner(s)	Applicability to Corps' Mission Areas	Within an AOC?	Support GRLI Focus Areas?	Stakeholder Support?	Applicable Authority/Program
BC – 9	Fish passage/dam removal – Saginaw River watershed • Saginaw Bay WIN has a prioritized list of dams/fish passage projects on its website • Dow Dam removal - potentially problematic – dioxin issues and private ownership	Saginaw Bay WIN MDEQ Drain Commissioner Council of Michigan Foundations	Ecosystem restoration	Saginaw River/Bay watershed	Habitat restoration Contaminated sediments	Yes	EPA – GLRI No potential Corps role at this time; Corps assistance with dam removal/fish passage could be requested in the future under Section 206 program; future Corps role, if any, at Dow Dam depends on resolution of dioxin issues.
BC – 10	Wetland restoration – Saginaw River and tributaries • Crow Island (along with phragmites control) • Saginaw Bay Land Conservancy study of shoreline wetlands • Saginaw Bay Land Conservancy – Potential acquisition of abandoned golf course on lower Tittabawassee River and restoration of wetlands	Saginaw Bay Land Conservancy	Ecosystem restoration	Saginaw River/Bay watershed	Habitat restoration	Yes	EPA – GLRI Potential wetland restoration projects may be eligible for the USACE – Section 206 program (Ecosystem Restoration). However, potential projects are not sufficiently defined at this time and no willing NFS has been identified. Therefore, no further consideration was given at this time. Work could be pursued at a future date under GLRI or Corps Continuing Authorities Program.
BC – 11	Bacteria source assessment and control • Need strategic source investigations and source control • Saginaw Bay Coastal Initiative Combined Sewage Overflow Workgroup reviewed the data from CSO discharges and have ruled out CSOs as major sources of bacteria	Bay County Environmental Affairs and Community Development Dept.	None	Saginaw River/Bay watershed	Nearshore health and nonpoint source pollution	Yes	EPA – GLRI

Project #*	Project/Study Opportunities	Likely Partner(s)	Applicability to Corps' Mission Areas	Within an AOC?	Support GRLI Focus Areas?	Stakeholder Support?	Applicable Authority/Program
BC – 12	Restore Saginaw Bay public access • Need funding to reestablish the Wenona Park bayfront park and public promenade with a bayfront restaurant close to the Bay City urban area • Need funding to help develop the limited public access sites and to create additional sites	Bay County Environmental Affairs and Community Development Dept.	None	Saginaw River/Bay watershed	Not directly	Yes	Bay County HUD programs
BC - 13	General Bay County Opportunities • Phosphorus loads from Huron and Tuscola Counties that enter Saginaw Bay • Mercury from coal ash discharged from coal-fired plants where Saginaw River enters the bay • Land application of fertilizers/sludge • Reestablish road end access to Saginaw Bay at the end of State Road	Various	None	Tributaries to Saginaw River/Bay AOC	Nearshore health and nonpoint source pollution Habitat restoration	Yes	EPA – GLRI
PA-3	*E. coli* source management • More livestock than people in the "thumb" • Septic problems too • Flows from Bird Creek to bay • Closes Lighthouse Beach • Need management options • Unified septic • Drain tile weirs	Health departments Drain Commissioner	None	Tributary to Saginaw River/Bay AOC	Nearshore health and nonpoint source pollution Habitat restoration	Yes	EPA – GLRI
PS-2	Agricultural weirs • Installation of weirs in agricultural areas to retain moisture and reduce pollutants (nitrogen and *E. coli*)	Farm Bureau Conservation District NRCS	None	No	Nearshore health and nonpoint source pollution Habitat restoration	Yes	EPA – GLRI NRCS programs
TS-1	Lexington Heights dune preservation	Conservation District NRCS	None	No	Habitat restoration	Yes	EPA - GLRI

Project #*	Project/Study Opportunities	Likely Partner(s)	Applicability to Corps' Mission Areas	Within an AOC?	Support GRLI Focus Areas?	Stakeholder Support?	Applicable Authority/Program
TS-3	Potable water (Tuscola County) study • The identified area does not have potable water available to its residents. The problem is elevated levels of lead and arsenic. • The source(s) of the problem are unknown. A study to identify the sources needs to be conducted.	Tuscola County Health Department	None	Saginaw River/Bay watershed	Not directly	Yes	NRCS rural water supply programs EPA drinking water program
TS-4	BUI delisting criteria – more specific targets need to be developed	PACs	None	Applicable to St. Marys and Saginaw River/Bay AOCs	All GLRI focus areas	Yes	EPA – GLRI
TS-5	Invasive species monitoring for fish passage structure on Cass River, Frankenmuth • Concerns that fish ramp might also allow invasive species to migrate upstream in addition to desirable fish species • Lamprey are of particular concern • Need for a monitoring program	Great Lakes Fisheries Commission	None	Tributary to Saginaw River/Bay AOC	Invasive species		EPA – GLRI
TS –9	Muck and phragmites management and removal demonstration project • Conduct demonstration projects using Truxor vehicle	MDEQ	None	Applicable to St. Marys and Saginaw River/Bay AOCs	Invasive species Nearshore health and nonpoint source pollution		EPA – GLRI

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5.8 Preliminary Plans

Preliminary plans will be composed of one or more management measures for each of the twelve (12) Tier 1 project opportunities (presented in Table 5) that would address specific water resource problems in the WLHB study area and survived the initial screening process for detailed feasibility level investigations. The study team conducted a preliminary evaluation of each project opportunity with respect to the following considerations: (1) the nature and extent of the water resource problem being addressed; (2) the significant resources likely to benefit from a potential project; (3) probable management measures to be considered during feasibility level studies; (4) potential benefits to significant resources; and (5) the likelihood that a cost-effective plan can be developed. This preliminary evaluation for each potential project is reflected in the water resource problem/opportunity summaries in Appendix C.

5.9 Conclusions from the Preliminary Screening

The preliminary screening indicates that potential studies and projects identified in Tier 1 have high potential for implementation. Of the 12 Tier1 study/project opportunities identified in the large and diverse WLHB study area, nine are for ecosystem restoration, one is for flood risk management, and two address opportunities for ecosystem restoration combined either with flood risk management or storm risk management/coastal erosion. All of these are directly relevant and applicable to Corps authorities and capabilities. The potential magnitude and types of benefits from the proposed actions would support and be directly consistent with the priority focus areas of the GLRI. In addition, six of the study/project opportunities lie in or are on tributaries to the St. Marys River AOC or Saginaw River/Bay AOC. These opportunities offer potential to support delisting of pertinent BUIs in those AOCs. For the ecosystem restoration opportunities, the environmental effects are expected to beneficial, with only minor temporary adverse effects during construction and no separable mitigation requirements. For the flood (or coastal storm) risk management opportunities, adverse effects would be expected to be minor overall, with minimal or no separable mitigation requirements. Based on this information, alternatives to address planning goals and objectives appear viable.

All the Tier 1 projects, with one exception discussed below, are expected to fall within the scope of one of the Corps' Continuing Authorities, as identified in Table 5. As presented in detail in Section 10, feasibility study cost estimates for these Continuing Authority projects are expected to range between $200,000 and $600,000. Based on limited information at this point, the total Federal project implementation costs for each project may be expected to range from about $600,000 up to a maximum of about $7.0 million.

A proposed General Investigations study was identified for the coastline and coastal watersheds in eastern Sanilac County, Michigan, and it has been discussed in detail with the staffs of the Michigan DEQ, Michigan DOT, Sanilac County Drain Commission, Sanilac County Road Commission, and Sanilac County Conservation District. There are significant erosion problems along the coast of Lake Huron in the project area. Additionally, these tributary streams are experiencing significant erosion and sedimentation issues as they near the coast. These issues pose a major threat to Michigan Highway 25 and the associated infrastructure along the highway. Erosion is causing loss of fish and wildlife habitat and is resulting in heavy sediment deposition into Lake Huron. These parties have discussed the need for a holistic evaluation of the water resource problems in this coastal area are considering the various state/local needs with respect to this potential Corps study. They are considering whether a "traditional" feasibility study leading to congressional authorization of a project for construction or watershed assessment in accordance with Section 729 of WRDA 1986 (not leading to construction of a project) would better meet their needs. A watershed assessment for this area would likely cost in the range of $400,000 to $800,000. A "traditional" feasibility study would likely cost in the range of $1.5 to $2.5 million, depending on the scope of the study that would be negotiated with the NFS. The potential

NFS has not been determined among the participating parties but is most likely to be Michigan DEQ or Michigan DOT.

A proposed General Investigations study was identified for Kawkawlin River watershed in Bay, Midland, and Gladwin Counties, Michigan. The watershed has experience excessive erosion and sedimentation associated with agriculture and urban development that have led to highly degraded wetland and aquatic habitat conditions, decline of important fisheries, and some backwater flooding problems under high flow conditions. Discussions concerning the water resource problems in the watershed have been initiated local agencies and stakeholders in the project area regarding pursuit of this study and non-Federal sponsorship. These parties recognize the need to build on a recently completed Kawkawlin River watershed management plan to investigate and determine specific cost-effective measures necessary to achieve restoration objectives in the watershed. Pending further discussions, it is not clear whether a "traditional" feasibility study leading to congressional authorization of a project for construction or watershed assessment in accordance with Section 729 of WRDA 1986 (not leading to construction of a Federal project) would better meet their needs. A watershed assessment for this area would likely cost in the range of $400,000 to $800,000. A "traditional" feasibility study would likely cost in the range of $1.5 to $2.5 million, depending on the scope of the study that would be negotiated with the NFS. The potential NFS has not been determined at this point.

5.10 Establishment of a Plan Formulation Rationale

The conclusions from the preliminary screening form the basis for the next iteration of the planning steps that will be conducted in the feasibility phase. The likely array of alternatives that will be considered in the next iteration include measures typically considered for stream and coastal aquatic ecosystem restoration projects performed by the Corps (and others) in similar conditions across the region, including no Federal action and nonstructural alternative(s). Future screening and reformulation will be based on the following factors and considerations:

- Application of principles and guidelines and Corps planning and policy guidance
- Resource agency and public input
- Engineering feasibility
- Environmental acceptability
- Cost effectiveness/incremental cost analysis of habitat benefits (for ecosystem restoration features)
- Benefit/cost analysis (for flood risk management features)

6. Federal Interest

Ecosystem restoration and flood (storm) risk management represent high priority mission areas (or project purposes) in the Corps' water resources program and, consequently, have high budget priority. Additionally, the proposed studies/projects will address several of the focus areas in the GLRI action plan, and eight sites are located such that restoration would be expected to contribute to efforts to delist pertinent BUIs in the St. Marys River AOC or Saginaw River/Bay AOC.

Federal Interest is established once it has been determined that the project will contribute to NED or, in the case of ecosystem restoration, NER (or the net increase of habitat value). For each of the twelve (12) Tier 1 project opportunities presented in Table 5, the study team considered the preliminary evaluation of plans discussed in Section 5.8 as well as the general level of stakeholder support for the project and the availability of an interested non-Federal sponsor. This preliminary evaluation for each potential project is reflected in the water resource problem/opportunity summaries in Appendix C.

It appears that ten of these twelve project opportunities could be initiated and pursued separately under the Corps Continuing Authority Program and two watershed planning opportunities could be pursued under the General Investigations program. Based on the information developed during this 905(b) study, there is a strong Federal interest in conducting the feasibility investigations for all twelve of these project opportunities in the WLHB study area. Based on the preliminary review of the project opportunities and potential alternatives, there appear to be potential solutions that would be consistent with Army policies, costs, benefits, and environmental impacts.

7. Preliminary Financial Analysis

Each prospective NFS for Tier 1 projects identified in Table 5 will be required to provide 50 percent of the cost of the feasibility phase. This can be provided as a combination of cash and in-kind services. For each proposed project in Table 5 that falls within the scope of the Continuing Authorities Program, the NFS will provide 50 percent of the feasibility phase study cost after the first $100,000 expended (Federal cost). The NFSs are also aware of the cost-sharing requirements for potential project implementation. A letter of interest (LOI) has been requested from each prospective NFS to indicate willingness to pursue the feasibility study and to share in its cost, as well as an understanding of the cost sharing that would be required for project construction. Letters received to date for the Tier 1 projects are included in Appendix C.

8. Assumptions and Exceptions

8.1 Feasibility Phase Assumptions

A number of assumptions have been used that will guide development of the PMP and schedule for feasibility investigations. The following critical assumptions will guide the feasibility investigations:

- Feasibility studies for ecosystem restoration and flood risk management will be pursued in the WLHB watershed.
- The feasibility investigations will recognize and consider the effects of other ongoing and likely future activities under the GLRI and other related programs and activities. To the extent practicable, these feasibility investigations will be conducted in a manner that complements and leverages the environmental benefits of the ongoing and any likely future efforts.
- Without Federal action in areas identified for feasibility investigations in the 905(b) study, ecosystem health and flooding conditions in the affected areas of WLHB are likely to continue to deteriorate over time. State and local interests are unlikely to pursue these potential projects identified in this study apart from Federal participation. These deteriorating conditions are likely to be offset to some degree by implementation of other environmental protection and restoration projects in the watershed under the GLRI. The “without project condition” for these feasibility investigations will consider the implementation of the other GLRI projects.
- Feasibility studies will be conducted in accordance with the Principles and Guidelines, Corps of Engineers regulations, and all applicable Federal laws and executive orders.
- For each of the identified studies, the decision document will be the recommendation of the Feasibility Report (also called the Detailed Project Report) supported by the appropriate National Environmental Policy Act documentation (Environmental Assessment/Finding of No Significant Impact or Environmental Impact Statement/Record of Decision), as applicable.
- Appropriate cost effectiveness/incremental costs analysis (for ecosystem restoration) and a benefit-cost analysis (for flood damage reduction) will be developed in accordance with the requirements of ER 1105-2-100.

- All models used in the development of feasibility studies will be subject to model certification by the pertinent Corps Planning Center of Expertise.
- For feasibility phase investigations, an MCACES (MII) cost estimate will be performed on the project features that comprise the selected plan. The cost of preliminary alternatives for ecosystem restoration and flood risk management measures will be developed at a lesser level of detail with comparative cost estimating techniques.
- Sustained Federal appropriations to conduct the feasibility investigations, in accordance with agreed on scopes and schedules with the NFS, are anticipated. Schedules for feasibility investigations will assume uninterrupted funding (both Federal and non-Federal) for the period of the study.

8.2 Risk and Uncertainty Considerations

Consideration of risk and uncertainty is a vitally important element of effective water resources planning. Situations of *risk* are conventionally defined as those in which the potential outcomes can be described in reasonably well-known probability distributions. Risk can generally be managed or minimized by improving the quantity and quality of data and refining the analytical tools and models. In situations of *uncertainty*, potential outcomes cannot be described in objectively known probability distributions. Some future demographic, economic, hydrologic, meteorological, and ecological events are often unpredictable because they are subject to random influences. Absent a historical database to describe the probability distribution objectively, these random influences can be described subjectively, using best available insight and judgment.

Risk and uncertainty considerations for follow-on feasibility level investigations conducted as a result of this reconnaissance study will include: (1) those that influence the timing, funding, and scoping of any actual investigations that may be conducted; and (2) those directly associated with the technical analyses conducted during the feasibility phase that capture and quantify the degree of reliability of the estimated benefits and costs as well as the effectiveness of alternative plans. Those considerations include:

- While a letter of interest or intent may be provided by a potential NFS during the 905(b) study, there is a residual degree of uncertainty associated with the process of negotiating and reaching agreement with the NFS(s) on scope and cost estimates for feasibility level investigations and successfully completing a FCSA.
- Availability of Federal and non-Federal funds to initiate the feasibility study (or studies) and to sustain the ongoing investigations in subsequent years is uncertain. Upon initiation, the likelihood of continued funding during out years, while not certain, would be much higher.
- Some prospective NFSs in the WLHB area are seeking financial resources through the GLRI and other sources to address their water resource problems independently, while concurrently exploring the potential for cost-shared feasibility level investigations with the Corps. The successful outcome of ongoing local efforts to secure grants or funding from other sources to address problems/opportunities identified during the Corps' reconnaissance study may supersede or significantly influence or change future Corps feasibility study/project plans.
- All feasibility level investigations conducted as a result of the reconnaissance study will incorporate risk-based analytical methods, as prescribed in ER 1105-2-100 and other supplemental guidance documents, to characterize the different degrees of risk and uncertainty to the extent possible and to describe them clearly so that decision makers have the best available information on which to base their decision.

8.3 Policy Exceptions and Streamlining Initiatives

The feasibility investigations will be conducted in accordance with the principles and guidelines and the Corps of Engineers regulations. No potential exceptions to established guidance have been identified that would appreciably streamline the feasibility study process and maintain the same standard of quality for the feasibility investigations. Portions of the WLHB study area have been the subject of extensive studies and evaluations by Federal, state, and local agencies, as well as nongovernment organizations and academic interests. This is particularly true over the last 20 years, as greater focus on the environmental challenges in the Great Lakes area has emerged. During feasibility investigations, the study team will make maximum use of existing and relevant data and analyses and will leverage the knowledge and experience of technical experts in other organizations to reduce overall study costs, eliminate duplication of effort, and condense the study schedule to the extent practicable. Wherever possible, the study team will also use ecological and other models that have already been reviewed and certified for use by the appropriate Corps Planning Center of Expertise to further streamline the technical work.

9. Feasibility Phase Milestones

The schedule milestones to complete the feasibility studies for Tier 1 projects detailed in this report that are pursued under the Continuing Authorities Program will be fully developed with the completion of a PMP. In that process, the study schedule will be negotiated with the NFS. A typical schedule for a Continuing Authority level study (from initiation to Division approval) would be expected to last about 17 months. A typical schedule, presented by major study milestones, is depicted in Table 8. The actual schedule for each study would vary based on the overall scope, complexity, and range of alternatives associated with the problem or opportunity being addressed.

Table 8. Typical Feasibility Study Milestones (Continuing Authority Study)

Milestone	Description	Duration (mo)	Cumulative (mo)
Milestone F1	Initiate Study	0	0
Milestone F2	Public Workshop/Scoping	2	2
Milestone F3	Feasibility Scoping Meeting	2	4
Milestone F4	Alternative Review Conference	3	7
Milestone F4A	Alternative Formulation Briefing	3	10
Milestone F5	Draft Feasibility Report	2	12
Milestone F6	Final Public Meeting	1	13
Milestone F7	Feasibility Review Conference	1	14
Milestone F8	Final Report to Division	2	16
Milestone F9	Division Approval of Report	1	17
-	Chief of Engineer's Report	NA*	NA*
-	Project Authorization	NA*	NA*

* Not Applicable – The Chief of Engineer's Report and Project Authorization (by Congress) milestones are not applicable to Continuing Authority projects. These milestones apply to GI studies only.

As discussed in Section 5.9, one potential General Investigations study for the coastline and coastal watersheds in eastern Sanilac County, Michigan, has been considered. A study of severe erosion and sedimentation issues along the coast line and in the coastal tributaries appears to be in the Federal interest.

A consortium of non-Federal stakeholders (including Michigan DEQ, Michigan DOT, Sanilac County Drain Commission, Sanilac County Road Commission, and Sanilac County Conservation District) support a holistic evaluation of the water resource related problems in the area. However, they are not yet

clear on the approach that would best address their needs, nor has a willing NFS been identified to date. Development of a watershed plan for this area in accordance with Section 729 of WRDA 1986 (not leading to construction of a project) would likely take 18 to 30 months to complete. A "traditional" feasibility study leading to congressional authorization of a project for construction would likely take 36 to 48 months to complete, including Washington level review, Chief of Engineer's Report, Office of Management and Budget review, and Congressional authorization in a WRDA. The actual study schedule would be negotiated with the NFS.

10. Feasibility Phase Cost Estimate

The costs to complete the feasibility studies for Tier 1 projects detailed in this report that are pursued under the Continuing Authorities Program will be fully developed with the completion of a PMP. In that process, study costs will be negotiated with the NFS. The costs to complete each of these feasibility studies are expected to fall between $200,000 and $600,000, depending on the scope of work developed for each study. An expected range of costs for each major study element is presented in Table 9.

The cost of the potential General Investigations study of severe erosion and sedimentation issues along the coast line and in the coastal tributaries of eastern Sanilac County would vary depending on the approach to the study that the NFS (TBD) would be willing to pursue. A watershed assessment for this area in accordance with Section 729 of WRDA 1986 (not leading to construction of a project) would likely cost in the range of $400,000 to $800,000. A "traditional" feasibility study leading to congressional authorization of a project for construction would likely cost in the range of $1.5 to $2.5 million, depending on the scope of the study that would be negotiated with the NFS. Discussions with the Michigan DEQ, Michigan DOT, and other parties regarding this potential study are ongoing.

Table 9. Range of Feasibility Study Costs for a Typical Continuing Authority Study in WLHB

WBS#	Description	Range of Costs ($ 000s)
JAA00	Feas - Surveys and Mapping except Real Estate	$10 – 20
JAB00	Feas - Hydrology and Hydraulics Studies/Report	$10 – 40
JAC00	Feas - Geotechnical Studies/Report	$10 – 25
JAE00	Feas - Engineering and Design Analysis Report	$15 – 50
JB000	Feas - Socioeconomic Studies	$5 – 15
JC000	Feas - Real Estate Analysis/Report	$10 – 30
JD000	Feas - Environmental Studies/Report (Except USFWS)	$10 – 50
JE000	Feas - Fish and Wildlife Coordination Act Report	$5 – 15
JF000	Feas - HTRW Studies/Report	$5 – 25
JG000	Feas - Cultural Resources Studies/Report	$5 – 15
JH000	Feas - Cost Estimates	$10 – 20
JI000	Feas - Public Involvement Documents	$10 – 20
JJ000	Feas - Plan Formulation and Evaluation	$25 – 80
JL000	Feas - Final Report Documentation	$5 – 15
JLD00	Feas - Agency Technical Review Documents	$10 – 25
JM000	Feas - Washington Level Report Approval (Review Support) / Independent External Peer Review (IEPR)	NA*
JPA00	Project Management and Budget Documents	$5 – 20
JPB00	Supervision and Administration	$10 – 30
JPC00	Contingencies	$10 – 30

WBS#	Description	Range of Costs ($ 000s)
L0000	PMP	$20 – 55
Q0000	PED Cost Sharing Agreement	$10 – 20
Total		$200 – 600

* Not Applicable - Washington Level Review support and IEPR are not normally required for CAP level studies. For traditional GI studies, these costs would be expected to be in the range of about $50,000.

11. Views of Other Resource Agencies

During the course of the 905(b) study, numerous informal contacts were made with knowledgeable Federal and state resource agency personnel in the study area concerning their views of water resource problems and opportunities, as well as potential solutions. In addition, the study team conducted nine stakeholder meetings in July and August 2011 (one regional meeting focused on Federal, state, and regional officials, large nonprofit organizations, and tribal representatives, and eight were localized community meetings with local officials, community groups and associations, business and agricultural interests, and interested individuals). While the various interests represented in these meetings and through other coordination efforts might hold differing views in regard to the significance of the identified problems and opportunities and their relative priorities for action, the proposed studies and projects in Tiers 1 and 2 generally received broad support for further consideration. Agency and public involvement efforts for this study are described in detail in Section 5.2, with substantial supporting documentation included in Appendix B.

