2. Chapter 2 - State of the Kawkawlin River Watershed

2.1 *Watershed Characteristics*

2.1.1 *Geographic Setting*

The Kawkawlin River has approximately 53.4 miles of main channel consisting of the Main, South and North Branches, with 450 miles of tributary watercourses and a watershed area of nearly 225 square miles in Bay, Midland, Gladwin and Saginaw Counties (Figure 2.1). Elevations in the watershed range from 580 feet at Lake Huron (Saginaw Bay) to 805 feet above mean sea level in the upper reaches of the North Branch of the Kawkawlin, see Exhibit 5 in Appendix A. Current municipal project partners within the KRW include the municipalities listed below, which make up the Kawkawlin River:

- Bangor Township
- Beaver Township
- Garfield Township
- Kawkawlin Township
- Monitor Township
- Mt. Forest Township
- Williams Township

2.1.2 *Demographic Characteristics*

The watershed encompasses a total of 225 square miles. That includes four counties, three cities and 14 townships and has over 30 stakeholder groups interested in restoration of this watershed. The population density of the area is very light. The surrounding township populations and their contributing area to the watershed are shown in Table 2.1.

Table 2.1 Bay County Township Populations and Contributing Areas

TOWNSHIP	*POPULATION*	*CONTRIBUTING AREA*
Bangor	15,547	4,625 acres
Monitor	10,037	18,091 acres
Kawkawlin	5,104	12,957 acres
Williams	4,492	21,331 acres
Beaver	2,806	22,388 acres
Garfield	1,775	11,876 acres
Mt. Forest	1,405	2,300 acres

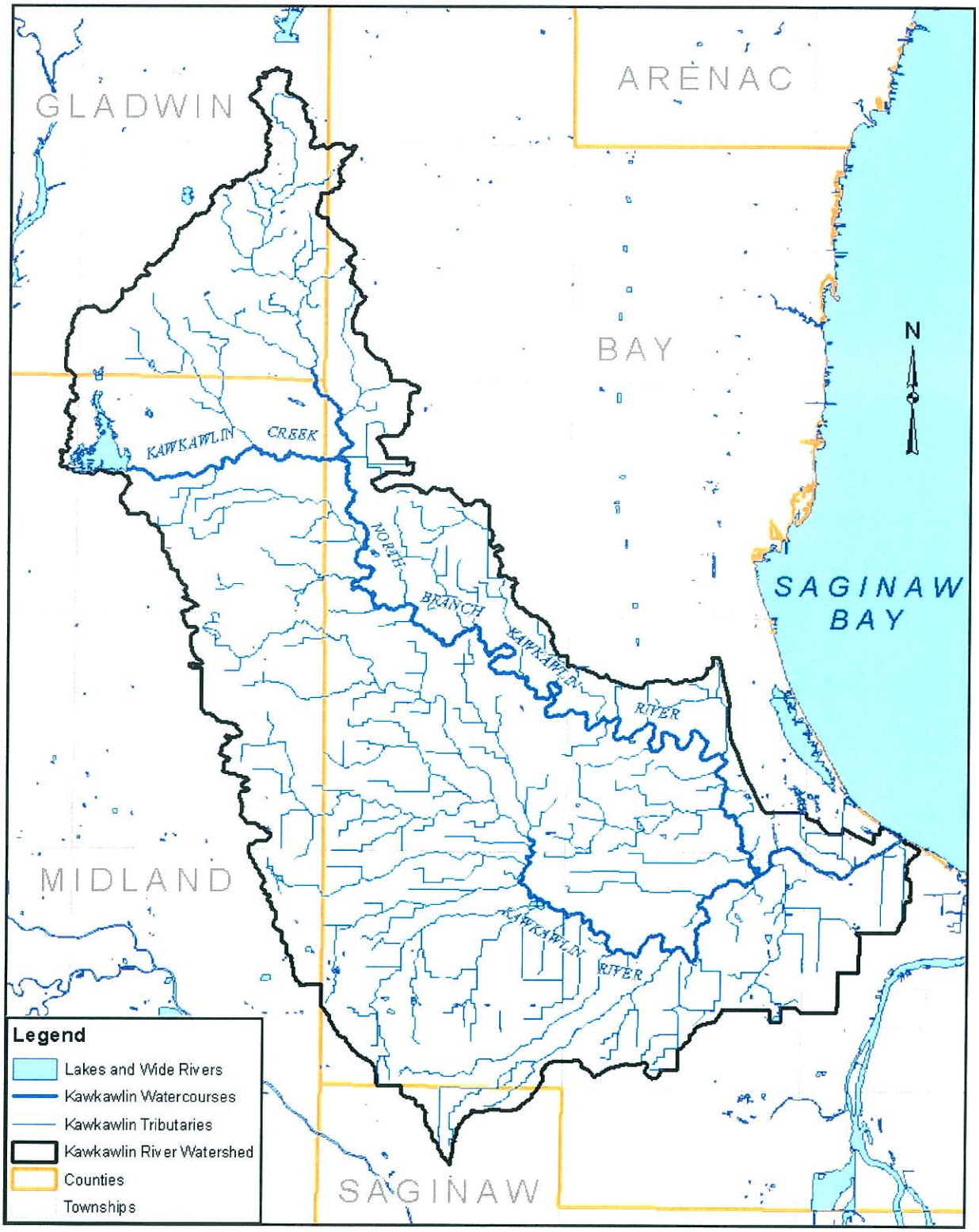

Figure 2.1 Kawkawlin River Watershed

The areal breakdowns for the counties in the Kawkawlin watershed are as follows in Table 2.2.