12. Potential Issues Affecting Initiation of Feasibility Phase

Continuation of a study into cost-shared feasibility phase investigations is contingent on an executed FCSA. Failure to achieve an executed FCSA within 18 months of the approval date of the Section 905(b) study will result in termination of the studies. The schedule for signing the FCSA will be determined with each NFS. Based on the schedule of milestones in paragraph 9, completion of a feasibility report under General Investigations would be in the range of 36 to 48 months from study initiation, including potential congressional authorization in a future WRDA.

Feasibility study milestones for all CAP studies that have been identified during this 905(b) study would be determined on a case-by-case basis.

There are no known issues at this time that are likely to impact the initiation of feasibility investigations for WLHB. However, there are a number of factors that could emerge to disrupt or impede the initiation and subsequent progress/completion of feasibility investigations. They could include the following:

- Inconsistent or interrupted Federal funding levels that would likely result in loss of NFS and public support.
- Inconsistent or interrupted NFS funding levels could impact the continuity of Federal appropriations to the project.
- Feasibility investigations in the WLHB are likely to involve representatives of the public, resource agencies, and even the NFS, who have not worked extensively with the Corps and may not understand the Corps' planning process and the specific authorities and mission areas of the Corps. Ongoing communication, education, and outreach in these areas help keep the process on track and minimize confusion and frustration.

- NFSs could encounter limitations to their basic legal or operational authorities in regard to implementing certain project features or acquiring certain real estate interests that could be recommended as a result of feasibility investigations.
- Cross-jurisdictional issues at the local government level could create potential issues for the NFS and study costs and schedules if the pertinent local government entities are not continuously involved in the study.

Some of these issues may be unavoidable during the study, but they can be effectively managed by maintaining a highly collaborative feasibility planning environment.

13. Recommendations

The results of this investigation demonstrate that there is Federal Interest in ecosystem and fishery restoration and flood risk management within the study area of the WLHB.

I recommend that the WLHB 905(b) study proceed into feasibility phase investigations (beginning with a formal Determination of Federal Interest) under the Continuing Authorities Program for the recommended studies and locations cited below (and presented in more detail in Table 5 and in Appendix C):

- Ashmun Creek and Bay Ecosystem Restoration, Sault Ste. Marie, Michigan (Project # SSM-5)
- Thunder Bay River Ecosystem Restoration, Alpena, Alcona, Presque Isle, and Montmorency Counties, Michigan (Project # Che-2) *
- Trout River Dam Rebuild/Replacement, Presque Isle County, Michigan (Project # Che-5) *
- Alpena Township Flooding, Alpena, Michigan (Project # Alp-6) *
- Rifle River Watershed Restoration, Arenac and Ogemaw Counties, Michigan (Project # Taw-6) *
- Saganing River/Creek Watershed Ecosystem Restoration, Arenac County, Michigan (Project # BC-1)
- Downtown Caseville Ecosystem Restoration, Caseville, Michigan (Project # PA-4) *
- Lexington Harbor Environmental Restoration, Lexington, Michigan (Project # PS-1)*
- Doe Creek Watershed Ecosystem Restoration, St. Clair County, Michigan (Project # PS-3) *
- Spaulding Drain (Ambrose Road) Ecosystem Restoration, Saginaw County, Michigan (Project # TS-8)

Prospective NFSs for seven of the studies identified above (as indicated by *) have provided LOIs, indicating their desire to pursue the studies and their understanding of the sponsorship requirements. LOIs for the other studies have been requested and are pending. In addition, letters of support from key stakeholders have been provided for some of the potential studies. Those letters received to date are included in Appendix C.

In addition, I recommend that ongoing discussions continue with the Michigan DEQ, Michigan DOT, and other potential partners to determine the appropriate scope of studies and confirm a NFS for potential feasibility level investigations to address severe erosion and sedimentation issues along the coast line and in the coastal tributaries in eastern Sanilac County, Michigan, under the General Investigations program. A summary of the proposed study, pertinent issues, potential partners, and the status of coordination efforts is included in Appendix C. I further recommend that discussions continue with the Michigan DEQ, the Bay County Drain Commissioner, and other potential partners to determine the appropriate scope of studies and confirm a NFS for potential feasibility level investigations to address ecosystem restoration

and flood risk management opportunities in the Kawkawlin River watershed in Bay, Midland, and Gladwin Counties, Michigan under the General Investigations program. A summary of the proposed study, pertinent issues, potential partners, and the status of coordination efforts is included in Appendix C.

During the course of this 905(b) study, a variety of water resource related needs were identified from the existing literature and agency and stakeholder input that could effectively be addressed by one or more authorities under which the Corps may provide various types of technical assistance to state and local governments, as described in Section 5.6.2.2. Specific opportunities in the WLHB are summarized in Table 6 of the report. These opportunities can and will be pursued independently of this report in accordance with the specific requirements of the applicable program(s), availability of Federal funds, and availability of a NFS (as applicable).

These recommendations are based upon the best information available during the report formulation process. They reflect program and budgetary considerations but do not necessarily represent the final program and budgetary priorities of the Administration.

22 MAY 12
Date

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List of Abbreviations and Acronyms

AOC	area of concern
BUI	beneficial use impairment
CAP	Continuing Authorities Program
CDF	confined disposal facility
CSO	combined sewer overflow
DMMP	dredged material management plan
EC	Environment Canada
EPA	(United States) Environmental Protection Agency
ER	engineer regulation
ERA	Estuary Restoration Act (of 2000, as amended)
FCSA	feasibility cost share agreement
FPMS	Floodplain Management Services
FY	fiscal year
GI	general investigations
GIS	geographic information system
GLFC	Great Lakes Fisheries Commission
GLFER	Great Lakes Fishery and Ecosystem Restoration (Program)
GLRI	Great Lakes Restoration Initiative
IEPR	independent external peer review
IJC	International Joint Commission
LOI	letter of interest
LRD	Great Lakes and Ohio River Division
MDEQ	Michigan Department of Environmental Quality
MDNR	Michigan Department of Natural Resources
MDOT	Michigan Department of Transportation
NED	National Economic Development
NEMCOG	Northeast Michigan Council of Governments
NER	National Ecosystem Restoration
NFS	non-Federal sponsor
NRCS	Natural Resource Conservation Service
O&M	operations and maintenance
PMP	project management plan
RAP	remedial action plan
RHA	River and Harbor Act
SOLEC	State of the Lakes Ecosystem Conference
SWS	Sweetwater Sea
SNWR	Shiawassee National Wildlife Refuge
TNC	The Nature Conservancy
USACE (or Corps)	United States Army Corps of Engineers
USCG	United States Coast Guard
USFWS	United States Fish and Wildlife Service
WLHB	Western Lake Huron Basin
WRDA	Water Resources Development Act

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Western Lake Huron Basin (WLHB)
Watershed Reconnaissance Study
Technical Stakeholder Meeting

Wednesday, July 27, 2011 • 9:00 am – 12:00 pm

Doubletree Hotel • Bay City, Michigan

Hosted by the U.S. Army Corps of Engineers Detroit District

Reference Material

The following is a list of reports, conference proceedings, and other reference material that Tetra Tech has collected to date to support the WLHB watershed reconnaissance study. The focus of the literature search was two-fold: 1) to collect background material that frames future activities intended to preserve and restore the WLHB and 2) to collect documents that contain projects and other action items aimed at the preserving or restoring specific areas in the WLHB. While this list contains a significant number of documents related to the WLHB, Tetra Tech recognizes that Technical Stakeholders will likely have other materials to contribute to this list.

Background Documents

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Help Lake Huron and Bring Funding to Your Community: Western Lake Huron Basin (WLHB) Community Meetings

The U.S. Army Corps of Engineers (USACE) Detroit District is leading a watershed reconnaissance study for the WLHB and we need your input and local knowledge. We know what the past and current planning documents say about the problems around Lake Huron, but we want to hear from local officials, community organizations, and residents. What are the problems you see around Lake Huron and what solutions will work in your community? If you can tell us about the problems and opportunities, we can help find the funding to make the solutions happen.

WLHB Community Meeting Schedule

Please join the USACE and other concerned stakeholders at a community meeting in your area.

Wednesday, August 17, 2011

9:00 am – 11:00 am: Lake Superior State University Cisler Center, Anchor Room, 650 W. Easterday Avenue, Sault Ste. Marie, MI 49783 *(focus: Chippewa and Mackinaw Counties)*

2:30 pm – 4:30 pm: Cheboygan Public Library, 100 S. Bailey Street, Cheboygan, MI 49721 *(focus: Cheboygan and Presque Isle Counties)*

Thursday, August 18, 2011

9:00 am – 11:00 am: Alpena Community College, Donald Newport Center Building, Room 104, 665 Johnson Street, Alpena, MI 49707 *(focus: Alpena and Alcona Counties)*

2:30 pm – 4:30 pm: East Tawas Community Center, Multi-Purpose Room, 760 Newman Street, East Tawas, MI 48730 *(focus Arenac and Iosco Counties)*

Tuesday, August 23, 2011

9:00 am – 11:00 am: Alice and Jack Wirt Public Library, Community Meeting Room, 500 Center Avenue, Bay City, MI 48708 *(focus: Bay County)*

2:30 pm – 4:30 pm: Grace A. Dow Memorial Library, Lounge, 1710 W. Street Andrews, Midland, MI 48640 *(focus: Midland County)*

Wednesday, August 24, 2011

9:00 am – 11:00 am: Port Austin Visitor's Center, 17 W. State Street, Port Austin, MI 48467 *(focus Huron and Tuscola Counties)*

2:30 pm – 4:30 pm: Bark Shanty Community Center, 20 N. Ridge Street, Port Sanilac, MI 48469 *(focus Sanilac and St. Clair Counties)*

Community Meeting Agenda

- What Is a Watershed Reconnaissance Study and What Does It Mean for the WLHB?
- Existing Plans and Projects in the WLHB
- Interactive Session: Identifying WLHB Problems, Projects, and Partners in Your County
- Project Schedule and Next Steps

If you have questions about these meetings, please contact Kellie DuBay, the WLHB project outreach specialist, at kellie.dubay@tetratech.com or by phone at 216-861-2950, ext. 104.

US Army Corps of Engineers®

Photos courtesy USEPA/GLNPO, NOAA/OER, and USGS.

What Is a Watershed Reconnaissance Study?

Authorized by Section 102 of the River and Harbor Act of 1966, the WLHB watershed reconnaissance study is the first phase of a larger USACE planning process. It is intended to identify impairment areas and determine if there is both federal interest and local support for conducting more detailed feasibility studies in the future. Reconnaissance studies are 100 percent federally funded. Feasibility studies are cost-shared efforts that use 50 percent federal funding and 50 percent non-federal funding, with the provision that the non-federal share may be a combination of funds and credit for eligible in-kind services necessary to complete the study. Through the watershed reconnaissance study process, USACE hopes to identify interested non-federal cost-share partners in the WLHB.

Getting to Know the Western Lake Huron Basin (WLHB) Project Area

- Includes the 14 coastal counties in Michigan
- Approximately 8,700 square miles
- Two Areas of Concern (AOCs): the Saginaw River/Saginaw Bay and the St. Mary's River
- Problems include polluted stormwater runoff, combined sewer overflows, habitat loss, natural drainage modifications

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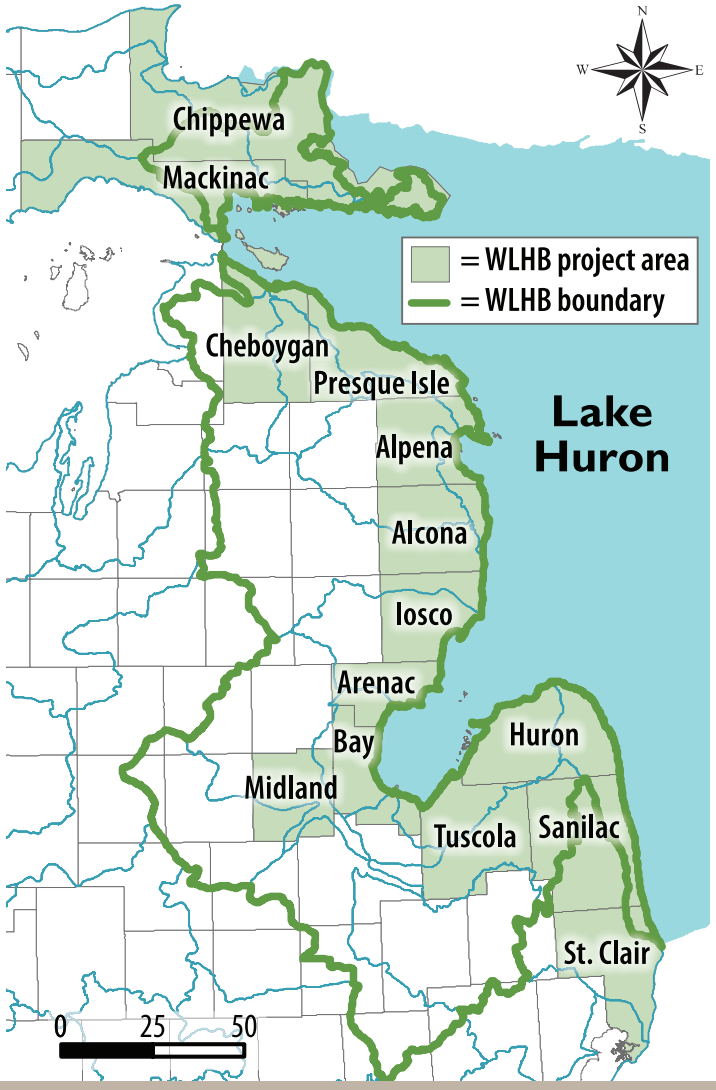

Finding and Funding New Opportunities to Restore the Western Lake Huron Basin

Getting to Know the Western Lake Huron Basin (WLHB)

- Includes 22 counties and 20 watersheds in Michigan (the 15 coastal counties are the focus of the Corps' WLHB watershed reconnaissance study)
- Drainage basin of approximately 8,700 square miles
- Two Areas of Concern (AOCs): the Saginaw River/Saginaw Bay and the St. Marys River
- Problems include polluted stormwater runoff, combined sewer overflows, habitat loss, natural drainage modifications

The Western Lake Huron Basin (WLHB) is a scenic portion of eastern Michigan that supports agriculture, manufacturing, tourism, outdoor recreation, and provides habitat for wildlife. While the historical industrial and municipal sources of pollution that caused environmental problems either no longer exist or have been effectively addressed, other factors continue to threaten the health of the WLHB—polluted stormwater runoff, combined sewer overflows, habitat loss and modifications to natural drainage. Stakeholders throughout the WLHB are developing plans and conducting studies to address these remaining challenges. The U.S. Army Corps of Engineers (Corps) Detroit District is leading a watershed reconnaissance study for the WLHB that will compile and review past and ongoing planning efforts and work with WLHB stakeholders to identify potential solutions.

What Is a Watershed Reconnaissance Study?

The Western Lake Huron watershed reconnaissance study is authorized by Section 102 of the River and Harbor Act of 1966. A watershed reconnaissance study is the first phase of a larger Corps planning process. It is intended to help the Corps identify impairment areas and determine if there is both federal interest and local support for conducting more detailed feasibility studies in the future. Reconnaissance studies are 100 percent federally funded. Feasibility studies are cost-shared efforts that use 50 percent federal funding and 50 percent non-federal funding, with the provision that the non-federal share may be a combination of funds and credit for eligible in-kind services necessary to complete the study. Through the watershed reconnaissance study process, the Corps hopes to identify interested non-federal cost-share partners in the WLHB.

The Corps Detroit District has contracted Tetra Tech to support the WLHB watershed

US Army Corps of Engineers®

Photos courtesy USEPA/GLNPO, NOAA/OER, and USGS.

Project Website: www.lre.usace.army.mil/ *(select Western Lake Huron Basin Reconnaissance Study)*

reconnaissance study. This support includes compiling and reviewing past and ongoing studies and reports relevant to the WLHB, including two Lake Huron Areas of Concern—the Saginaw Bay and St. Marys River. This information, in addition to watershed stakeholder input, will serve as the foundation for the development of a watershed reconnaissance study report.

How Can Stakeholders Participate?

Stakeholder participation is essential to the success of the WLHB watershed reconnaissance study process. Throughout the course of the project, the Corps Detroit District and Tetra Tech are planning nine stakeholder meetings throughout the WHLB. The first of these nine meetings will focus on Technical Stakeholders, including federal, state, tribal, and academia, took place in July 2011. The remaining eight stakeholder meetings, focusing on obtaining input from local agencies, organizations, and residents, are scheduled for August 2011.

Wednesday, August 17, 2011

9:00 am – 11:00 am: Lake Superior State University Cisler Center, Anchor Room *(**focus: Chippewa and Mackinac Counties**)*

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2:30 pm – 4:30 pm: Bark Shanty Community Center *(**focus: Sanilac and St. Clair Counties**)*

If you have questions about these meetings, please contact Kellie DuBay, the WLHB project outreach specialist, at kellie.dubay@tetratech.com or by phone at 216-861-2950, ext. 104.

What's In a Section 905(b) Watershed Reconnaissance Report?

- Study Authority/ Purpose
- Project Location/ Congressional District
- Prior Studies & Reports/Existing Projects
- Plan Formulation
- Federal Interest
- Preliminary Financial Analysis
- Summary of Feasibility Assumptions
- Feasibility Milestones
- Feasibility Costs
- Recommendations
- Issues Affecting Feasibility Phase
- Views of Other Agencies

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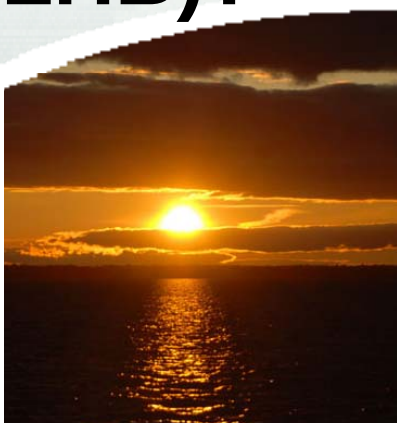
What is a Watershed Reconnaissance Study and What Does it Mean to the Western Lake Huron Basin (WLHB)?

Community Meetings

August 2011



US Army Corps of Engineers

BUILDING STRONG®

What We'll Cover

- Overview of the WLHB watershed reconnaissance study
  - Team
  - Geographic scope
  - Purpose
  - Study tasks and report contents
- How the process works
- Example projects and outcomes

Western Lake Huron Basin Project Team

US Army Corps of Engineers – Detroit District

Tetra Tech (Public Outreach and Technical Support)

Western Lake Huron Basin Stakeholders

WLHB Project Area

- 13 coastal counties
- 2 inland counties
- Saginaw River/Bay AOC
- St. Marys River AOC
- Heavily forested
- Sparsely populated

WLHB Watershed Reconnaissance Study Purpose

- Create a “wish list” of projects that fall into organizing framework

- Determine interest in proceeding to Feasibility Studies with eligible non-federal cost-share partners

WLHB Watershed Reconnaissance Study Outcomes

- Determine water resource problem(s)
- Define the Federal Interest (FI)
- Assess the level of interest and support from non-Federal entities – identify willing partners
- Prepare Project Management Plan (PMP) and Feasibility Cost Sharing Agreement (FCSA) if above is established

WLHB Watershed Reconnaissance Study Contents

- General identification of watershed problems, potential partners, proposed projects
- Identify opportunities for multiple benefits
- Outline tasks for feasibility study
- Estimated schedule of feasibility study

What the Corps Needs to Conduct the WLHB Study Follow-On Projects

- Authorization
- Appropriation
- Local participation that will lead to non-federal cost share partners for future feasibility studies

Corps Planning Process

Authorization

- Legislation that enables an agency to perform a specific task (i.e. provides permission)

- Continuing Authority Program that provides blanket authorization for certain types of projects

Authorization for WLHB Study

- Section 102 - 1966 River and Harbor Act

"Sec. 102 – The Secretary of the Army is hereby authorized and directed to cause (develop) surveys (studies) to be made at the following localities, and subject to all applicable provisions of Section 110 of the Rivers and Harbors Act of 1950:

> Great Lakes, particularly Lake Ontario and Lake Erie, in connection with water supply, pollution abatement, navigation, flood control, hydroelectric power, and relater water resources development and control."

Appropriation

- Legislation that directs the levels of funds available to an agency for a fiscal year

Appropriation for WLHB Study

- Great Lakes Restoration Initiative
  - ▶ through the U.S. Environmental Protection Agency
  - ▶ appropriations for fiscal year 2010 and 2011

Potential Non-Federal Cost Share Partners

- States
- Local governments
- Indian tribes
- Non-profit organizations (Sections 1135, 206, 204)

Non-Federal Sponsors Must Be Able To:

- Generate Revenue 
- Acquire Real Estate 
- Save and Hold the Government Harmless 
- Maintain project with 100% local funds 

BUILDING STRONG®

Cost-Sharing Considerations

- Project percentage break-outs can vary
  - 65 /35
  - 75/25

- Match can be both cash and in-kind services, but requires a 5 percent cash minimum

Potential Projects

- Navigation
- Flood Damage Reduction
- Ecosystem Restoration
- Shoreline or Streambank Protection
- Water Quality Enhancement
- Local Action Plans (i.e. Rain Barrels, Rain Gardens, Ordinance Changes, etc.)

Example Watershed Study Outcomes

The example projects listed below have been initiated because of Great Lakes Basin watershed studies:

- Blanchard River (Ohio) Watershed study for Flood Risk Management and Ecosystem Restoration.
- Lower Maumee Watershed study – Ecosystem and Flood Reduction.
- Low-head dam removals on Swan Creek in Toledo.
- Ottawa River Environmental Dredging Project.
- Removal of the Ballville Dam on the Sandusky River
- Modeling sources of non-point source pollution in Blanchard and Upper Auglaize watersheds.

Information

If you want to provide additional input regarding this study, please contact the USACE Project Manager at:

email: WesternLakeHuronBasin-PM@usace.army.mil

Additional Information and Community Meeting presentations can be found at the following web pages:

- USACE Detroit District Home Page:

http://www.lre.usace.army.mil/

- Western Lake Huron Basin Study Web Page:

http://www.lre.usace.army.mil/_kd/go.cfm?destination=Page&Pge_ID=2417


Questions ?

Western Lake Huron Basin (WLHB)
Watershed Reconnaissance Study
Alpena Community Meeting Summary

Thursday, August 18, 2011 • 9:00 am – 11:00 am

Summary of Stakeholder Identified Problems/Opportunities

1. Alpena Harbor
    a. Channel to harbor is contributing sediment and tannic water to the harbor
    b. Culverts are needed under the break wall in order to flush system

2. Sediment
    a. North-East Michigan Integrated Assessment documents sediment sources
    b. Huron Pines inventory

3. US 23 Heritage Route
    a. Focus on viewsheds
    b. Management plan lists priority projects (http://heritageroute.com/ManagementPlan/index.htm)

4. Small Dam Assessment
    a. Conducted by Huron Pines; work in progress
    b. Inventory only (no prioritization)

5. Starlight Beach – Beach closings
    a. Poor water quality due to *E.coli*, muck, sludge
    b. Stormwater from Alpena is an issue
    c. Illicit Discharge Detection and Elimination Program (IDDEP) has not been undertaken
    d. Need stormwater master plan

6. La Farge Plant (wood pulp)
    a. Mercury (although currently meeting EPA requirements)
    b. Silt affecting Bell River/Harbor
    c. CDK dust pile (problem area)
    d. Flooding

7. Need study that focuses on small Lake Huron tributaries in the NEMCOG planning area

8. Manage tributaries with karst features

a. Potentially expand Michigan Karst Conservancy Program which currently includes Thunder Bay Karst Preserve
b. Private land ownership issues could be obstacle

9. Lake Essau – Dolomite quarry (LeFarge)
    a. Is there a legal lake level?
    b. Side effect of mining is the lowering of the lake level
    c. LeFarge has agreed to capture and return water to lake but what about after the mine is abandoned (in 10 to 15 yrs).
    d. Lake Essau level affect Grand Lake.

10. Phragmites
    a. Black River
    b. Phelan Creek to Cheboygan
    c. Huron Pines has mapped problem areas
    d. Treated 80 sites – 80 – 100K a year
    e. Need early detection and methods for land owners to address the problem
    f. AmeriCorps SWAT program
        i. Phragmites and other invasives (e.g., Buckthorne)
        ii. Mouth of the Thunder Bay River
        iii. Need to develop a sustainable way to deliver programs
    g. Need to expand program
    h. MDOT funding to spray phragmites been eliminated in past couple years

11. Van Etten Creek – Nutrient loading (non attainment)

12. Climate change impacts
    a. Marine Sanctuary affected
    b. Need policy

13. Wolverine powerplant
    a. Potentially located in Rogers City
    b. Concerned about potential impacts associated if it goes through
14. Bell River/Harbor
    a. Silt from mining
    b. Clogged with invasives
15. Alpena Township
    a. Significant flooding concerns in Fletcher Creek and Sunset Lake areas
    b. Runoff from north and west drains into Alpena Township
    c. Worried about redirecting runoff and causing downstream impacts
    d. Some ordinances in place, but adequately addressing issue because development is already there (need to retrofit)

e. Grant application for potential projects completed by Alpena Township; could be used to create a future GLRI type grant
f. Marie Twite is primary point of contact

16. MDOT right of way on US 23
    a. Significant drainage issues
    b. Low lots experiencing flooding
    c. Having a difficult time finding people to accept the runoff
    d. MDOT contacted to address drainage issues; limited opportunities for outlets
17. Alcona drainage issues
    a. No drain commission
    b. Lack of coordination at county level to address drainage issues
    c. Need ordinance and knowledgeable entity to handle drainage issues

Identified Significant Resources

Au Sable River
Pigeon River
Rifle River

Identified Priorities

- Phragmites
- Drainage/flooding

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Western Lake Huron Basin (WLHB)
Watershed Reconnaissance Study
Bay City Community Meeting Summary
Tuesday, August 23, 2011 • 9:00 am – 11:00 am

Summary of Stakeholder Identified Problems/Opportunities

1. E. coli issues
    a. Expand county septic system revolving loan fund
        i. Two-step process: 1) identify then 2) remediate/educate
        ii. Currently have small amount in test phase in Bay County
        iii. Arenac, Huron, and Tuscola Counties are also interested
        iv. Would involve changes to ordinances and mapping
        v. Joel Strasz at Bay County Health Department or Laura Ogar at Bay County Environmental Department as points of contact
    b. State sanitary code needs to be developed
    c. Ensure all marinas have boat waste system pump out
    d. SVSU e.coli study underway
    e. Need assistance in distinguishing sources of e.coli to avoid beach closures due to wildlife e.coli

2. Saginaw Bay Channel
    a. Need Corps' assistance on pier/navigational issues
    b. Other sources of funding and a local sponsor are available (Laura Ogar, Bay County)

3. Kawkawlin River
    a. Dredge for navigation into Saginaw Bay and four miles upstream (from Euclid Rd to M-13 at Kawkawlin Park) to increase flow for flood purposes
        i. Spring backflow of particular concern
        ii. Causes sedimentation/erosion of farm fields; as flood waters recede, deposits sediment downstream and into mouth of the Saginaw Bay
        iii. Institutional issues about how the County Drain Commissioner looks at it (i.e., not a drain)
        iv. Need to go to North and South Branch
        v. Important for Walleye spawning
    b. Install sediment traps
    c. Promote 10 foot filter strips for farmers

d. Refer to white paper in Kawkawlin River Watershed Management Plan written by the Kawkawlin River Watershed POA entitled "Restoration of Kawkawlin River from N. Euclid to Kawkawlin Park"

4. Saganing Creek
    a. No/minimal flow
    b. High sedimentation
    c. High TDS and TSS
    d. Complete die off of all plant life
    e. DO below WQS
    f. No longer supports fishery
    g. Has tribal interest for potential projects (Cary Schalm Paquette)

5. Bay City State Park
    a. Lagoon
        i. Restore channel to pre 1974
        ii. Want to restore fish habitat
    b. Beach
        i. Restore beach for recreation
        ii. Pilot equipment for muck removal
        iii. Address phragmites problem (see #6 below)
6. Muck
    a. Affects the entire shoreline
    b. Rules do not allow for muck removal
    c. Source of muck focus needs to shift to allow removal
    d. Allow people with private property to control
    e. Areas and timing associated with muck are similar
    f. Need a study to help legislation to change
    g. Causing extention of beaches and muck; more shoreline holds more muck

7. Invasive Species Control
    a. Saginaw Chippewa Tribe and Saginaw Basin Land Conservancy Project
        i. Focus on coastal property
        ii. Need for management and reseeding
        iii. Potential long-term management through organizations that have land ownership of 100+ acres
        iv. Species would include phragmites, purple loosestrife, emerald ash borer, autumn olive, honey suckle
    b. Phragmites Management
        i. Focus on coordination/prioritization
        ii. Identified in numerous places

1. Throughout shoreline
2. Along Cheboyganing Creek (Portsmouth Township)

iii. Saginaw Bay WIN funded a Pinconning Nature Preserve project that was successful, but phragmites is on the other side of the lake

iv. Saginaw Basin Land Conservancy submitted a GLRI grant to do technical mapping

v. Risk Assessment and Removal study submitted to GLRI, but not funded (unclear if this is related to the Saginaw Basin Land Conservancy GLRI grant application mentioned above; appeared on two different maps/groups)

vi. Need to provide more coordinated/comprehensive landowner education and assistance (e.g., cost-share project approach)

1. Ducks Unlimited doing some of this
2. One idea is to put it in landowners' taxes and then pay for informed contractor to do it
3. In Cass River, a small team going house-to-house to inform landowners they have a problem and obtain approval to clear it

c. Asian Carp

8. Toxics/dioxins
    a. Install sediment traps Tittabawassee/Saginaw Rivers
    b. Goal is to catch migrating dioxins and other toxics before entering Saginaw Bay/Lake Huron

9. Wet Weather Issues
    a. Flooding
        i. Kawkawlin River
        ii. Flood gates at Lincoln Rd. in Portsmouth Township
    b. Combined Sewer Overflows
        i. Saginaw
        ii. Bay City
    c. Rain barrels
        i. Promoted by the Bangor Township Green Team
        ii. Promote throughout watershed
    d. Stormwater Master Plans for non-MS4 communities

10. Dam Removal
    a. Midland County (Dow dam)
        i. This is the "holy grail" of dams
        ii. The dam is necessary to maintain a head of water
        iii. Removal would help with fish passage
        iv. Dow is hesitant to do anything until the dioxin settlement

b. Saginaw County (Frankenmuth – ongoing)
    i. Saginaw Bay WIN has provided match for this project
    ii. There is concern about working with the Corps and the time associated; lots of steps to get reviews/approvals
    iii. Corps appeared to have limited knowledge of how to create a fish ramp
    iv. First time locals had experience working with Corps; affects perception for future projects
c. Genessee County (Hamilton dam on the Flint River)
d. Saginaw Bay WIN has a prioritized list of dams/fish passage projects on their website
e. Need to consider the social component (recreational uses behind the dam) when considering dam removal

11. Wetland restoration
    a. Crow Island (along with phragmites control)
    b. Saginaw Bay Land Conservancy study of shoreline wetlands

12. Other Issues
    a. Phosphorus loads from Huron and Tuscola counties that enter the Saginaw Bay
    b. Mercury from coal ash discharged from coal-fired plants where Saginaw River enters the Bay
    c. Land application of fertilizers/sludge
    d. Re-establish road end access to Saginaw Bay at the end of State Rd.

Other Stakeholder Input

Laura Ogar, Director of Bay County Environmental Affairs and Community Development, provided additional input via email on August 30, 2011

1.) Impaired beach quality

A) beach closings due to bacteria - so we need funding for strategic source investigations and source control ..keeping in mind the SBCI Combined Sewage Overflow Workgroup reviewed the data from CSO discharges and we have been able to rule out CSO's as major sources of bacteria.

B) people avoiding the beach due to heavy accumulations of muck and its associated health and safety and odors problem - so we need funding to focus on muck removal on the beaches and in the nearshore swimming zone.

C) phragmytes - the invasive weed growing 12' tall that blocks visual access to the bay, takes over and destroys wildlife/waterfowl habitat, and chokes off physical access to the bay- so we need funding support for treatment and control of dense stands of this invasive weed.

2) Inadequate access points to the bay

A) we have no restaurant or bay-front pier for sitting, viewing or fishing on the bay, no handicapped access to the shoreline in our 37 miles of shoreline, so we need funding to re-establish the Wenona Park bay-front park and public promenade with a bay-front restaurant within close proximity to the Bay City urbanized area.

B) we have inadequate public access points, and we need funding to help develop the limited sites we have and for additional sites.

Identified Significant Resources

Shoreline/beaches

Identified Priorities

Muck removal/management

E.coli source identification and control/septic system management

Phragmites management

Flooding in the Kawkawlin River watershed

Identified Additional Stakeholders

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Western Lake Huron Basin (WLHB)
Watershed Reconnaissance Study
Cheboygan Community Meeting Summary

Wednesday, August 17, 2011 • 2:30 pm – 4:30 pm

Summary of Stakeholder Identified Problems/Opportunities

Cheboygan County Focus

1. Cheboygan Port Authority
    a. Want to expand the Port to be a commercial center
    b. Need to dredge from 21 ft to 23 ft (on average)
    c. Targeting 760 – 1000 ft. boats
    d. U.S. Oil is interested in having a port
    e. No other competing Port in lower MI
    f. Port Authority is 501c3
        i. It can charge for services, raise revenue.
    g. Need to purchase land
    h. Business and jobs are the target
        i. Working with Cheboygan Economic Development
    i. Support businesses exist
        i. De Rossa boat repair with a dry dock
    j. County owns marina adjacent to proposed port
    k. Ice breaker Mackinac is local attraction too

2. Road Stream Crossings
    a. Undersized pipes
    b. Too steep/too short
    c. Perched culvert
    d. Flooding
    e. Huron Pines RC&D has inventory and ratings for each
    f. Implementation of Better Back Roads activities

3. Paper dam in Cheboygan may need fish passage

Presque Isle County Focus

1. Ocqueoc River Watershed
    a. Under-utilized fishery due to erosion
    b. Breakwall is needed at the mouth of the Ocqueoc River to help with erosion issues

i. Property acquisition for this type of project could be an issue b/c of private landownership
ii. MI DNR would be logical cost-share partner due to investment in launch infrastructure

c. Conducting water quality monitoring as part of planning phase for Atlantic salmon
d. Silver Creek Super Project led by the Huron Pines to address road-stream crossings to reduce sedimentation and improve fish passage; to be completed December 2011 (http://www.huronpines.org/project/93)

2. Trout River dam
    a. Need to be rebuilt because it is blocking lamprey
    b. If it goes, huge sediment load behind it
    c. Owned by the Presque Isle Conservation District
    d. U.S. Fish and Wildlife Service and Great Lakes Fisheries Commission might have vested interest

3. Thompson Harbor State Park
    a. Recreational plan in progress that might contain relevant information (Action: Tt to obtain from MI DEQ)

4. Septics an issue due to age and lot size, although health department appears to be on top of the issue

5. Invasive species concerns
    a. Phragmites starting to appear along shoreline according to work done by Presque Isle Conservation District and Huron Pines
    b. Asian carp from Lake Michigan

6. Rockport
    a. Unimproved recreational access
    b. Potential tribal issues

7. Alpena wants to extend the marine sanctuary to extend up to Presque Isle

8. Wolverine Cooperative Powerplant in Rogers City
    a. potentially will go through; to be built in lime quarry
    b. will include 1,000 ft dock that might involve Corps to do more dredging
    c. could put more pressure on resources and could increase demand for recreation and access

Identified Significant Resources

- Ocqueoc River watershed (largest waterfall in the Lower Peninsula)

Identified Priorities

- Trout River dam rehabilitation

Identified Additional Stakeholders

- Tip of the Mitt
- Burt Lake Preservation Association
- County commissioners
- Rogers City representatives

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Western Lake Huron Basin (WLHB)
Watershed Reconnaissance Study
East Tawas Community Meeting Summary

Thursday, August 18, 2011 • 2:30 pm – 4:30 pm

Summary of Stakeholder Identified Problems/Opportunities

1. Tawas River
    a. Milfoil
    b. Lots of sand/sedimentation in river
    c. Affecting habitat and wildlife
    d. Decline in fishing
    e. Is it a county drain?

2. Pine River
    a. Sediment, especially at the mouth
    b. Huron Pines recently received $2 million grant; will address road/stream crossings
    c. Pine River Van Etten Lake 319 WMP approved in 2010
    d. Partners working in the watershed include Huron Pines and Saginaw Bay Watershed Initiative Network (WIN)

3. Rifle River
    a. Huron Pines updating the Rifle River WMP
    b. Flooding issues
    c. Road/Stream Crossing
    d. Hydrologic alterations

4. Big Creek
    a. 1980s watershed management plan (WMP)
    b. Identifies stream restoration/stabilization sites
    c. Possible feasibility estimate (very dated)

5. Au Gres River
    a. Flooding at the mouth due to sedimentation
    b. Primarily agricultural areas; need filter strips
    c. Experiencing wind erosion

6. Tawas Harbor

a. Needs continual dredging
b. Sand coming from the Tawas River
c. Shoreline/Bank stabilization needed
d. Tawas Lake levels are low; stakeholders suggested wing dam
e. Decreases in fish and wildlife abundance

7. Saganing Creek/Whites Beach
    a. Casino is going in/already there and there is proposed additional development (condos)
    b. Lacking wastewater infrastructure
    c. Known septic problems in the area
    d. Small watershed in need of a WMP
    e. Tribal interest in WMP (Cary Schalm-Pauquette)

8. Septic problems and straight pipes
    a. Forest Lake (outside study area)
    b. Whites Beach

9. Whitney Drain
    a. E.coli problem
    b. Levels triggering beach closings
    c. BEACH program providing funding to do testing; sources identified as both human and bovine
    d. Assuming that activities in Huron and Tuscola counties (e.g., agricultural operations) are affecting Arenac/Iosco due to wind effect in inner Saginaw Bay

10. Invasive species concerns
    a. Phragmites
        i. Huron Pines helping with phragmites control; Tuttle Marsh slated for treatment
        ii. MDNR and MDEQ have rules regarding phragmites management
    b. Asian carp
    c. Snakeheads

11. Dredging
    a. Specific areas in need
        i. Oscoda
        ii. Au Gres
    b. Impediment to cruising which is affecting economy/tourism development

12. Beach grooming on private property
    a. Need for public education on benefits of shoreline protection and acceptable beach management practices

b. Landowners are using bulldozers to clear the beach which affects shorebird habitat
c. Area relies on birding as part of tourist draw; shorebirds are evading areas due to beach conditions

13. Loss of fisheries
    a. Salmon
    b. Perch

14. Agricultural issues
    a. Manure management
    b. Livestock management
    c. Michigan Agricultural Assurance Program
        i. 2015 goal to have 85% of livestock farmers meeting standards
        ii. New legislation

15. Existing ordinances
    a. Lack of staffing/resources to enforce
    b. No penalities
    c. In need of updating

Identified Significant Resources

- Pine River watershed (187,000 acres of wetlands)
- Shorebird habitat
- Lake Huron shoreline

Identified Priorities

- Watershed management planning
- Agricultural runoff management
- Septics/straight pipes management
- Sedimentation/Flooding/Dredging
- Phragmites control

Identified Additional Stakeholders

- Saginaw Bay RC&D
- Saginaw Bay WIN
- Rifle River Restoration Committee
- Huron Pines RC&D
- County drain commissioners

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Western Lake Huron Basin (WLHB)
Watershed Reconnaissance Study
Midland Community Meeting

Thursday, August 23, 2011 • 2:30 pm – 4:30 pm

Summary of Stakeholder Identified Problems/Opportunities

1. Tittabawassee River
    a. Contamination
        i. Well known contamination – Superfund project
        ii. Working with feds
        iii. Pending litigation - Jim Sigo – MDEQ contact
    b. Flooding

2. Dam removal/fish ramps
    a. Chesaning rock ramp
        i. Poor structure; rocks are too large
        ii. Results in capture of fresh water mussels; organisms are stranded
    b. Frankenmuth rock ramp
        i. Concerns about putting in incorrect structures
    c. Dow dam
        i. Study available
        ii. Contact Roger Garner – Midland Emergency Services (989.832.6750)
    d. Sanford dam in poor condition
    e. Need an environmental impact type document to look at the consequences of dam removals; the Public Sector Consultants dam study is not a technical document of this nature
    f. Future dam projects need to have data before and after to anticipate and assess impacts
    g. Council of Michigan Foundations want to know where they can fit into the habitat restoration/dam removal process

3. Culvert project
    a. MDNR/MDEQ interested in what is passing through culverts
    b. Mussels as indicator species
        i. Eggs are carried on fish near their gills. If the fish cannot get over the culvert the eggs drop off. Researchers found large numbers of eggs near culverts.
        ii. Representative of how the system is changing
    c. Suggest bottomless culverts (no science to back up yet)

    d. Mussels are good indicators of changes in environmental conditions over time because of their long life span, but need to look back 50 years and these types of studies don't exist

4. Restore hydrology on Salt River

5. Watershed management planning/implementation
    a. Sturgeon Creek WMP
        i. Identifies Erosion repair sites
        ii. WMP needs to be implemented
    b. Pine River needs a 319 WMP
    c. Chippewa River needs a 319 WMP; collaborative potential between CMU and Saginaw Chippewa Tribe

6. Snake Creek
    a. Largest source of flooding in the Midland area
    b. New FIS maps with new Baseline Flood Elevations
    c. Sanford Lake Dam

7. Training for road commissioners
    a. Not obtaining the necessary scientific information
    b. Saginaw Chippewa Tribe interested in doing more trainings for road commissioners

8. Shiawassee National Wildlife Sanctuary
    a. Obtain documents/studies from Steve Kahl, Director

9. Beal City septic system
    a. Concern for Saginaw Chippewa Tribe, although it falls outside of WLHB project area (in Isabella County)
    b. Large septic system area with straight pipes
    c. Everything downstream of Mt. Pleasant is high for e. coli
    d. Having an impact on downstream ecosystems
    e. Group of organizations starting to form to address this issue

Identified Significant Resources

1. Shiawassee National Wildlife Sanctuary
2. Avral Preserve – log banking
3. Chippewa Nature Center property
4. Pere Marquette
5. Sand Point Nature Preserve

Identified Priorities

Fish passage/dam removal impact assessment

Septic systems/straight pipes

Flooding

Watershed management planning

Road stream crossing training for road commissioners

Identified Additional Stakeholders

Road commissioners

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Carey Paquette
Saginaw Chippewa Tribe (also attended Bay City Community Meeting)

Wayne Hofmann
Wade Trim (also attended Bay City Community Meeting)

Western Lake Huron Basin (WLHB)
Watershed Reconnaissance Study
Port Austin Community Meeting Summary

Thursday, August 24, 2011 • 9:00 am – 11:00 am

1. Port Austin Harbor
    a. Considered a Harbor of Refuge
    b. Steel breakwall constructed in 1980s
        i. Owned by Corps
        ii. Harbor designed by Northwest Design Group (Howard H. (231) 348-1180))
    c. Breakwall prevents flow and harbor is stagnant
    d. Stakeholders believe that the stone riprap wall adjacent to harbor prevents flow into harbor and contributes to muck-related problems
        i. Due to declining lake levels the flow needed to increase circulation is most likely not available
        ii. DNR owns rip rap portion of break wall
        iii. Corp maintenance staff surveyed 2 yrs ago – we have report.
        iv. Stakeholders stated that the Corps has indicated willingness to remove riprap even though the structure is on DNR property
    e. Need to do a hydrological study to determine best solution

2. Drain maintenance
    a. Stakeholder documenting problems with Huron County Drain Commission approach to drain maintenance in the Pinnebog watershed (see photos provided by stakeholders)
    b. Ditch maintenance (referred to as "dredging" by stakeholders) leads to substantial erosion/sedimentation
    c. Stakeholders want to see an improved method for drain maintenance that doesn't cause excessive sedimentation
    d. Need for changes to ordinances
    e. Need for drainage commission education

3. Dredging needs
    a. Sebewaing
    b. Caseville
    c. Bay Port
    d. Port Hope

4. E. coli concerns
    a. Beach closures
        i. Health Department conducts beach testing

ii. Lighthouse Co. Park has been closed for ½ the season
iii. Thought to be caused by stormwater/septics

b. CAFO/Agriculture
   i. Significant CAFOs (60 – 70K dairy cows; 100K+ beef cattle; 600K+ chickens)
   ii. Need an anaerobic digester demo project for the waste
   iii. Drainage tile and soil saturation

c. Septics are problem
   i. Inadequate septic systems along shoreline (Sand Pointe to Port Austin)
   ii. Around Lighthouse Beach
   iii. Need unified sanitary code

d. Migrating geese and other wildlife

5. Phragmites
   a. Throughout shoreline
   b. Need to control using chemical and mechanical methods
   c. Want opportunities for individual landowners to participate
   d. Affecting wildlife/ecosystem health, as well as recreation
   e. Port Aux Barques has approximately 900 acres (1/3 wetlands) with phragmites

6. Muck
   a. Problem at Oak Beach area since 2001
   b. Identified around shoreline
   c. Foamy/chocolate colored water at shore
   d. Bird Creek beach unswimmable
   e. Noted at Caseville and Port Austin beaches

7. Public Access Issues
   a. Need more access on Pigeon and Pinnebog
   b. Other points throughout Huron and Tuscola counties

8. Groundwater
   a. Farm irrigation draining groundwater systems
   b. New wells dug to compensate

9. Other Issues/Concerns
   a. Lake water quality for public water systems
   b. Deep water port expansion at Harbor Beach
   c. Ballast water issues to prevent spread of invasive species
   d. Concerns about changes in fisheries species

Significant Resources

1. Saginaw Bay
2. Port Austin (harbor of refuge)
3. Beaches/shoreline

Identified Priorities

Muck removal/management

E.coli source identification and control (septic system management and agricultural runoff)

Drain maintenance

Improving flow near marina/breakwall

Identified Additional Stakeholders

No additional stakeholders specifically identified by participants.

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Western Lake Huron Basin (WLHB)
Watershed Reconnaissance Study
Port Sanilac Community Meeting

Thursday, August 24, 2011 • 2:30 pm – 4:30 pm

Summary of Stakeholder Identified Problems/Opportunities

1. Lexington Harbor breakwall
    a. Increases sedimentation
        i. Harbor becomes hazardous to navigate
        ii. Masses of accreted land have occurred – applied to MDEQ to build on them
    b. Water quality in the harbor is poor
        i. Algae
        ii. Stormwater runoff

2. Village of Lexington wants funds for a study related to converting a mobile home park into a public amenity adjacent to the harbor

3. Restore/preserve Lakeland prairie
    a. Stakeholders feel this is more important than restoring/preserving wetlands
    b. St. Clair shoreline study should identify sites

4. Weirs in agricultural drains
    a. Tile drains to have weirs installed at strategic locations.
    b. Retains water on field as well as nitrogen
    c. Partners – Farm Bureau and Conservation District
    d. Demonstration project/ technical assistance
    e. Ben Thalen (NRCS) has information and will send

5. Erosion and flooding concerns
    a. St. Clair County: Doe Creek Watershed/Ecosystem Restoration
        i. Problems in the watershed include poor storm water management and flooding; erosion, bank failure, and sedimentation along Doe Creek and tributaries causing loss of habitat, damaging roads and culverts, and transporting excessive sediment loads to Lake Huron.
        ii. Potential watershed/ecosystem restoration plan could restore aquatic habitat and provide more stable conditions to reduce erosion/ sedimentation conditions.
    b. Sanilac County

i. Occurring on smaller creeks with direct discharge to Lake Huron due to significant change in slope (150 foot drop in elevation along shoreline)
ii. Need for protective measures
    1. Potential to lose M-25
    2. Portions of the road have been taken out due to erosion
    3. MDOT cited this area as an issue during Alpena community meetings
iii. Private property concerns (received post-meeting phone calls from residents about this issue)
iv. Challenges in addressing this issue because DEQ has jurisdiction in this area, not county drain commissioner
v. DEQ jurisdiction is a roadblock for county/Corps to get onsite to do restoration work
vi. Potential project if Corps could request DEQ to authorize work and act as non-federal cost share partner; County would like to do this, but can't because not in their jurisdiction; watershed group could provide in-kind

6. Sanilac County in need of an Illicit Discharge Detection and Elimination Program
    a. Worth Township currently under lawsuit due to failing septic systems
    b. No action currently taken to remediate these sites

Identified Significant Resources

Shoreline

Identified Priorities

Erosion control

Flood management

E.coli source identification and control/septic system management

Identified Additional Stakeholders

Road commissioners

Port Sanilac Community Meeting Participants

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Western Lake Huron Basin (WLHB)
Watershed Reconnaissance Study
Sault Ste Marie Community Meeting Summary

Wednesday, August 17, 2011 • 9:00 am – 11:00 am

Summary of Stakeholder Identified Problems/Opportunities

1. The Eastern Upper Peninsula Regional Planning and Development Commission has recently completed a recreational inventory between St. Ignace and Drummond Island. Funded through a Michigan Coastal Zone Management grant. Extends 1000 ft inland. *(Action: Tt needs to obtain)*

2. *E.coli* study (pre-TMDL) recently completed at the mouth of the St. Marys River *(Action: Tt has this)*

3. Sault Ste Marie Road Stream and Site Inventory
   - Available on Conservation District's Web site *(Action: Tt has downloaded)*

4. Septic system problem was identified in the Cederville area/Les Cheneaux Islands
   - The Nature Conservancy conducted a study in early 2000's

5. Dolomite mine/tailings north of the Les Cheneaux Islands

6. Munuscong Section 319 Watershed Management Plan (WMP) under development by Conservation District *(Action: Conservation District to provide draft Section 319 WMP in mid-September)*

Summary of Stakeholders' Notes on the Chippewa/Mackinac Counties Map

1. Problems by geographic location
   A. Carp River
      - Sedimentation/erosion
      - Scenic River protection

   B. Pine River and tributaries
      - Sedimentation/erosion
      - Agricultural impacts and deforestation

   C. St. Marys Rapids
      - Loss of habitat due to water flow

D. Lower Islands Rapids
   - Aquatic habitat

E. Neebish Island
   - Rock cut
   - Aquatic habitat

2. Problems by category
   A. Urban
      - Road stream crossings (railroad, multiple)
   B. Agriculture
      - Sediment
      - Nutrients (Taylor Creek and Waiska River)
      - Deforestation
   C. Residential failing septic systems
   D. Contaminated Sediments
      Algoma Steel
      Various city sources (gas plants, Union Carbide)
   E. Shipping Impacts
      - Aquatic habitat
      - Natural hydrology
   F. Commercial dredging
      - Cedarville/Les Cheneaux
      - Raber
      - Munuscong
      - Sault Sainte Marie/Ashman Bay

Identified Significant Resources

1. St. Marys River Area of Concern
2. Carp Trail (Natural Historic Scenic Waterway)
3. Les Cheneaux Islands
4. Ashman Creek Bioreserve Area in the City of SSM (Greg Zimmerman's area of interest)

Identified Priorities

1. Habitat restoration of creeks
   - Riparian restoration/removal of hard lining
   - Restore hydrology (meandering streams)
2. Ordinance updating to protect waterways
   - No regional Master Plan

- Local code is from 1970's

3. Agricultural areas
    - Restore wetlands *(Action: Look at MDEQ Functional Wetland Assessment; thought to be available)*
    - Restore riparian vegetation
    - Limit livestock access through fencing and alternative watering
    - Taylor creek is almost entirely impacted due to cattle access/manure

Identified Additional Stakeholders

- Mike Ripley, Chippewa Ottawa Resource Authority
- Bob Smith re: Les Cheneaux Islands
- Greg Zimmerman re: Ashman Creek Bioreserve Area

Sault Ste. Marie Community Meeting Participants

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Western Lake Huron Basin (WLHB) Watershed Reconnaissance Study

Water Resource Problem/Opportunity Summary (SSM-5)

Water resource problem or opportunity: *Ashmun Creek and Bay Ecosystem Restoration, Sault Ste. Marie, Michigan*

The potential project involves ecosystem restoration in the 2,558-acre Ashmun Creek watershed and potentially in the receiving water (Ashmun Bay) along the St. Marys River (see Figure 1). Restoration may involve measures to address erosion, bank failure, and high levels of sedimentation along Ashmun Creek and within the watershed. The degradation is a result of poor land management and storm water management practices in the watershed, extensive land development in the upper portion of the watershed, and stream channel instability in portions of the watershed. The resulting impacts from these problems include loss of stream habitat for fish and wildlife, degraded water quality, and excessive sediment loading to Lake Huron. The potential restoration has strong local support.

It appears that the Corps Section 206 program (Ecosystem Restoration) would be the most appropriate authority under which to study and pursue implementation of the proposed project. The potential partners (listed below) have been requested to submit a letter of interest regarding a potential Section 206 study/project to the US Army Corps of Engineers, Detroit District.

Problem/opportunity category: The project area is within the St. Marys River Area of Concern (AOC). The project would address priority categories of ecosystem restoration, nearshore health and non-point source pollution, and sediment management. The project would also provide important opportunities to forge innovative strategic partnerships and promote environmental education in the community.

County: Chippewa County, Michigan

Watershed: **S**ault Ste. Marie Area Watershed, Michigan

Significant resources affected: The project would restore important aquatic habitat in the Ashmun Creek watershed and Bay. Despite having the approximately 300-acre Ashmun Creek Bio-reserve in the watershed, much of its habitat value has been lost due to degradation from several causes. Additionally, the project would likely result in significant reduction in sediment loading to Ashmun Bay and St. Marys River. The project would improve conditions and provide habitat benefits in the watershed and in the nearshore areas of Ashmun Bay.

Key stakeholders (other than pertinent Federal/State agencies): Chippewa-Ottawa Resource Authority (CORA) (POC - Mike Ripley, Environmental Coordinator); Chippewa County Health Department (POCs – Christine Daley); City of Sault Ste. Marie (POC – Linda Basista, City Engineer); Dr. Greg Zimmerman (Lake

Superior State University); Chippewa/East Mackinac Conservation District (POC – Dusty King, Director); The Sault Tribe of Chippewa Indians (Kathleen Brosemer, Tribal Environmental Consultant; Bay Mills Indian Community (Amanda Bosak, Aquatic Biologist);

Potential solution(s): Restoration of the Ashmun Creek and Bay ecosystem may involve some or all of the following measures: (1) erosion/sediment reduction and control measures in the channel, (2) sediment removal, (3) features to improve fish habitat and fish passage in Ashmun Creek and tributaries, (4) implementation of BMPs on contiguous lands, (5) habitat improvement/restoration features in Ashmun Bay, and (6) other pertinent measures.

Key issues for detailed feasibility-level investigations: There appear to be no significant issues or potential impediments to the proposed restoration study/project. The study/project has strong interest from the City of Sault Ste. Marie, Chippewa County, Chippewa-Ottawa Resource Authority, and academic interests (LSSU). The project would be subject to environmental review (NEPA) and full public coordination.

Potential non-federal partners: Chippewa Ottawa Resource Authority (CORA) (POC - Mike Ripley, Environmental Coordinator); Chippewa County Health Department (POCs – Christine Daley); City of Sault Ste. Marie (POC – Linda Basista, City Engineer); Chippewa/East Mackinac Conservation District (POC – Dusty King, Director)

Knowledgeable technical stakeholder point(s) of contact (and contact info): Dr. Greg Zimmerman, gzimmerman@lssu.edu; Mike Ripley, mripley@sault.com.

Pertinent reference documents: Sault Ste. Marie Area Watershed Management Plan, and the St. Marys Remedial Action Plan

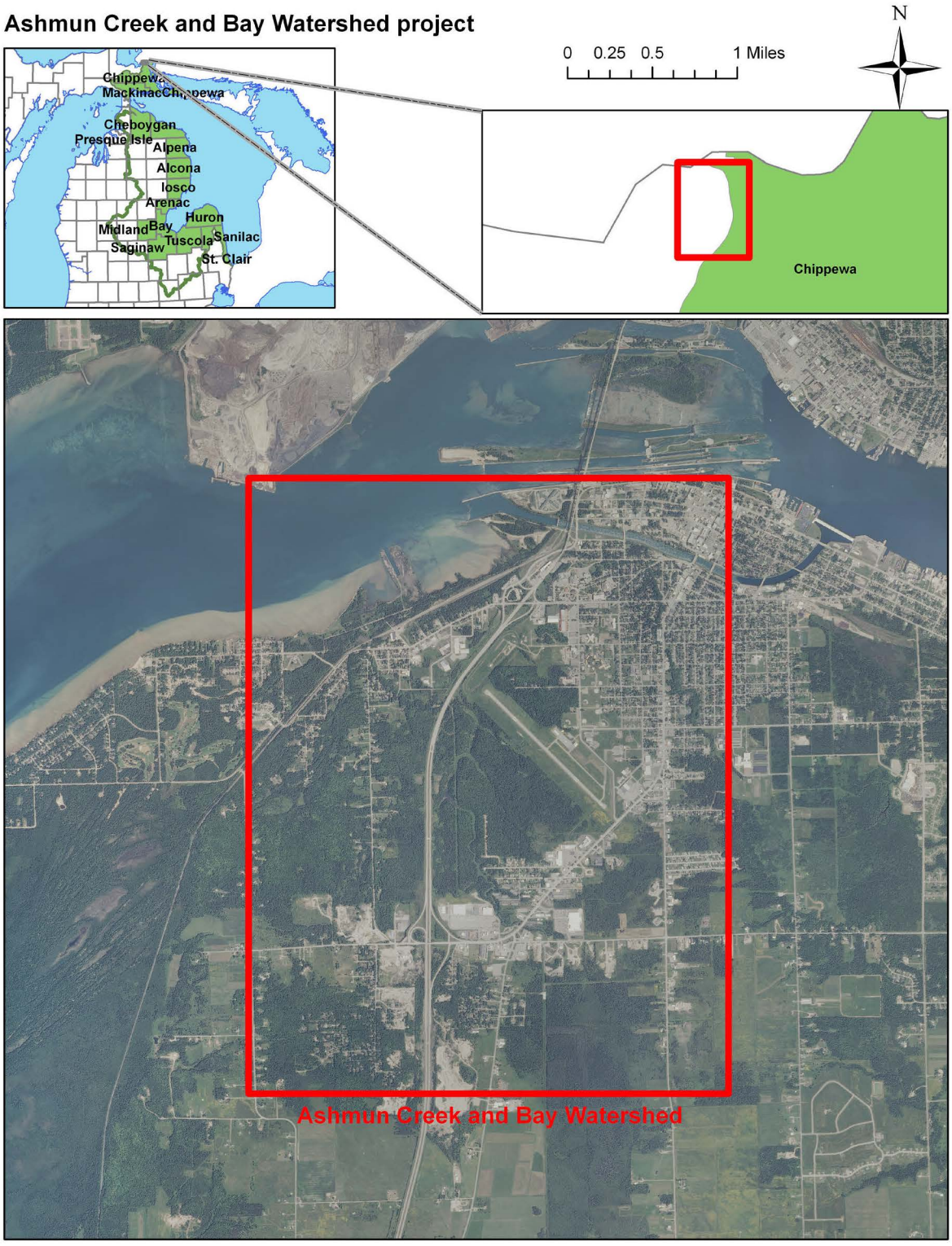

Figure 1. Location of potential Ashmun Creek and Bay watershed ecosystem restoration project

Western Lake Huron Basin (WLHB) Watershed Reconnaissance Study

Water Resource Problem/Opportunity Summary (Che-2)

Water resource problem or opportunity: *Thunder Bay Watershed, Implementation of Restoration Actions, Alpena, Alcona, Presque Isle County, and Montmorency Counties*

The opportunity involves ecosystem restoration of the Thunder Bay River watershed (see Figure 1), a vast river system well known for its high water quality and aesthetically pleasing scenery. Huron Pines, with the help of project partners and input from resource surveys, has identified opportunities to improve water quality and wildlife habitat (The Mega List: http://www.huronpines.org/project/99) in Lake Huron by reducing sedimentation, reconnecting critical habitat and decreasing nutrient loading from the Thunder Bay River watershed. It is estimated that nearly 200 tons of sediment enters the watershed annually from human induced sources such as road/stream crossings and eroding stream banks.

It appears that the Corps Section 206 program (Ecosystem Restoration) could be the most appropriate authority under which to study and pursue implementation of the potential study/project. In addition, the Corps Section 506 (Great Lakes Fishery and Ecosystem Restoration (GLFER)) program could also potentially be used to address the project opportunity in the areas adjacent to the bay.

Problem/opportunity category: The project area drains directly to Lake Huron and the Thunder Bay National Marine Sanctuary. The project would address priority categories of ecosystem restoration, nearshore health and non-point source pollution, and sediment management and strategic partnerships.

County: Alpena, Alcona, Presque Isle, and Montmorency Counties, Michigan

Watershed: Thunder Bay watershed, Michigan

Significant resources affected: The project would improve habitat within the Thunder Bay watershed, as well as water quality within Thunder Bay itself. The project would likely result in significant reduction in sediment and other pollutant loadings (N, P, metals) to the river, bay and in the Thunder Bay National Marine Sanctuary.

Key stakeholders (other than pertinent Federal/State agencies): Huron Pines (POC – Lisha Ramsdell); local road commissions (POC Montmorency County-Kim Bleech, Alpena County-Larry Orcutt), NEMCOG (POC - Richard Deuell), U.S. Fish & Wildlife Service (POC- Heather Rawlings), Sea Grant (POC-Brandon Schroeder), Montmorency County Conservation Club (POC-Carol Rose) and other local conservation partners.

Potential solution(s): Restoration of the Thunder Bay Watershed may involve some or all of the following measures: (1) erosion/sediment reduction and control measures along streambanks and in channel, (2) sediment removal, (3) features to improve fish habitat, (4) implementation of BMPs on contiguous lands, and (5) other pertinent measures.

Key issues for detailed feasibility-level investigations: There appear to be no significant issues or potential impediments to the proposed restoration study/project. The study/project has strong interest from Huron Pines, the local road commissions and Drain Commissioners, and the Northeast Regional Council of Governments (NEMCOG). The project would be subject to environmental review (NEPA) and full public coordination.

Potential non-federal partners: Huron Pines has expressed interest in potentially serving as the non-Federal sponsor and provided a letter of interest (dated November 14, 2011) to the US Army Corps of Engineers, Detroit District, to initiate the process.

Knowledgeable technical stakeholder point(s) of contact (and contact info): Huron Pines (POC – Lisha Ramsdell); NEMCOG (POC - Richard Deuell)

Pertinent reference documents: Thunder Bay watershed Initiative Phases I & II

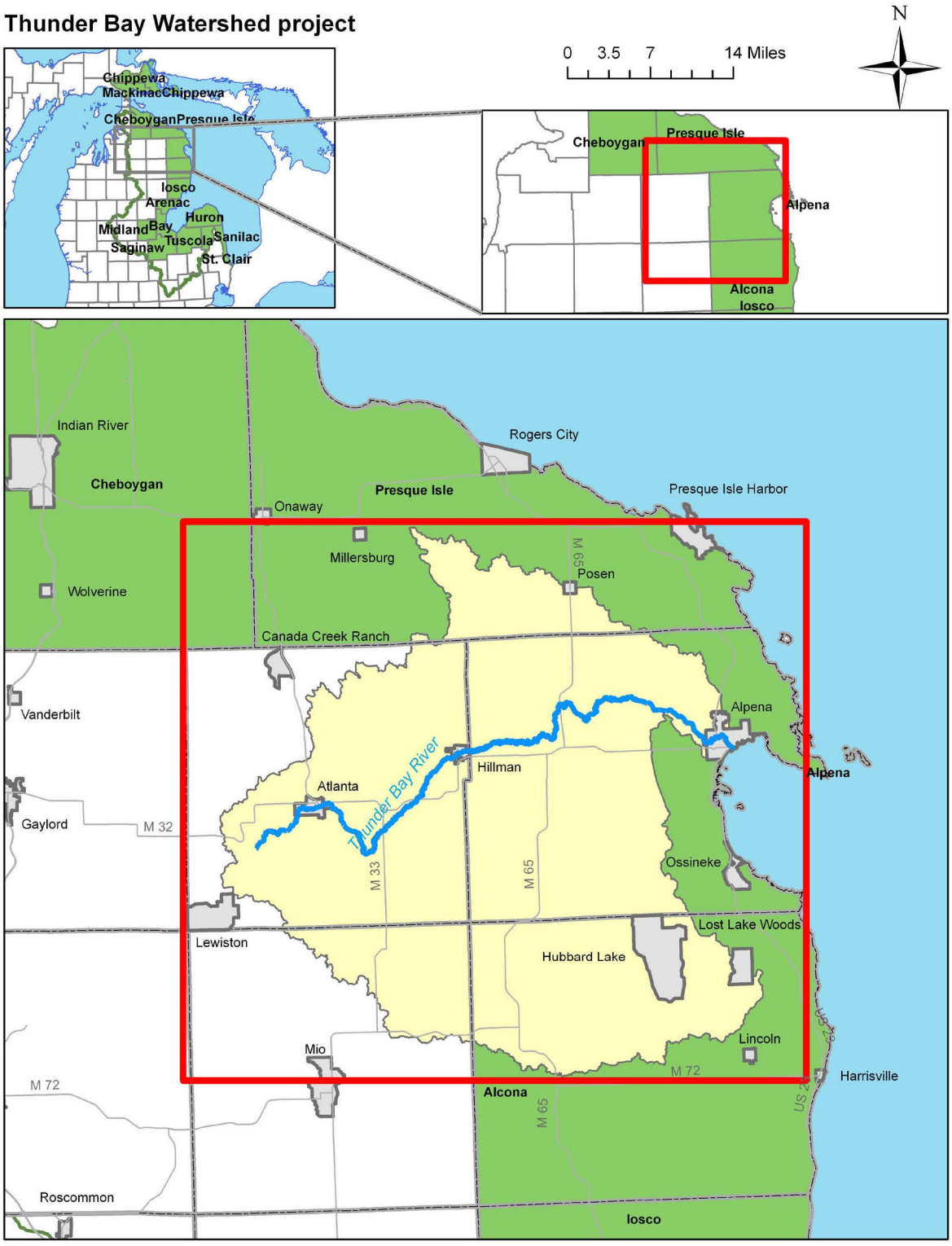

Figure 1. Location of Thunder Bay watershed potential implementation project area

Huron Pines
501 Norway Street, Grayling, Michigan 49738
Phone: (989) 344-0753 Website: www.huronpines.org Email: info@huronpines.org

Conserving the Forests, Lakes and Streams of Northeast Michigan

November 14, 2011

Mr. Terry Long
Plan Formulation Branch
Detroit District
U.S. Army Corps of Engineers

Dear Sir:

Huron Pines, with the help of project partners and input from resource surveys, has identified a potential opportunity to improve water quality and wildlife habitat in Lake Huron by reducing sedimentation, reconnecting critical habitat and decreasing nutrient loading from the Thunder Bay River Watershed. It is estimated that nearly 200 tons of sediment enters the watershed annually from human induced sources such as road/stream crossings and eroding streambanks. In order to protect the unique cultural and ecological features of Thunder Bay, Huron Pines is requesting that the U.S. Corps of Engineers consider a holistic approach to aquatic ecosystem restoration as authorized under Section 206 of the Watershed Resources Development Act of 1996. A multi-phase approach by completing a feasibility study, preparing engineering designs and implementing best management practices at the highest priority sites will go a long way to enhancing the northern Lake Huron basin.

Huron Pines is a nonprofit 501(c)3 organization that for 38 years has worked in northeast Michigan to build private-public relationships in order to implement the highest priority conservation projects in a cost-effective manner. We are currently leading a large-scale restoration project in the Thunder Bay Watershed that will restore ten sites that have been determined to contribute significant amounts of sediment to the river system and which also act as barriers to aquatic passage. These projects will be completed in partnership with local road commissions, National Fish and Wildlife Foundation, U.S. Fish & Wildlife Service and local conservation partners. Momentum provided by this current project in the watershed will lend itself well to a larger partnership with the U.S. Corps of Engineers. By working with the Corps partners in the watershed will be able to address more top priorities helping to ensure the ecological and cultural viability of Thunder Bay and northern Lake Huron.

We understand that a local sponsor will assume costs for land, easements, right-of-ways, relocations and disposal areas (LERRD) and/or assume costs to demonstrate ownership of such. Maintenance of all projects will also be assumed by Huron Pines and/or authorized local entities.

Your consideration of this request will be appreciated. Please feel free to contact me if you should have any questions (989-344-0753 ext. 18).

Sincerely,

Brad Jensen
Executive Director

Western Lake Huron Basin (WLHB) Watershed Reconnaissance Study

Water Resource Problem/Opportunity Summary (Che-5)

Water resource problem or opportunity: *Trout River Dam Rebuild/Replacement, Presque Isle County, Rogers Township, Michigan*

The Presque Isle County Sportsman's Club constructed the Trout River Dam (see Figure 1) during the 1950s. It nearly washed out in the early 1970s but was rebuilt by the Sportsman's Club at that time. In 1986, the dam was repaired to prevent it from failing. In 1996, the Great Lakes Fishery Commission (GLFC) and Sea Lamprey Control (US Fish & Wildlife Service) funded installation of an iron spillway barrier on the dam to prevent sea lamprey migration upstream along with some strengthening of the east embankment. No further repairs or construction to the dam have occurred since 1996. The Presque Isle Conservation District currently oversees the operation and maintenance of the dam. The dam was evaluated by an engineer in October 2010 and found to be in stable condition. The engineer stated that the dam would need structural strengthening during the next three to five years. There are some problems with leakage around the dam and tree roots that affect the structure, but the issues have not been deemed critical at this time. There are approximately 25 square miles of watershed upstream of the dam.

The Trout River is a designated trout stream under the Michigan Department of Natural Resources regulations and downstream of the dam is excellent trout and salmon habitat. Should the dam fail, it would be likely to release a huge load of sediment that would smother fish spawning habitat (salmon spawn in the river during fall) and possibly result in a large fish kill. A load of silt would smother aquatic insects which fish need for food. Loss of the native food source could result in reduced trout and salmon survival for a long time. Dam failure could pose some potential for structural damage downstream to property owners as the river flows through a residential section of Rogers City.

The USFWS Sea Lamprey Control program under the direction of the GLFC has a vested interest in maintaining the dam and does not want it removed because it would make sea lamprey treatment much more difficult and expensive. Presently, the sea lamprey control program conducts research in the river and treats the river with lampricide every three to four years. A 1997 study estimated that, if the Trout River Dam was removed or failed, the cost to treat the river would more than triple, and the extent of stream requiring treatment would be eight times greater than at present.

There are also other beneficial wildlife considerations to replacing the Trout River Dam. At present, water flows over the top of the dam, draining only the top layer of warm water from the pond. Retrofitting the dam with a structure to release water from a lower level in the pool would allow cooler water to flow downstream. It would also reduce the rate sediment retention in the pond. Having a steadier supply of cool water could increase the populations of trout in the river and enable it to function more closely to pre-dam conditions. Rehabilitation of the Trout River Dam could also include a

water level control mechanism to make the pond more attractive and beneficial to waterfowl. The upstream pool is used by ducks and geese annually. However, because of the huge silt load, the pond is slowly evolving into a marsh habitat which is reducing the open water component for waterfowl. Installing a control structure would allow the pool levels to be manipulated to make the impoundment more usable for waterfowl feeding and nesting. Further, a lamprey-free fish ladder might also be installed on the dam to allow more trout and salmon to move upstream and spawn, thus increasing the fish populations in the river and Lake Huron over time along with fishing opportunities.

It appears that the Corps Section 206 program (Ecosystem Restoration) could be the most appropriate authority under which to study and pursue implementation of the proposed project. In addition, the Corps Section 506 (Great Lakes Fishery and Ecosystem Restoration (GLFER)) program could potentially be used to address the project opportunity along Trout Creek.

Problem/opportunity category (potential federal interest?): The project would address priority categories of ecosystem restoration, nearshore health and non-point source pollution, and, to a lesser degree, invasive species management. The project would also provide important opportunities to forge innovative partnerships and promote environmental education in the community.

County: *Presque Isle County, Rogers Township, Michigan*

Watershed: Trout River

Significant resources affected: The unstable dam structure poses risk to an important MDNR-designated trout stream. Dam failure would release sediments that would likely smother spawning habitat and native food source (aquatic insects), reducing trout and salmon survival for an extended period of time. Dam failure could also impact and impose increased costs on the ongoing sea lamprey control program in the watershed. Retrofitting the dam outflow could significantly improve downstream trout/salmon habitat conditions. There are also opportunities for improved water level control in the impoundment that could significantly benefit migratory waterfowl.

Key stakeholders (other than pertinent Federal/State agencies): Presque Isle Conservation District, Presque Isle County, Trout Unlimited, Great Lakes Fishery Commission

Potential solution(s): Rehabilitate or replace the Trout River Dam and outflow structure to protect and restore ecosystem function.

Key issues for detailed feasibility-level investigations: Dam ownership, coordination with GLFC and USFWS Sea Lamprey Control Program, non-federal sponsor resources

Potential non-federal partners: Presque Isle Conservation District, 658 S. Bradley Highway, Rogers City, MI 49779, (POC – Ralph Stedman, PCID Administrator, rstedmanPICD@speednetllc.com , (989) 734-4000). PICD has provided a letter of interest (LOI) to the Corps Detroit District dated November 9, 2011.

Knowledgeable technical stakeholder point(s) of contact (and contact info): Ralph Stedman, Presque Isle Conservation District (contact information provided above).

Pertinent reference documents: TBD

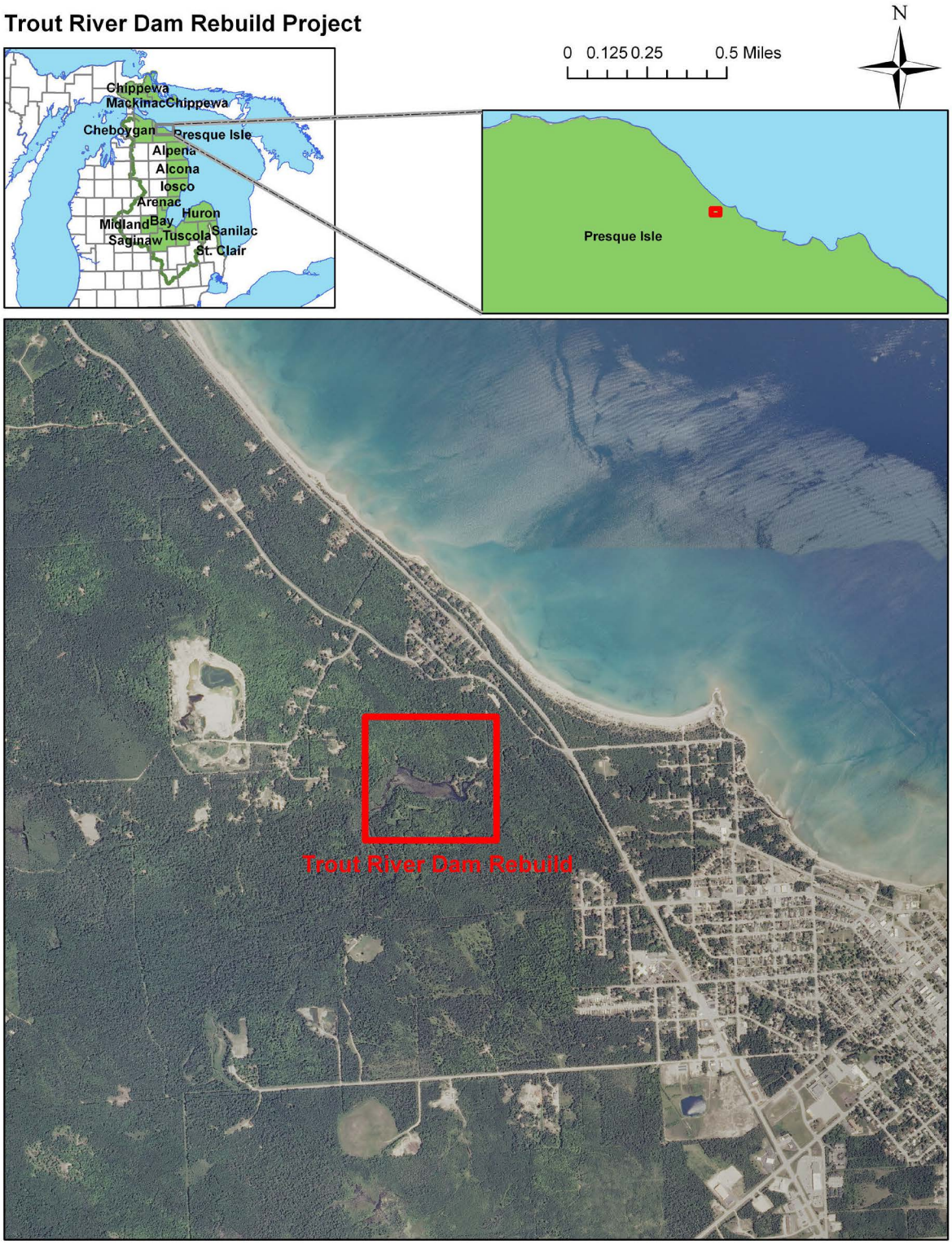

Figure 1. Location of Trout River Dam potential project

Presque Isle Conservation District
658 South Bradley Highway
Rogers City, MI 49779
989-734-4000 phone
989-734-7920 fax

9 November 2011

Mr. Terry Long
US Army Corps of Engineers
Detroit District
477 Michigan Avenue
Detroit, MI 48226-2550

Dear Mr. Long,

The Administrator of the Presque Isle Conservation District has identified a potential opportunity to prevent a sedimentation disaster to a trout stream and nearshore Lake Huron spawning areas as well as improving water quality and waterfowl habitat. This letter seeks the assistance of the US Army Corps of Engineers for the possibility of preparing a feasibility study for replacement of the Trout River Dam in Presque Isle County, Rogers Township (T35N, R5E, S16) under the Aquatic Ecosystem Restoration Program, Section 206 of the Water Resources Development Act of 1996.

The Trout River is a designated trout stream under Michigan DNR regulations and downstream of the dam is excellent trout and salmon habitat. Should the dam fail it would release a huge load of silt (the dam was constructed during the 1950's) that would smother fish spawning habitat (salmon spawn in the river during fall) and possibly result in a large fish kill. A load of silt would smother aquatic insects which fish need for food. Loss of the native food source could result in reduced trout and salmon survival. If the dam burst suddenly it could cause structural damage downstream to property owners as it flows through a residential section of Rogers City.

There are also other beneficial wildlife considerations to replacing the Trout River dam. It is an overspill dam and drains only the top layer of warm water from the pond. Replacing it with an underspill structure would allow cold water to flow downstream and prevent the heavy buildup of sediment in the pond. Having a steady supply of cold water could increase the populations of trout in the river and enable it to function the way it did during the 1950's.

Another enhancement of replacing the Trout River Dam would be to include a control mechanism that would make the pond more attractive and beneficial to waterfowl. Trout River Pond is used by ducks and geese annually but because of the huge silt load the pond is slowly evolving into a marsh habitat and will not have open water for waterfowl. Installing a control structure would allow pond levels to be manipulated to prevent a build up of silt and make it more usable for waterfowl by increasing their feeding and nesting areas.

Lastly, if a lamprey free fish ladder were installed on the dam it would allow more trout and salmon to move upstream and spawn, thus slowly increasing populations of those fishes in the river and Great Lakes and increasing fishing opportunities. The USFWS Sea Lamprey Control program (Great Lakes Fishery Commission) has a vested interest in maintaining the dam and does not want it removed because it would make sea lamprey treatment much more difficult and expensive.

We are aware as local sponsor that we will assume costs for lands, easements, right-of-way, relocations and disposal area (LERRD) and/or assume costs to demonstrate ownership of such. We also will assume responsibility for any operation and maintenance of the project.

Your consideration of this request will be appreciated. Please contact Ralph Stedman, Administrator, Presque Isle Conservation District, 658 S. Bradley Highway, Rogers City, MI 49779, phone 989-734-4000 for further consideration.

Sincerely,

Ralph Stedman
Administrator

Email: rstedmanPICD@speednetllc.com
Office Hours: Tue - Thu 9:30 a.m. to 6:00 p.m.
Mon, Fri - project needs

Western Lake Huron Basin (WLHB) Watershed Reconnaissance Study

Water Resource Problem/Opportunity Summary (Alp-6)

Water resource problem or opportunity: *Alpena Township Flooding, Alpena, Michigan*

The potential project would involve measures to address flooding problems in Alpena Township, including Fletcher Creek and adjacent watershed areas (see Figure 1). Major flooding events occurred in April 1998 and April 2011, causing damages to residences, businesses, roads, and other infrastructure. The Fletcher Creek watershed itself is relatively small (approximately 654 acres). The lower portion of the watershed is highly developed in residences and businesses. The upper portion of the watershed is principally undeveloped and forested land. However, there is strong evidence that, under larger flood events, water spills over from the Genshaw Drain watershed into the Fletcher Creek watershed and further exacerbates flooding problems. The limestone bedrock geology in the area also complicates flooding conditions. The limestone bedrock conditions impede water infiltration over much of the area while other areas have bedrock cracks at the surface (called swallow holes) that drain large amounts of surface runoff into the subsurface aquifer. According to local officials (Drain Commissioner, Road Commissioner, Alpena Township, Northeast Michigan Council of Governments (NEMCOG)), the total watershed area affected by flooding conditions in Alpena Township watersheds is about 9.5 square miles. A much clearer definition of the source(s) of flooding is needed, and past damages should be more clearly documented.

It appears that flooding problems in Alpena Township (Fletcher Creek watershed and adjacent areas) may be appropriate for investigation under the Corps Continuing Authorities Section 205 program.

Problem/opportunity category: The project area is within the WLHB watershed. The project would address priority category of *flood risk management*. Opportunities may exist, in partnership with the NFS, to address *ecosystem protection and restoration* opportunities in the most upstream portions of the watershed as an integral part of flood risk management project planning (e.g., in development of features such as flood water detention areas, etc.).

County: Alpena County, Michigan

Watershed: Fletcher Creek watershed and adjacent drainage areas, Alpena Township, Michigan

Significant resources affected: Flooding affects residences, businesses, and public infrastructure (roads, culverts, etc.)

Key stakeholders (other than pertinent Federal/State agencies): Alpena Township, City of Alpena, NE Michigan Council of Governments (NEMCOG), Alpena County Drain Commissioner, Alpena County Road Commissioner

Potential solution(s): Channel improvements, detention areas, flood proofing of structures, etc.

Key issues for detailed feasibility-level investigations: Size of watershed (potential policy issues); sufficient damages to structures

Potential non-federal partners: To initiate this study process, a letter of interest (dated November 8, 2011) was sent to the US Army Corps of Engineers, Detroit District, by the Alpena Township Supervisor, Marie Twite. The Township expressed interest in potentially serving as the non-Federal sponsor (NFS). Other partners with the township may include the City of Alpena, Alpena County Drain Commissioner, and Alpena County Road Commissioner.

Knowledgeable technical stakeholder point(s) of contact: Marie Twite, Alpena Township Supervisor (Phone: 989-356-4024); Don Woods, Alpena County Drain Commissioner; Greg Sundin, Director, Planning and Development, City of Alpena (Phone: 989-354-1700; Fax: 989-354-1709; email: gregs@alpena.mi.us); Rich Sullenger, City Engineer, City of Alpena (richs@alpena.mi.us); Richard Deuell, AICP, NEMCOG, (rldeuell@nemcog.org)

Pertinent reference documents: NEMCOG (Northeast Michigan Council of Governments). 2000. *Fletcher Creek Watershed Study*.

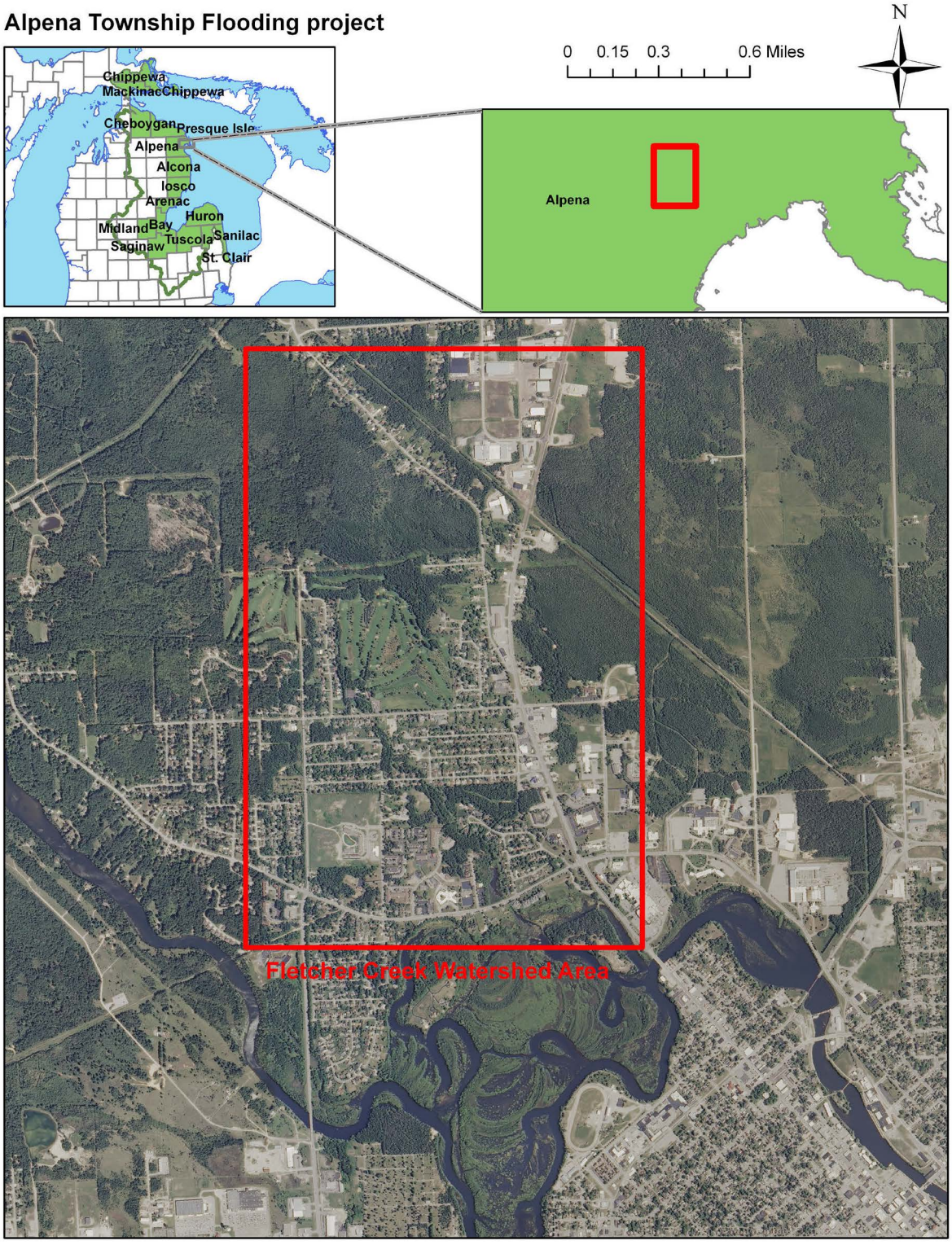

Figure 1. Location of potential project area to address flooding in Alpena Township

Township of Alpena
ALPENA TWP. CIVIC BLDG.
4385 U.S. 23 North
ALPENA, MICHIGAN 49707
Telephone: (989) 356-4024
Email: alpsuper@voyager.net

November 8, 2011

Mr. Terry Long, Chief
Plan Formulation Branch
Detroit District
U.S. Army Corps of Engineers
477 Michigan Avenue
Detroit, MI 48226

Mr. Long,

This is a letter of interest for a Section 205 Flood Protection Project. We have identified several areas of flooding in the Township of Alpena. We have homes and roads that are destroyed in the Bloom, French, Truckey, Hobbs Drive, Princeton, Golf Course, and Genshaw areas. We request that the Corps of Engineers investigate the problem under its Flood Damage Reduction Program (Section 205 of the 1948 Flood Control Act).

We understand that Corps of Engineers will initially investigate the problem to determine whether it meets the requirements for federal participation. We understand that the feasibility study costs could be in excess of $100,000.00 and the cost share is at 50 percent federal and 50 percent non-federal. We as a community would expect that before any funds could be expended a request would come to the Alpena Township Board of Trustees for approval. We also understand that project implementation costs are shared at 65 percent federal and 35 percent non-federal.

We have requested that the City of Alpena, the Alpena County Drain Commissioner, Alpena County Road Commission Manager and the Alpena County Local Emergency Planning Manager partner with the Township of Alpena on this project.

The Township of Alpena has designated Marie A. Twite as the point of contact on this project. That number is (989) 356-4024.

Sincerely,

Marie A. Twite

Marie A. Twite
Supervisor

CC: Alpena Township Board of Trustees
City of Alpena
Alpena County Drain Commissioner
Alpena County Road Commission Manager
Alpena County Local Emergency Planning Manager

Western Lake Huron Basin (WLHB) Watershed Reconnaissance Study

Water Resource Problem/Opportunity Summary (Taw-6)

Water resource problem or opportunity: *Rifle River Watershed, Implementation of Restoration Actions, Ogemaw and Arenac Counties*

The opportunity involves ecosystem restoration of the Rifle River watershed, a tributary to the Saginaw Bay (Lake Huron) located in lower northeast Michigan (see Figure 1). Due to its high quality natural resource base, the Rifle River watershed supports a diversity of recreational uses including fishing, hunting, canoeing, trapping, and birding. A number of suspected water quality challenges have been identified within the watershed including: sedimentation from road/stream crossings, eroding streambank segments, impacts transmitted from various agricultural activities, stormwater runoff from developed lands, impacts related to public access needs, excessive localized beaver activity, the tapping of artesian flows, improperly functioning septic systems, industrial and municipal surface water discharges, urban sprawl, thermal pollution, recreational use conflicts and agricultural drainage. Huron Pines, with the help of project partners and input from resource surveys, has identified opportunities to improve water quality and wildlife habitat (The Mega List: http://www.huronpines.org/project/99) in Saginaw Bay by reducing sedimentation, reconnecting critical habitat and decreasing nutrient loading from the Rifle River watershed.

It appears that the Corps Section 206 program (Ecosystem Restoration) could be the most appropriate authority under which to study and pursue implementation of the potential study/project. In addition, the Corps Section 506 (Great Lakes Fishery and Ecosystem Restoration (GLFER)) program could also potentially be used to address the project opportunity in the areas adjacent to the bay.

Problem/opportunity category: The Rifle River feeds into Saginaw Bay, an Area of Concern, and efforts to reduce sediment and nutrient loading will assist in the overall efforts to improve Saginaw Bay. This project also directly ties into several goals outlined in the Great Lakes Regional Collaboration Strategy. The project would address priority categories of ecosystem restoration, nearshore health and non-point source pollution, and sediment management and strategic partnerships.

County: Ogemaw and Arenac Counties, Michigan

Watershed: Rifle River watershed, Michigan

Significant resources affected: The project would improve habitat within the Rifle River watershed, as well as water quality within Saginaw Bay. The project would likely result in significant reduction in sediment and other pollutant loadings (N, P, metals) to the river and bay.

Key stakeholders (other than pertinent Federal/State agencies): Huron Pines (POC – Abigail Ertel); local road commissions and Drain Commissioners, Rifle River Watershed Restoration Committee (POC - Gus Chutorash); Saginaw Bay RC&D, U.S. Fish & Wildlife Service (POC-Andrea Ania), Saginaw Bay Land Conservancy (POC-Valerie Roof), Mershon Chapter of Trout Unlimited (POC-Bob Spence) and other local conservation partners.

Potential solution(s): Restoration of the Rifle River Watershed may involve some or all of the following measures: (1) erosion/sediment reduction and control measures along streambanks and in channel, (2) sediment removal, (3) features to improve fish habitat, (4) implementation of BMPs on contiguous lands, and (5) other pertinent measures.

Key issues for detailed feasibility-level investigations: There appear to be no significant issues or potential impediments to the proposed restoration study/project. The study/project has strong interest from Huron Pines, the local road commissions and Drain Commissioners. The project would be subject to environmental review (NEPA) and full public coordination.

Potential non-federal partners: Huron Pines has expressed interest in potentially serving as the non-Federal sponsor and provided a letter of interest (undated, but submitted on approximately November 14, 2011) to the US Army Corps of Engineers, Detroit District, to initiate the process.

Knowledgeable technical stakeholder point(s) of contact (and contact info): Huron Pines (POC – Lisha Ramsdell)

Pertinent reference documents: Rifle River Non-point Source Pollution Watershed Plan, the Rifle-Au Gres-Tawas Rivers Rapid Watershed Assessment, 2008.

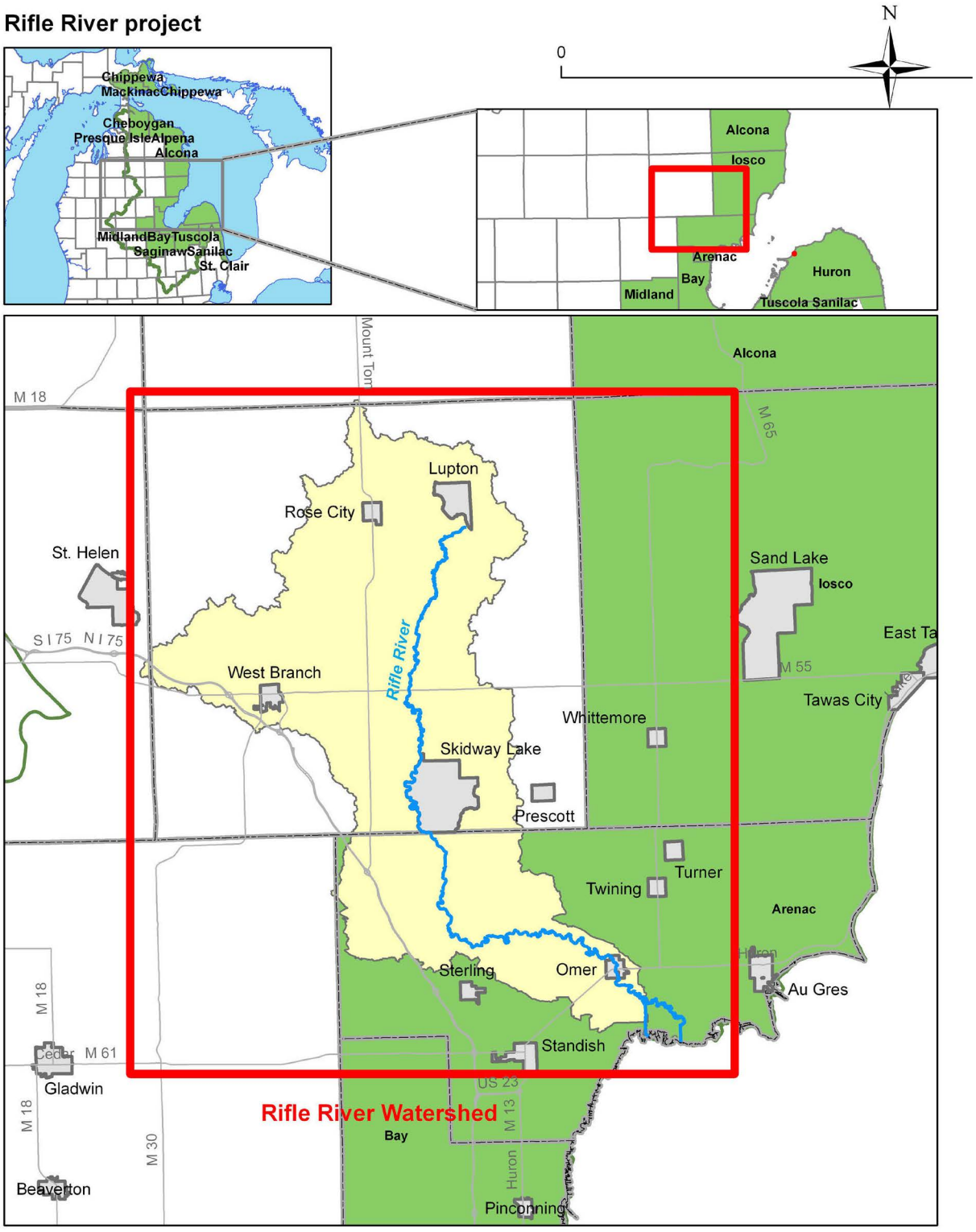

Figure 1. Location of the Rifle River watershed potential project area

Huron Pines
501 Norway Street, Grayling, Michigan 49738
Phone: (989) 344-0753 Website: www.huronpines.org Email: info@huronpines.org

Conserving the Forests, Lakes and Streams of Northeast Michigan

Mr. Terry Long
Plan Formulation Branch
Detroit District
477 Michigan Avenue
Detroit, MI 48226-2550

Dear Mr. Long,

Huron Pines recently completed a comprehensive resource inventory in the Rifle River Watershed to identify the most current threats to water quality and wildlife habitat. The results of this work will allow Huron Pines to prioritize restoration efforts throughout Ogemaw and Arenac counties effectively addressing the two highest pollutants of concern; sediment and nutrient loading. With the help of key local partners like road commissions, watershed groups, and state and federal agencies streambank, road/stream crossing, stormwater, and permanent land protection best management practices will be implemented at high priority sites having the greatest positive impact on watershed resources as a whole. This letter serves as a request to the US Army Corps of Engineers for assistance under Aquatic Ecosystem Restoration – Section 206 of the Water Resources Act for the Rifle River Watershed Project.

The proposed project is particularly important as the Rifle River has no large dams on the mainstream; draining 396 square miles into Saginaw Bay a US Environmental Protection Agency designated Area of Concern. Efforts to reduce sediment and nutrient loading in the river and its tributaries will have a direct impact on the overall water quality of Saginaw Bay and Western Lake Huron. The project will protect the high quality waters and ecological integrity of the Rifle River Watershed while maintaining the economic and cultural fabric of the communities dependent upon the health of these resources. Huron Pines has a 38 year history of successfully implementing large-scale watershed projects in a very cost effective manner, and by addressing the top threats to watershed integrity collectively cost effectiveness is increased further.

Huron Pines understands that a local sponsor will assume costs for lands, easements, rights-of-way, relocations and disposal areas (LERRD) and/or assume costs to demonstrate ownership of such. They will also assume responsibility for any operation and maintenance of the project. Your consideration of this request is greatly appreciated. Please contact me if you have additional questions on this proposal and I look forward to coordinating with the US Army Corps of Engineers on this project.

Sincerely,

Brad Jensen
Executive Director

Western Lake Huron Basin (WLHB) Watershed Reconnaissance Study

Water Resource Problem/Opportunity Summary (BC-1)

Water resource problem or opportunity: *Saganing River/Creek Watershed (Arenac County, Michigan) Ecosystem Restoration*

The potential project would involve actions to restore the aquatic ecosystem in the Saganing River/Creek watershed (see Figure 1). Aquatic habitat quality in the watershed has substantially declined and the system no longer supports a viable fishery. Stream has erosion/sedimentation and potential over drainage.

- No/minimal flow at points in the watershed at times (potential overdrainage)
- High sedimentation (total dissolve solids and total suspended solids)
- Loss of beneficial aquatic plant life
- DO below water quality standards (WQS)
- Proposed development near the shoreline
- No wastewater infrastructure
- Potential septic problems in the area

It appears that the Corps Section 206 program (Ecosystem Restoration) would be the most appropriate authority under which to study and pursue implementation of the potential study/project.

Problem/opportunity category: The project area is within the WLHB watershed and more specifically within the Saginaw River and Bay Area of Concern. The project would address the priority categories of ecosystem restoration, nearshore health and non-point source pollution, sediment management, and strategic partnerships. The project would provide important opportunities to forge a partnership with tribal interests and would promote opportunities for environmental education in the project area.

County: Arenac County, Michigan

Watershed: Saganing Creek/River watershed, Michigan

Significant resources affected: The project would restore an important aquatic habitat throughout the watershed. The watershed has lost much of its habitat value due to a number of contributing factor, including s sedimentation, water quality, flow alterations, and development activities. Additionally, the project would likely result in a reduction in sediment loading to Lake Huron from the watershed. The project would improve conditions and provide habitat benefits in the watershed and in the nearshore areas of Lake Huron in the vicinity of the mouth of the Saganing River.

Key stakeholders: Saginaw Chippewa tribe, Arenac County, Saginaw Bay Land Conservancy

Potential solution(s): Restoration of the Saganing River/Creek watershed may involve some or all of the following measures: (1) erosion/sediment reduction and control measures in the channel, (2) sediment removal, specific features to improve fish habitat, (4) implementation of BMPs in the watershed, and (5) other pertinent measures.

Key issues for detailed feasibility-level investigations: There appear to be no significant issues or potential impediments to the proposed restoration. The project enjoys strong support from the Saginaw Chippewa tribe and others. The project would be subject to environmental review (NEPA) and full public coordination.

Potential non-federal partners: The Saginaw Chippewa Indian Tribe has expressed interest in potentially partnering with the non-Federal sponsor on the project. The non-Federal sponsor has yet to be identified. The tribe provided a letter of support (dated November 7, 2011) to the US Army Corps of Engineers, Detroit District, for the potential project concept. The possible NFS could be the Office of the Arenac Drain Commissioner, Larry Davis, (989) 846-2011. The Saginaw Bay Land Conservancy (POC – Valerie Roof) could also potentially be a partner.

Knowledgeable technical stakeholder point(s) of contact (and contact info): Ms. Carey Pauquette Schalm (Water Quality Specialist, Saginaw Chippewa Indian Tribe) has served as a local point of contact for the tribal interest in this project. Contact information: cpschalm@sagchip.org, (989) 775-4016, 7070 E. Broadway, Mt. Pleasant, MI 48858.

Pertinent reference documents: TBD

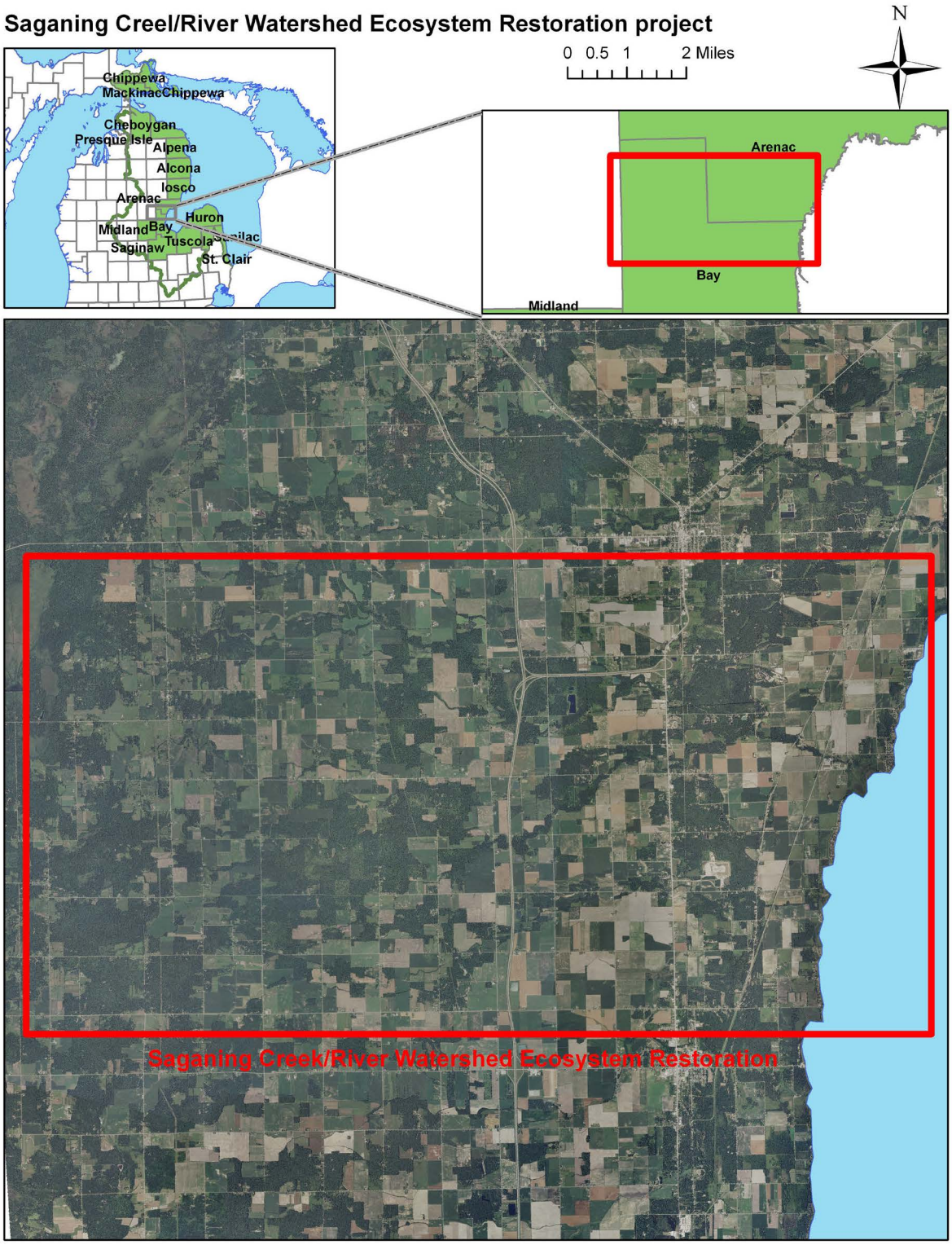

Figure 1. Location of Saganing Creek watershed for potential ecosystem restoration project

The Saginaw Chippewa Indian Tribe Of Michigan

7070 EAST BROADWAY MT. PLEASANT, MICHIGAN 48858 (989) 775-4005
FAX (989) 775-4131

November 7, 2011

Chief of Planning Office, US Army Corps of Engineers

Detroit District

477 Michigan Avenue

Detroit, MI 48226-2550

Dear Sir:

Please find this as a letter of support on behalf of Tetra Tech, a company seeking support from the US Army Corps of Engineers for funding assistance regarding a potential study on the Saganing Creek on or near the Saganing Reservation in Arenac County, Michigan. This study is a result of problems and opportunities discussed at a stakeholder meeting regarding the Western Lake Huron Basin.

The creek has been altered in some way over the past 20 years but it is unknown how. Local tribal and community members in the area including historical studies show the creek was once a fish nursery for Walleye and other popular sports fish. The creek is now a trickle and full of suspended sediment. It is a low quality stream and cannot support the fish that it once sustained.

The Saginaw Chippewa Indian Tribe of Michigan is a federally recognized Indian Tribe organized under a Constitution and by-laws ratified by the Tribe on November 4, 1986, pursuant to P.L. 99-346. According to data released by the Tribal Clerk's office there are 3645 enrolled members in the tribe. However, services provided to the local tribal community include descendants and members of other Tribes. There are 3 districts that comprise membership: Isabella (Isabella County), Saganing (Arenac County) and At-Large. Both the Isabella and Saganing reservations are within federal boundaries while the At-Large district members live off the reservation.

The Saginaw Chippewa Indian Tribe of Michigan's Isabella reservation is located in central Michigan's Isabella County approximately 67 miles north of the State's Capitol, Lansing, and is approximately 219 square miles within the Townships of Union, Wise, Denver, Isabella, Chippewa, Nottawa, Deerfield and Denver. The Saganing reservation is located near the bay in Arenac County's Standish Township.

The Tribe is governed by a twelve member council which is democratically elected every two years by the adult membership and includes an executive board consisting of the Tribal Chief, Sub-Chief, Treasurer, Secretary, Sergeant-at-Arms, Chaplains, and six members, two of which each represents the Saganing and At-Large memberships.

The Saginaw Chippewa Indian Tribe of Michigan along with the Tribes' Planning Department supports Tetra Tech in its request for research and funding to study this project.

Sincerely,

Dennis V. Kequom, Tribal Chief

ATTENTION:

TO: ~~Public Relations~~ Grants

The following action and/or motion was made concerning your department...
Please keep this documentation for your files and share it with the appropriate concerned staff!

PRINT DATE: Wednesday, November 09, 2011
2:12:10 PM

MEETING: Special Council

ACTION/MOTION:

V	**TETRA TECH LETTER OF SUPPORT/GRANTS:** (Dennis Kequom for Amanda George, Dye) The creek, once an active fisher, is now filled with sediment which the study will find out what has caused the problems. This is a request from Planning to support the letter for the company to submit. This letter of support is for the submittal of the request only. If funding is awarded any future collaboration with the company and the other entities would require future discussion. **On a motion duly made by Diana Quigno Grundahl, supported by Sheila Leaureaux, it was moved to approve a letter of support for Tetra Tech for funding assistance support from the US Army Corps of Engineers for a potential study of the Saganing Creek in Saganing, Arenac County. 10 for, motion carried.**

Official Signature...

Misty Bailey

Misty Bailey, Executive Transcriptionist
Ruth Straus, Executive Secretary

COUNCIL USE
cc: CFO
Legal
TO Administrator
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Western Lake Huron Basin (WLHB) Watershed Reconnaissance Study

Water Resource Problem/Opportunity Summary (BC-4)

Water resource problem or opportunity: *Kawkawlin River Watershed (Bay County, Michigan) Ecosystem Restoration*

The Kawkawlin River watershed is approximately 225 square miles with boundaries incorporating portions of Bay, Midland, Gladwin, and Saginaw counties (see Figure 1). The North Branch Kawkawlin River is approximately 36 miles long and drains a heavily forested area in Gladwin and Midland counties. The South Branch Kawkawlin River is approximately 12.9 miles long and drains agricultural and urbanized areas found in Saginaw and Bay counties. At the confluence of the North and South branches, the main stem of the Kawkawlin River then flows approximately 4.63 miles to the Saginaw Bay. The potential project area incorporates the portion of the watershed just above the confluence of the North and South branches at 8 Mile Road downstream to North Euclid Road. The watershed has experienced low flow to dry conditions in the summer and is plagued by excessive sedimentation issues, leading to backwater flooding of private property including agricultural lands during higher flow conditions. Excessive erosion and sedimentation has led to highly degraded wetland and aquatic habitat conditions in the watershed and decline of important fisheries.

The Kawkawlin River Watershed Management Plan (WMP) developed by the Office of the Bay County Drain Commissioner cites excessive sedimentation as a cause for water quality and ecosystem degradation. Both the WMP and a white paper developed by the Kawkawlin River Watershed Property Owners Association (KRWPOA) identify sedimentation as a contributing factor to elevated levels of phosphorus and *e.coli*, as well as low dissolved oxygen. Current research by Dave Karpovich at Saginaw Valley State University (SVSU) in the project area is likely to have findings that support these assumptions. Excessive sedimentation is also identified as a factor in the degradation of fisheries habitat, the spread of invasive species such as phragmites. The clogged natural system in the South Branch Kawkawlin River is also suspected to contribute to flooding during wet weather events. Watershed stakeholders believe that sediment removal in the proposed project area, coupled with implementation of sediment traps, upland sediment control strategies (e.g., greenbelts), and other ecosystem restoration measures, will promote the recovery of the Kawkawlin River ecosystem and decrease flooding events that contribute additional sediment and nutrients to the watershed.

Based on discussion with numerous stakeholders and several potential non-Federal sponsors (NFS) in the area, a study under the Corps General Investigations Program may be appropriate to address these issues. The study may be (1) a “traditional” feasibility report recommending a specific project(s) for congressional authorization and construction or (2) a holistic watershed plan developed in accordance

with Section 729 of the Water Resource Development Act of 1986 to assist state and local interests in determining cost-effective measures and strategies to address problems in the watershed on their own. The direction would be dependent on the objectives and interests of potential NFSs (described below). If these studies would exceed the financial capacity of the NFS(s) for study cost-sharing, a smaller scale ecosystem restoration study/project under Section 206 of the Water Resource Development Act of 1996 may be an option.

Problem/opportunity category: The potential project would address the priority categories of nearshore health and nonpoint source pollution, ecosystem restoration, and invasive species.

County: Bay, Saginaw, Midland Counties (as well as Gladwin County outside the project area boundary)

Watershed: Kawkawlin River Watershed, Michigan

Significant resources affected: Important fish spawning habitat and other wildlife habitat

Key stakeholders (other than pertinent Federal/State agencies): Michigan Department of Environmental Quality (MDEQ), Michigan Department of Agriculture, Bay County Drain Commissioner, Kawkawlin River Watershed Property Owners Association, Delta College, Saginaw Valley State University

Potential solution(s): Implementation of various measures to restore stream channel configuration, reduce erosion and sedimentation in the watershed, and improve wetland and aquatic habitat conditions in order to promote recovery and restoration of ecosystem function and to alleviate backwater flooding.

Key issues for detailed feasibility-level investigations: Identify and confirm a NFS and determine appropriate scope of studies. Non-federal cost sharing limitations are likely to present challenges, and credit for in-kind services will be an important issue to address early in the process. Channel dredging for restoration and long-term maintenance concerns will be important issues to address during the study.

Potential non-federal partners: Bay County Drain Commissioner with support from KRWPOA, SVSU, Delta College and other watershed stakeholders that would provide in-kind contributions toward project match

Knowledgeable technical stakeholder point(s) of contact (and contact info): MDEQ – Charlie Bauer; Bay County Drain Commissioner – Joseph Rivet; Kawkawlin River Watershed Property Owners Association – Dave Bledsoe and John Roszatycki; SVSU – Dave Karpovich

Pertinent reference documents: Kawkawlin River Watershed Management Plan, 2011 Draft, Office of the Bay County Drain Commissioner (cites several other watershed studies conducted at the state and local levels)

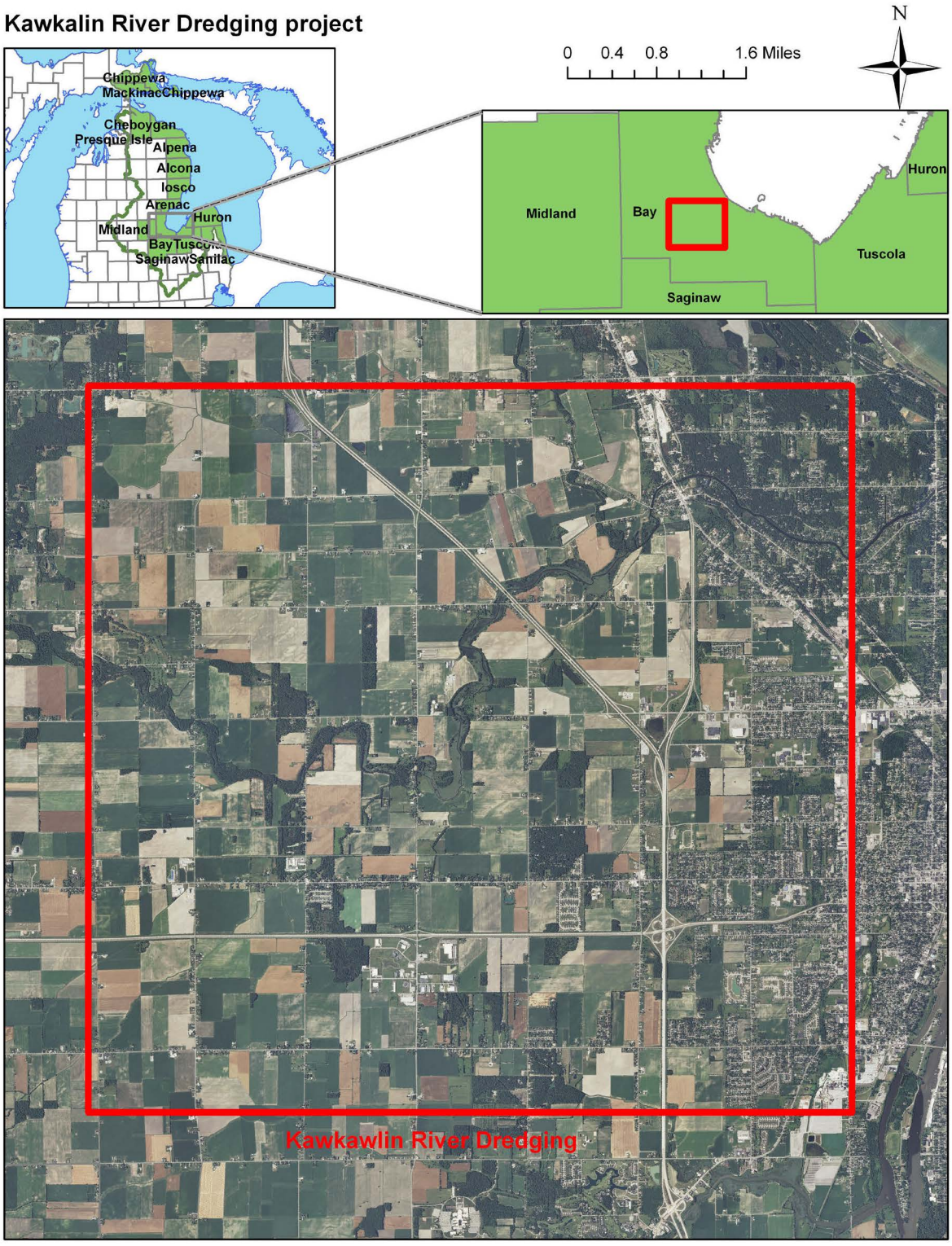

Figure 1. Potential project area for Kawkawlin River watershed sedimentation study

Western Lake Huron Basin (WLHB) Watershed Reconnaissance Study

Water Resource Problem/Opportunity Summary (PA-4)

Water resource problem or opportunity: *Downtown Caseville Ecosystem Restoration Project*

The potential project involves restoration of an old oxbow of the Pigeon River in downtown Caseville, Michigan, immediately adjacent to the federally authorized Caseville Harbor project (see Figure 1). The oxbow was originally bypassed in the mid-1800's to improve the efficiency of logging operations and to prevent logs and ice from lodging in the curves of the oxbow. Habitat in the old oxbow has become highly degraded over time by erosion and sedimentation, lack of circulation and flow, and the presence of invasive species (i.e., phragmites). The proposed project would involve restoration of several acres of aquatic habitat for spawning and nursery areas, support the baitfish holding capacity of the Caseville Harbor area, improve habitat for other wildlife, and improve public access and use of the restored area. The project would reestablish a healthy freshwater ecosystem, promote natural hydrologic functions, and add to the aesthetic and recreational values in downtown Caseville.

It appears that the Corps Section 206 program (Ecosystem Restoration) could be the most appropriate authority under which to study and pursue implementation of the proposed project. The Corps Section 1135 program may be applicable if impact impacts in the oxbow were exacerbated by construction or operation of the adjacent Caseville Harbor, or if the Caseville Harbor project could be modified in some way to achieve desired environmental benefits in the oxbow area. Further, the Corps Section 506 (Great Lakes Fishery and Ecosystem Restoration (GLFER)) program could potentially be used to address the project opportunity at Caseville.

The community submitted the proposed restoration for a 2010 GLRI program grant and was unsuccessful in securing an award. The grant application documented significant local and state support for the project. EPA had favorable comments on the proposed project in response to the grant review process, but the project did not rank high enough to receive a grant.

Problem/opportunity category: The project area is within the Saginaw River and Bay Area of Concern (AOC). The project would address priority categories of ecosystem restoration, nearshore health and non-point source pollution, and, to a lesser degree, invasive species management. The project would also provide important opportunities to forge innovative partnerships and promote environmental education in the community.

County: Huron County, Michigan

Watershed: Pigeon River Watershed, Michigan

Significant resources affected: The project would restore an important nursery areas for fish and increase baitfish holding capacity in the project area. The project site has essentially lost all of its habitat value due to sedimentation and invasive species (phragmites). Additionally, the area is in the immediate downtown Caseville area and offers potential for improved public access to important environmental resources and opportunities for public education.

Key stakeholders: The Huron Conservation District, Pigeon River Intercounty Drain Drainage Board, Huron County Building and Zoning Department, and Michigan Sea Grant College Program, and Caseville Downtown Development Authority and Chamber of Commerce have expressed strong support for the proposed project.

Potential solution(s): In order to reestablish healthy, functional conditions in the old Pigeon River oxbow, the proposed restoration project may involve a combination of: (1) erosion/sediment reduction and control measures, (2) measures to increase flow and circulation, (3) sediment removal, (4) invasive species (phragmites) removal, and (5) other pertinent measures.

The proposed project would complement (not overlap or duplicate) a larger ongoing GLRI-funded Pigeon River Corridor Sediment Reduction project, focused upstream of the Caseville project area. The Pigeon River Intercounty Drain Drainage Board is the lead organization for the Pigeon River Corridor project.

Key issues for detailed feasibility-level investigations: There appear to be no significant issues or potential impediments to the proposed restoration. The project enjoys strong public support from state agencies, various local interests, and citizens of the community. The project would be subject to environmental review (NEPA) and full public coordination.

Potential non-federal partners: The Village of Caseville, Michigan has expressed interest in potentially serving as the non-Federal sponsor by letter dated November 14, 2011 to the US Army Corps of Engineers, Detroit District. The principal point of contact with the village is Forrest Williams, Town Clerk. Other interests, such as Huron County and other non-government organizations, may play contributing roles.

Knowledgeable technical stakeholder point(s) of contact (and contact info): David Bouck (knowledgeable local businessman and member of the Caseville Downtown Development Authority and Chamber of Commerce) has served as a local point of contact for the project (dbtool@echoicemi.com).

Pertinent reference documents: Village of Caseville Grant Proposal for "*Downtown Caseville, MI Habitat-Ecosystem Restoration Project*" in response to GLRI solicitation EPA-R5-GL2010-1 for Habitat Restoration in Great Lakes Area of Concern.

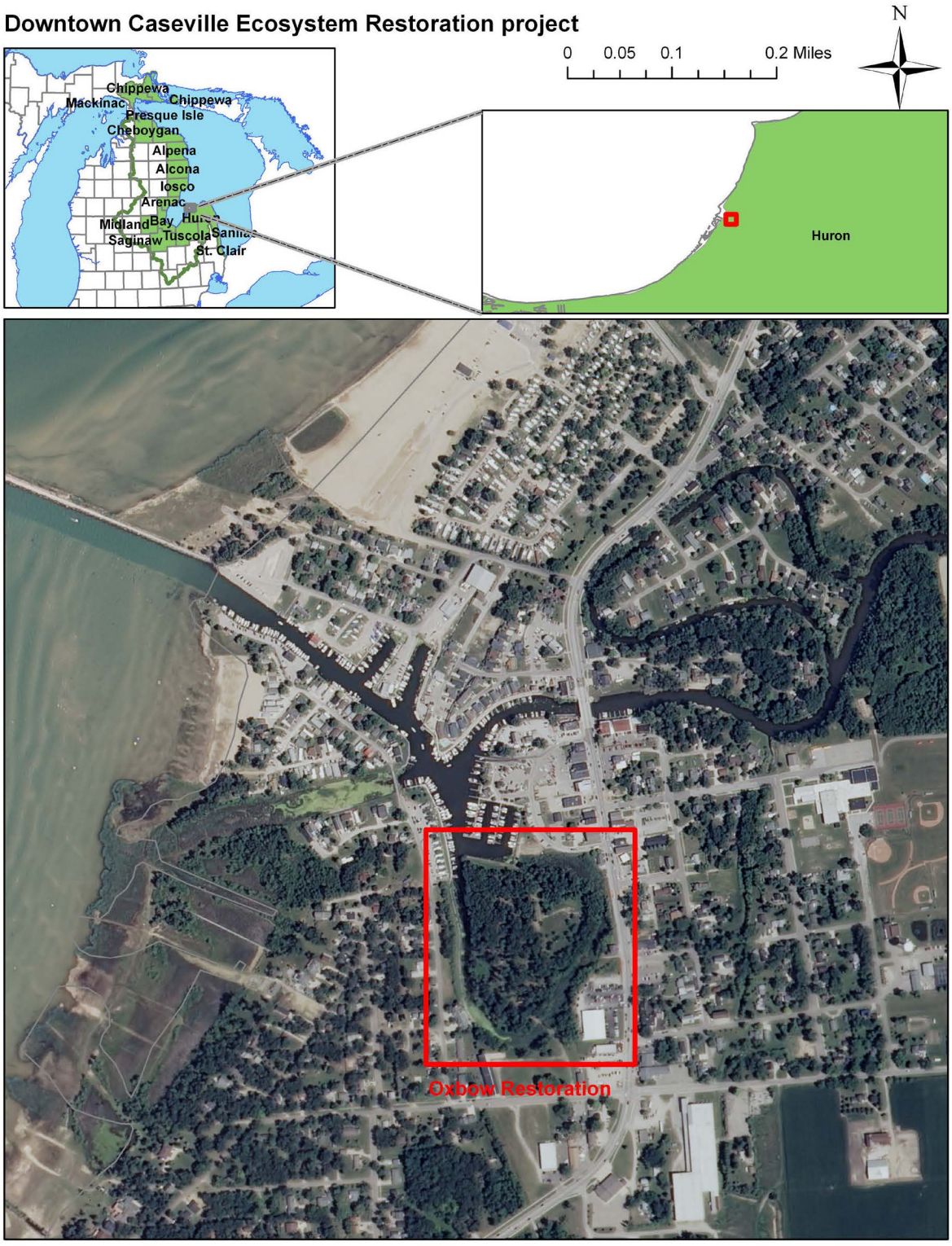

Figure 1. Location of potential oxbow restoration project in Caseville, Michigan

CITY OF CASEVILLE

6767 MAIN STREET
P.O. BOX 1049
CASEVILLE, MICHIGAN 48725-1049
(989) 856-2102 FAX (989) 856-3580 TDD (800) 649-3777
www.caseville-gov.com

Mr. Terry Long
Plan Formulation Branch – Detroit District
US Army Corps of Engineers
477 Michigan Avenue
Detroit, MI 48226

November 14, 2011

Dear Mr. Long:

We have identified a potential opportunity for an ecosystem restoration project in the City of Caseville that will reconnect an old river channel and positively change the habitat of an area in the center of the city. We request that the Corps investigate the possibility of preparing a feasibility study under its Aquatic Ecosystem Restoration Program (Section 206 of the Water Resources Development Act of 1996, as amended) to formulate a restoration plan for the site.

We believe this project would restore an aquatic ecosystem that has been damaged with incorrect past uses and invasion by non-native species. The restoration would enable the revived river to be utilized by native fish species as a spawning area with adequate access to Lake Huron and would greatly improve the quality of the local environment.

We understand that the study will investigate alternative solutions to identify a restoration plan for implementation. We also understand our obligations as local sponsor under the Section 206 Program, including the cost-sharing requirement of 50 percent of the feasibility cost after the first $100,000 in federal expenditures and 35 percent of the project implementation costs if a feasible plan is identified. We intend to pursue budgetary actions so that funds will be available to meet our cost sharing requirements at the time needed by the Corps of Engineers.

The proposed project area is contiguous to the federally authorized and constructed Caseville Harbor project. Accordingly, we believe that there may be some potential that the proposed restoration project could be studied and constructed under the authority of Section 1135 of the Water Resources Development Act of 1986, as amended. As you initiate investigations for the proposed restoration project, we would appreciate your review and determination regarding which authority would be most appropriate for this project.

The City of Caseville requests that you use Forrest N. Williams, City Clerk as the contact for this request. He can be contacted at 989 856-2102 or fw@caseville-gov.com.

Sincerely,

Patricia DesJardins, Mayor City of Caseville

Western Lake Huron Basin (WLHB) Watershed Reconnaissance Study

Water Resource Problem/Opportunity (PS-1)

Water resource problem or opportunity: *Lexington Harbor Environmental Restoration, Village of Lexington, Michigan*

Local interests identified environmental problems in Lexington Harbor, Michigan (see Figure 1), during community meetings in August 2011 for the WLHB watershed reconnaissance study. These problems were further reviewed and characterized in follow-up discussions with village officials. As identified by community leaders and stakeholders, some of the problems being experienced in the harbor include: sedimentation; poor water quality; poor water circulation and flushing; and invasive species (phragmites and watermilfoil)).

Village officials offered the following characterization of the problems in the harbor:

> The build-up of sediment, contaminants, algae and invasive species is evident in the constant need of dredging and the use of frequent chemical applications to keep Lexington Harbor functional. The closing of the south harbor wall has trapped much of the flow, along with sand infiltration from the north wall. Through a Coastal Management Grant, "Ours to Protect" 11D-07.01, the negative impact is evident in the Natural Features Inventory along the harbor shore. Three discharge tubes spill into the harbor, carrying storm water from upland locales. The harbor walls configuration exacerbates this problem.

The community has taken steps to address landside issues related to conditions in the harbor. The Village currently operates under an MS4 Jurisdictional Phase II permit, will participate in the National Flood Plain Program, and is developing a soft shore engineering plan through the Coastal Management Grant identified above. The harbor is an integral part of the municipality and its environmental status is a reflection of the Village's advocacy of Lake Huron resources. The community is acting to address environmental issues above the ordinary high water mark but needs assistance addressing issues within the aquatic environment in the harbor that may be exacerbated by the current project configuration.

Based upon the general characterization of the problems, it appears that they could be related to the harbor features as they were constructed or potentially could be improved by modifying the harbor features in a manner that would not adversely impact the authorized purpose or function of the harbor. If so, the Corps' Section 1135 program may provide an appropriate means by which to investigate those problems further and address them if an appropriate solution can be developed. The program basically allows the Corps to review and modify structures and/or operations of water resource projects constructed by the Corps for the purpose of improving the quality of the environment, when it is

determined that such modifications are feasible. In addition, the Corps Section 506 (Great Lakes Fishery and Ecosystem Restoration (GLFER)) program could potentially be used to address the project opportunity in the near shore areas of the harbor.

Problem/opportunity category: The potential project would address the priority categories of nearshore health and nonpoint source pollution, ecosystem restoration, and invasive species.

County: Sanilac County, Michigan

Watershed: Lake Huron, Michigan

Significant resources affected: Aquatic habitat**,** fishery, and water quality impacts; in addition, potential diminished value of important recreational harbor and MDNR facilities ramp and launch facilities

Key stakeholders (other than pertinent Federal/State agencies): Village of Lexington, MDNR Waterways Commission (potential), others TBD

Potential solution(s): Measures to improve circulation and minimize sedimentation in critical areas; sediment removal in selected areas (not related to navigation); removal of invasive species as part of initial restoration action; others

Key issues for detailed feasibility-level investigations: Clarifying and documenting the actual nature and severity of the environmental problems in the harbor; array of potential solutions may be limited

Potential non-federal partners: The Village of Lexington, Michigan has expressed interest in potentially serving as the non-Federal sponsor and provided a letter of interest (dated November 30, 2011) to the US Army Corps of Engineers, Detroit District, to initiate the process.

Knowledgeable technical stakeholder point(s) of contact (and contact info): Village of Lexington (POCs – Jamie McCombs, Chair, Village of Lexington Environmental Committee; Jon Kosht, Village Business Manager, and Bill Oldford, Village Council Member) ; MDNR – Michigan Waterways Commission (village to make contact for regarding potential interest)

Pertinent reference documents: TBD

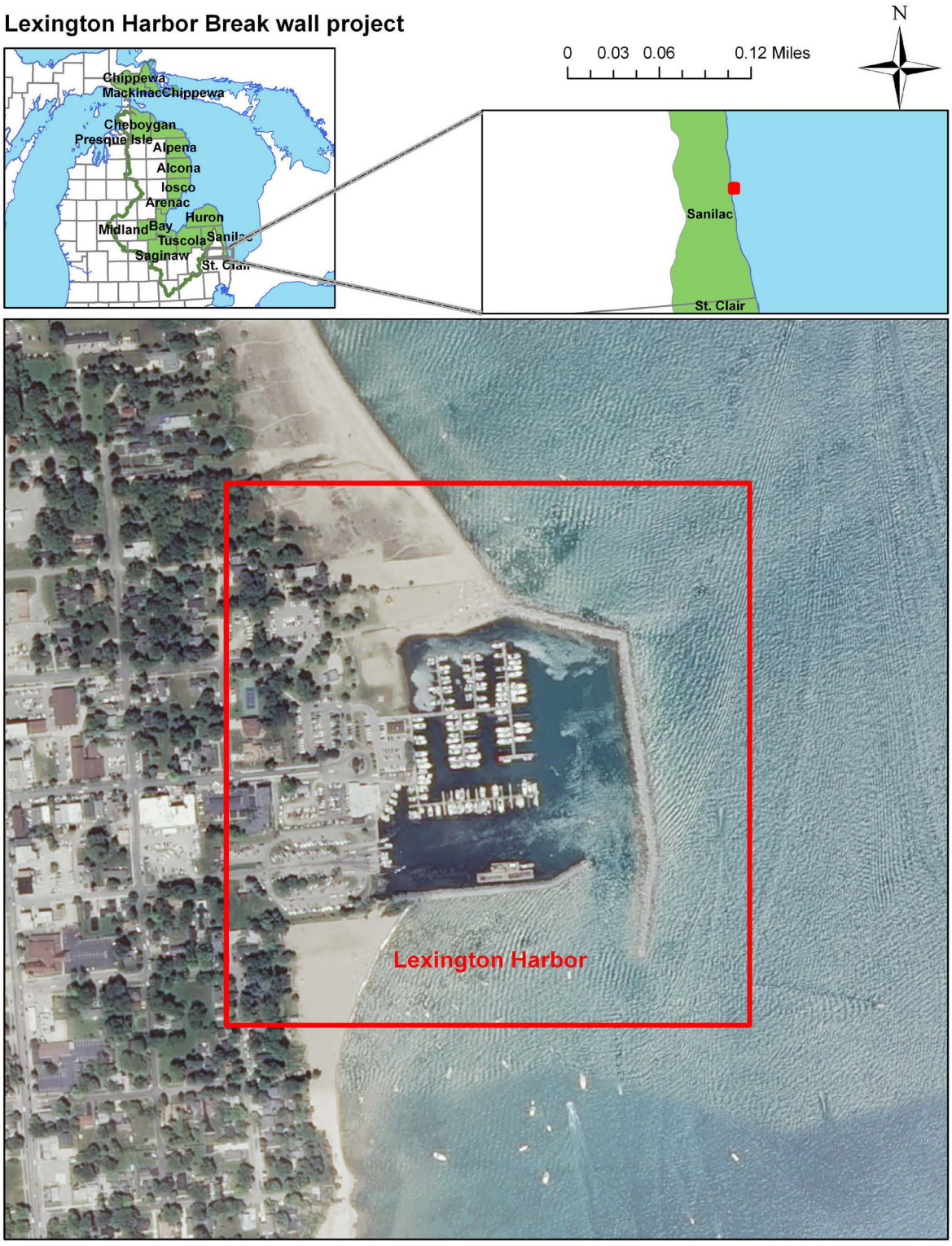

Figure 1. Location of potential Lexington Harbor project

VILLAGE OF LEXINGTON
7227 HURON AVENUE. SUITE 100
LEXINGTON, MICHIGAN 48450
810-359-8631
FAX: 810-359-5622

November 30, 2011

Chief of Planning Office, US Army Corps of Engineers
Detroit District
477 Michigan Avenue
Detroit, Mi. 48226-2550

Dear Sir:

This letter is to seek the assistance of the United States Army Corps of Engineers (USACE), under Sec. 1135 of the Water Resources Development Act of 1986, as amended; and/or Sec. 206 of the Water Resources Development Act of 1996, as amended.
Lexington Harbor is situated in Lake Huron, Village of Lexington, Michigan. Infill of sediments, contaminants and vegetation has damaged the environmental and navigational sustainability of this Western Lake Huron Basin site.

USACE completed the harbor project in 1980. Since the initial design, minor changes were made. There is a constant need of dredging and use of chemical applications to keep the harbor functional. The closing of the south harbor wall has trapped much of the flow, along with sand infiltration through the north wall. Three discharge tubes spill into the harbor, carrying storm water from upland locales. Water quality is poor at best and the overall eco-system suffers. The installation of the harbor created beach sand loss to the south side residents. There is an ongoing obligation by USACE for beach renourishment. The closing of the south harbor wall was perhaps an effort to meet these needs. The north shore of the harbor continues to build sand levels at a rapid pace.

A recommendation of a feasible solution is paramount to the economic and environmental vitality of this Lake Huron community. The Village currently operates under a Jurisdictional Phase II Ms4 permit; is participating in the National Flood Insurance Program; is developing a soft shore engineering plan through a Coastal Management Grant, " OURS TO PROTECT" 11D-07.01. [This will include a Natural Features Inventory and GPS mapping of waterfront adjacent public lands in the Village.]

Through the advocacy of a budgeted Environmental Committee and support of the Village Council, this small municipality consistently ups its environmental goals for the betterment of its residents and the protection of the Great Lakes.

Thank you for any guidance in these concerns.

Respectfully,

Jamie McCombs
Village of Lexington Environmental Committee Chair

Jon Kosht
Village of Lexington Business Manager

CC:

Kevin Kratt

Director, Water Resources Group

Tetra Tech Complex World, Clear Solutions

1468 W. 9th St., Suite 620

Cleveland, OH 44113

Elva Mills
Village of Lexington Council President

Western Lake Huron Basin (WLHB) Watershed Reconnaissance Study

Water Resource Problem/Opportunity Summary (PS-3)

Water resource problem or opportunity: *Doe Creek Watershed (St. Clair County) Ecosystem Restoration*

The potential project would involve measures to address erosion, bank failure, and high levels of sedimentation along Doe Creek and tributaries in St. Clair County, Michigan (see Figure 1). The degradation is a result of poor land management and storm water management practices in the watershed and stream channel instability. The resulting impacts from these problems include loss of stream habitat for fish and wildlife, damage to roads and culverts, and excessive sediment loading to Lake Huron. The potential project has strong local support a potential non-Federal sponsor.

It appears that the Corps Section 206 program (Ecosystem Restoration) would be the most appropriate authority under which to study and pursue implementation of the proposed project. In addition, the Corps Section 506 (Great Lakes Fishery and Ecosystem Restoration (GLFER)) program could potentially be used to address the project opportunity in the Doe Creek Watershed.

Problem/opportunity category: The project area is within the WLHB watershed. The project would address priority categories of ecosystem restoration, nearshore health and non-point source pollution, and sediment management. The project would also provide important opportunities to forge innovative partnerships and promote environmental education in the community.

County: St. Clair County, Michigan

Watershed: Doe Creek Watershed, Michigan

Significant resources affected: The project would restore an important aquatic habitat in the watershed, particularly in the lower portion of Doe Creek. The project site has lost most of its habitat value due to sedimentation from the watershed, head cutting, and bank sloughing. Additionally, the project would likely result in significant reduction in sediment loading to Lake Huron from the watershed. The project would improve conditions and provide habitat benefits in the watershed and in the nearshore areas of Lake Huron in the vicinity of the mouth of Doe Creek.

Key stakeholders: Thumb Land Conservancy, NRCS District Conservationist (Ben Thelan), MDNR Fisheries (Jim Baker)

Potential solution(s): Restoration of the Doe Creek watershed may involve some or all of the following measures: (1) erosion/sediment reduction and control measures in the channel, (2) sediment removal,

(3) features to improve fish habitat, (4) invasive species (phragmites) removal, (5) implementation of BMPs on contiguous lands, and (6) other pertinent measures.

Key issues for detailed feasibility-level investigations: There appear to be no significant issues or potential impediments to the proposed restoration. The project enjoys strong public support. The project would be subject to environmental review (NEPA) and full public coordination.

Potential non-federal partners: The Office of the Drain Commissioner, St. Clair County, Michigan has expressed interest in potentially serving as the non-Federal sponsor and provided a letter of interest (dated November 9, 2011) to the US Army Corps of Engineers, Detroit District, to initiate the process. The principal points of contact with the Drain Commissioner's Office are Mr. Jim Hartson (Deputy Drain Commissioner, St. Clair County) and Ms. Cheryl Collins (Drain Inspector, Office of the Drain Commissioner, St. Clair County).

Knowledgeable technical stakeholder point(s) of contact (and contact info): Ms. Cheryl Collins (Drain Inspector, Office of the Drain Commissioner, St. Clair County) has served as a local point of contact for the project. Contact information: cacollins@stclaircounty.org, (810) 989-6940.

Pertinent reference documents: Photos, maps, and news articles provided by the Office of the Drain Commissioner

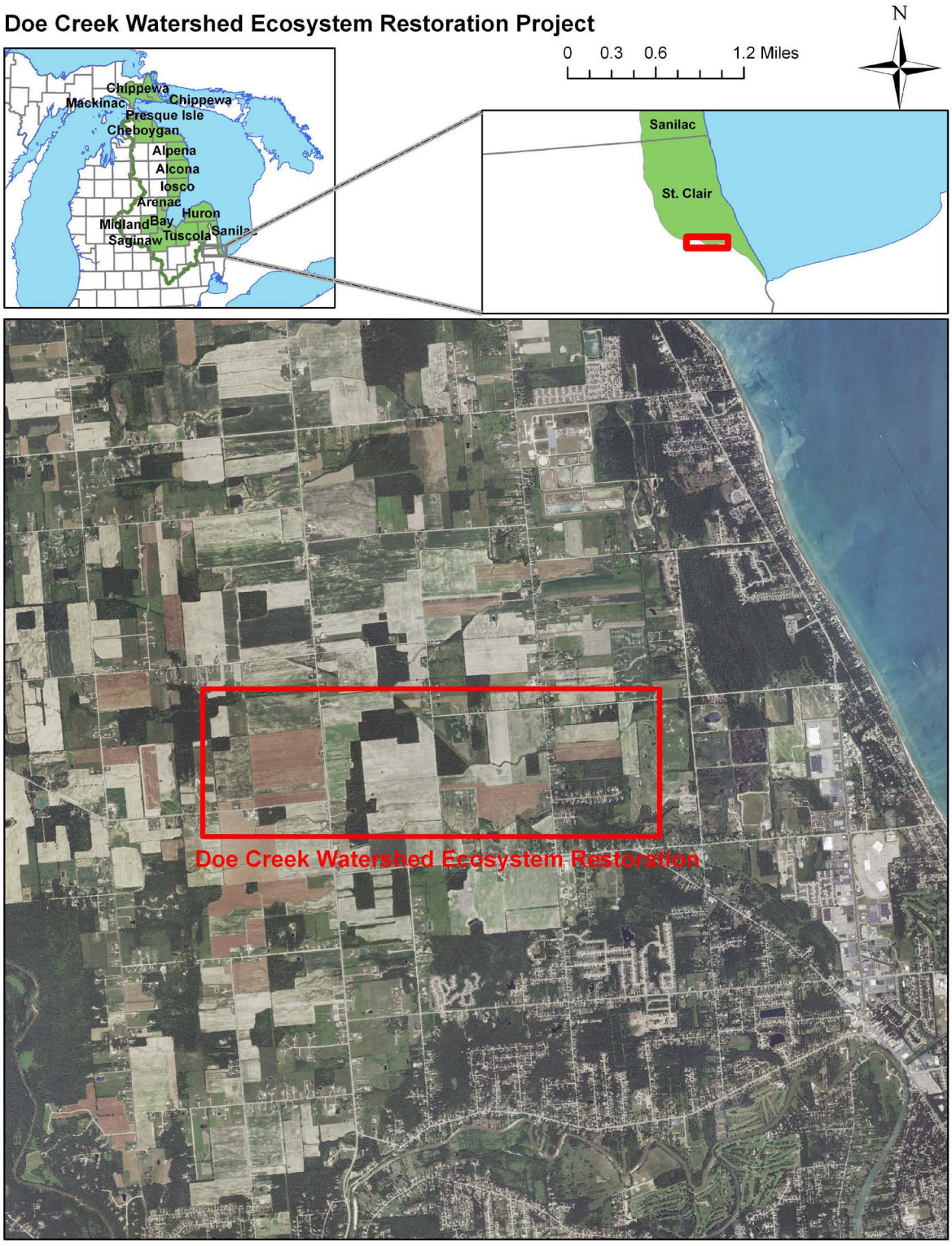

Figure 1. Location of potential Doe Creek watershed ecosystem restoration project

County of St. Clair, Michigan

ROBERT WILEY, DRAIN COMMISSIONER
21 Airport Drive, St. Clair Twp., Michigan 48079

PHONE: (810) 364-5369
FAX: (810) 364-7240

November 09, 2011

Mr. Terry Long
Plan Formulation Branch
Detroit District
US Army Corps of Engineers
477 Michigan Avenue
Detroit, Michigan 48226

Dear Mr. Long,

The St. Clair County Drain Commissioner has identified a potential opportunity to improve the water quality and aquatic ecosystem of Lake Huron and three county drains by reducing soil erosion and sedimentation. The three county drains are Doe Creek, Brace Drain, and the Edie Smiley, all of which are located in Fort Gratiot Township, St. Clair County. Therefore, I request that the Corps investigate the possibility of preparing a feasibility study under its Aquatic Ecosystem Restoration Program (Section 206 of the Water Resources Development Act of 1996, as amended) to formulate a restoration plan for the site.

As Drain Commissioner I believe the amount of soil being discharged to Lake Huron from Doe Creek can be greatly reduced by correcting slumping banks and restoring stability within these three drains. A successful project will not only address immediate impacts to the lake but will also help in avoiding future ecological and physical damages to both Lake Huron and the county drains.

We understand that the study will investigate alternative solutions to identify a restoration plan for implementation. We also understand our obligations as local sponsor under the Section 206 Program, including the cost-sharing requirement of 50 percent of the feasibility cost after the first $100,000 in federal expenditures and 35 percent of the project implementation costs if a feasible plan is identified. We intend to pursue budgetary actions so that funds will be available to meet our cost sharing requirements at the time needed by the Corps of Engineers.

As the St. Clair County Drain Commissioner I designate Jim Hartson, Deputy Drain Commissioner, 810-989-6985, jhartson@stclaircounty.org or Cheryl Collins, Drain Inspector, 810-989-6940, cacollins@stclaircounty.org as the points of contact for this project.

Sincerely,

Robert Wiley, St. Clair County Drain Commissioner

Email:
rwiley@stclaircounty.org

Office Hours:
Monday through Friday
8:00 a.m. to 4:00 p.m.

Western Lake Huron Basin (WLHB) Watershed Reconnaissance Study

Water Resource Problem/Opportunity Summary (PS-4)

Water resource problem or opportunity: *Eastern Sanilac County Coastal Watersheds, Michigan*

The Eastern Sanilac County Coastal Watersheds encompass approximately 114,560 acres of predominately agricultural land located on the eastern edge of the "thumb" area of Michigan along about 40 miles of coastline (see Figure 1). The potential project area has a series of small tributaries feeding into Lake Huron. Beaches at the outlets of the watersheds are used by residents and are important for tourism.

There are significant erosion problems along the coast of Lake Huron in the project area. Additionally, these tributary streams are experiencing significant erosion and sedimentation issues as they near the coast. These issues pose a major threat to Michigan Highway 25 and the associated infrastructure along the highway. Erosion is causing loss of fish and wildlife habitat and is resulting in heavy sediment deposition into Lake Huron.

Based on discussion with numerous stakeholders and several potential non-Federal sponsors (NFS) in the area, a feasibility study under the Corps General Investigations Program may be appropriate to address these issues. The study may be a “traditional” feasibility report recommending a specific project(s) for congressional authorization and construction or a holistic watershed plan developed in accordance with Section 729 of the Water Resource Development Act of 1986. The direction would be dependent on the objectives of potential NFS (described below).

Problem/opportunity category: The potential project would address the priority categories of storm damage reduction and coastal erosion, nearshore health and nonpoint source pollution, ecosystem restoration, and potentially invasive species.

County: Sanilac County, Huron County (extreme southern portion), and St. Clair (extreme northern portion), Michigan

Watershed: Eastern Sanilac County Coastal Watersheds, Michigan

Significant resources affected: Important coastal shorelines and bluffs, coastal watersheds and associated habitat, roadside park resources

Key stakeholders (other than pertinent Federal/State agencies): Michigan Department of Transportation (MDOT), Michigan Department of Environmental Quality (MDEQ), Sanilac County Road Commission, Sanilac County Drain Commission, Sanilac County Conservation District

Potential solution(s): Implementation of various measures to reduce coastal and stream erosion to reduce damages to infrastructure and to protect/restore healthy ecosystems.

Key issues for detailed feasibility-level investigations: Identify NFS and determine appropriate scope of studies.

Potential non-federal partners: Michigan Department of Environmental Quality, Michigan Department of Transportation. The Sanilac County Drain Commissioner, Greg Alexander, provided a letter of support to the US Army Corps of Engineers, Detroit District (dated November 21, 2011) for this project. No specific non-federal sponsor has provided a letter of interest to date.

Knowledgeable technical stakeholder point(s) of contact (and contact info): MDEQ – Charlie Bauer; MDOT – Rachel Phillips; Sanilac County road Commission – Rob Falls; Sanilac County Drain Commission – Greg Alexander; Sanilac County Conservation District – Sandy Pritchett

Pertinent reference documents: Sanilac County Lakeshore Watershed, Watershed Management Plan, December 2003

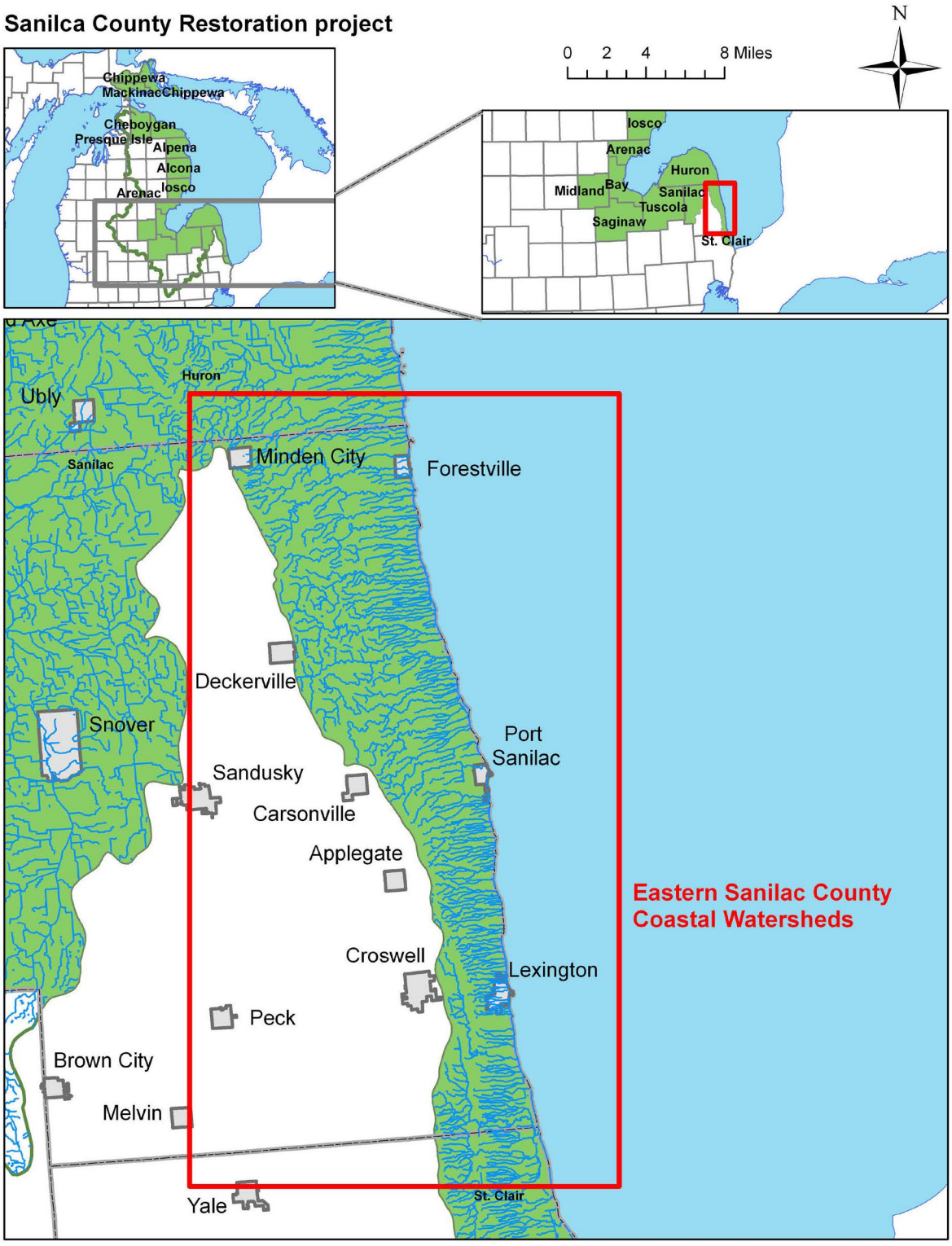

Figure 1. Location of Sanilac County coastal watershed for potential erosion control and drainage study

Gregory L Alexander

SANILAC COUNTY
DRAIN COMMISSIONER
60 West Sanilac Ave.- Room 201
Sandusky, Mi. 48471
draincommr@sanilaccounty.net

Telephone No: (810) 648-4900 *Fax Ph: (810) 648-5460*

November 21, 2011

Mr. Terry Long
Plan Formulation Branch
Detroit District
US Army Corps of Engineers
477 Michigan Avenue
Detroit, MI 48226

Dear Mr. Long:

The Western Lake Huron Basin (WLHB) Reconnaissance Study, conducted by the U.S. Army Corps of Engineers under the authority of Section102 of the River and Harbor Act of 1966, as amended, has identified water resource problems in the area generally described as the Eastern Sanilac Coastal Tributary Watershed that may be appropriate for further detailed feasibility level investigations. The problems in this watershed area involve coastal shoreline erosion and altered conditions in the near coastal watersheds that are threatening the coastal highway infrastructure (M-25) as well as causing high levels of sedimentation, coastal habitat loss, and other related problems.

The Sanilac County Drain Commission strongly supports a proposed watershed-based feasibility study in the Eastern Sanilac Coastal Tributary Watershed that would holistically investigate the erosion and washout issues along the coastline and in the tributary streams along the coast as well as associated ecosystem restoration opportunities in the area. We would be willing to actively participate as a key stakeholder in the study area by sharing relevant and readily available data and information that we may have, helping to identify other local sources of information and available resources, and serving as an advocate for the study with local organizations and agencies, businesses, and the general public.

I will act as the principal point of contact for further discussions regarding this potential study.

Sincerely,

Gregory L Alexander
Sanilac County Drain Commissioner
810-648-4900

Western Lake Huron Basin (WLHB) Watershed Reconnaissance Study

Water Resource Problem/Opportunity Summary (TS-8)

Water resource problem or opportunity: *Ambrose Road and Spaulding Drain, Saginaw County, Michigan*

The opportunity involves stream stabilization and ecosystem restoration of about one-half mile of the Spaulding Drain that parallels Ambrose Road (see Figure 1). Restoration may involve measures to address erosion, bank failure, and high levels of sedimentation along the Spaulding Drain. This section of the drain is immediately upstream of the Shiawassee National Wildlife Refuge (SNWR). The edge of the drain abuts the road along this section, which has contributed to stream channel instability. The impacts from this problem include loss of stream habitat for fish and wildlife, degraded water quality, and excessive sediment loading to the SNWR, Saginaw River, and eventually to Lake Huron. Because of the stream channel instability, the future integrity of Ambrose Road in this reach of stream is questionable. The potential restoration project has strong local support.

It appears that the Corps Section 206 program (Ecosystem Restoration) may be appropriate for this project to achieve the desired habitat restoration. Because of the potential loss of (or damage to) Ambrose Road, the Corps Section 14 program (Emergency Streambank and Shoreline Protection) may be an appropriate authority to consider for those areas of imminent potential impact.

Problem/opportunity category: The project area is within the Saginaw River/Bay Area of Concern (AOC). The project would address priority categories of ecosystem restoration, nearshore health and non-point source pollution, and sediment management.

County: Saginaw County, Michigan

Watershed: Flint River watershed, Michigan

Significant resources affected: The project would improve habitat within the Spaulding Drain and protect important aquatic habitat in the SWNR. The project would likely result in significant reduction in sediment and other pollutant loadings (N, P, metals) to the Refuge and Lake Huron.

Key stakeholders (other than pertinent Federal/State agencies): Saginaw County Drain Commissioner (POC - Mathew Rappley, Drain Commissioner); Saginaw County Road Commission (POC - Brian Wendling, Managing Director); Shiawassee National Wildlife Refuge – (POC – Steve Kahl and Michelle VanderHaar); Saginaw County Conservation District (Patti Copies, Executive Director)

Potential solution(s): Restoration of the Spaulding Drain may involve some or all of the following measures: (1) erosion/sediment reduction and control measures in the channel, (2) sediment removal, (3) features to improve fish habitat, (4) implementation of BMPs on contiguous lands, and (5) other pertinent measures.

Key issues for detailed feasibility-level investigations: There appear to be no significant issues or potential impediments to the proposed restoration study/project. The study/project has strong interest from the Drain Commissioner, Road Commission and the SNWR. The project would be subject to environmental review (NEPA) and full public coordination.

Potential non-federal partners: Saginaw County Drain Commissioner (POC - Mathew Rappley, Drain Commissioner); Saginaw County Road Commission (POC - Brian Wendling, Managing Director)

Knowledgeable technical stakeholder point(s) of contact (and contact info): Matthew D. Rappley, Public Works Commissioner, mrappley@saginawcounty.com; Brian Wendling, Managing Director, wendlingb@scrc-mi.org

Pertinent reference documents: TBD

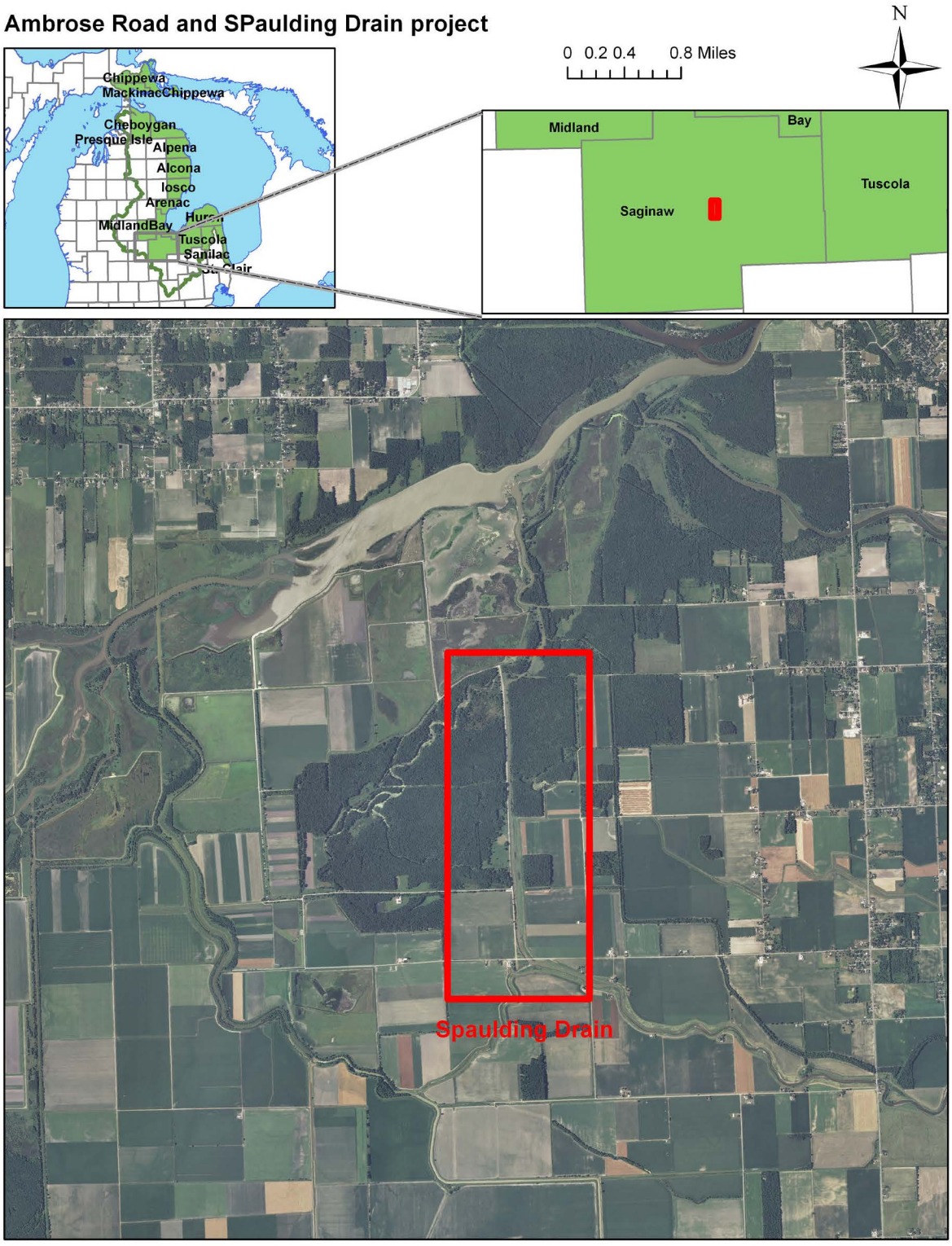

Figure 1. Location of Spaulding Drain potential project area