Table 2.2 Breakdown of County Contributing areas in the Kawkawlin River Watershed

County	*Contributing area (acres)*	*Contributing Area (sq. mi.)*
Bay	94,452	147.58
Gladwin	16,807	26.26
Midland	31,095	48.58
Saginaw	1,568	2.45

2.1.3 *Physical and Natural Features*

The Kawkawlin River is actually formed by the combination of two tributaries with entirely different characteristics. The North Branch, which is approximately 36 miles long, begins at the Kawkawlin Creek impoundment in Gladwin and Midland Counties and drains an area that is heavily forested. The North Branch contains a rocky bottom that supports the spawning of a variety of fish species, most notably walleye. The meandering North Branch has a moderate gradient and flows fairly swiftly during most months of the year.

Using the maps developed from DNRE data sources in ArcMap GIS, the South Branch, with a length of approximately 12.9 miles, tends to flow more slowly and has very little fall. This branch drains the agricultural and moderate urbanized areas of Bay and Saginaw Counties. These two tributaries come together near the Village of Kawkawlin to form the Main Branch of the Kawkawlin River, which then flows approximately 4.63 miles to the Saginaw Bay. The Main Branch flows through an urbanized area made up of Kawkawlin and Bangor townships (Kawkawlin River Conservation Partnership).

Branch	*Reach Length (ft)*	*Reach Length (mile)*
Main	24,460	4.63
North	189,322	35.85
South	68,122	12.90

2.1.4 *Hydrology*

The watershed has approximately 53.4 miles of riverine channel, which includes the Main, North and South branches, and over 450 miles of tributaries and established county drains which drain

into the river. The development of drains, ditches and field tile systems has served to increase flow velocities and volumes in surface and storm water drainage systems. This region of Michigan averages about 27.1 inches of precipitation annually based on 36 years of complete data from 1931 to 1978.

The only stream flow data is for the North Branch (HUC 04080102) with a drainage area of about 101 square miles upstream of the former USGS gage. The gage has records for the period of 1951 to 1982. The highest peak flow recorded was on May 18, 1974, at a rate of 1,610 cubic feet per second (cfs). The lowest recorded annual peak was 128 cfs on May 4, 1964. The highest annual flow rate average was 130.9 cfs in 1976 and the lowest recorded annual average was 5.86 cfs in 1977. As expected, the lowest monthly statistics of discharge are in the months of July (14 cfs), August (5.2 cfs), September (10 cfs) and October (14 cfs). The peak discharge months are March (185 cfs), April (188 cfs) and May (103 cfs) which correlates with snowmelt and spring runoff conditions as experienced in the watershed. See Exhibit 2 in Appendix A.

Groundwater recharge rate for the Kawkawlin River is estimated to be in the range of 4.9 inches per year (SIR 2005-5284). One of the priorities of the project is to evaluate the waterways and provide recommendations to improve water quality conditions but maintain drainage functions. The base flow needs improvement to help with water quality issues in the watershed, but it is difficult to improve this function based on the direction the land use has moved over the last one hundred years. This watershed management plan proposes best management practices, such as an increase in wetland area and establishment of greenways along the riparian corridor that may improve baseflow, but baseflow may never return to pre-settlement status. This plan will make an effort to provide landowners with information and incentives for everyday management of activities and to lessen environmental impact in the watershed. Exhibit 3, in Appendix A provides information on the watershed's groundwater elevations and Exhibit 4 shows the recharge rate for groundwater in the watershed at the rate of inches per year.

2.1.5 *Land Use and Land Cover*

Land use in the Kawkawlin River Watershed is predominately agricultural, with the northern portion of the watershed being heavily forested as shown in Exhibit 8 and detailed in Table 2.3.

Recreational use in the watershed includes hunting, fishing and boating. Boating activities along the lower reaches of the Kawkawlin River play a big role in the local economy. Appendix A, Exhibit 8 provides the watershed's landuse / land cover information from 1992.

Table 2.3 Kawkawlin River Watershed Land Use Saginaw Bay/River RAP 1994

LAND USE	*NORTH BRANCH KAWKAWLIN RIVER*	*SOUTH BRANCH KAWKAWLIN RIVER*
Urban	2.6%	12.6%
Agriculture	43.1%	73.3%
Forested	40.2%	7.5%
Water	0.1%	0.3%
Non-formal	6.1%	4.7%
Wetland	7.9%	1.6%

2.1.6 *Geomorphology*

The watershed consists of flat, lacustrine clay soils that have been artificially drained for agricultural purposes. A thorough geomorphic assessment has not been completed at this time. Most of the tributaries and portions of the main channel have been dredged or maintained over the last several decades. In large part, the tributaries consist of straight, deep, trapezoidal channels capable of containing relatively large storm flows.

Natural sections of the main branches of the Kawkawlin, as well as the relatively undisturbed tributaries, would be considered to be C or E type channels if using the Rosgen (1996) classification system. These channels are distinguished by their wide floodplains that are inundated during smaller storm events (1 to 5-year).

The topography of the Saginaw Bay Watershed is a primarily produced from historical glacial and post-glacial processes. See Exhibit 7, Appendix A. The region is classified as lake plain and consists of limestone, coal, shale and sandstone deposits. Under the topsoil are clay sediments over most of the region. There are sand plains ranging in depth from 5 to 10 feet and widths of several miles, which were deposited by glacial streams and to this day serve as streambeds for the regions existing rivers. In comparing aerial photography of 1938 to 1998 and overlaying a

survey of the center line of the Main, South and North Branches of the Kawkawlin, it was noted there has been little change in channel location brought about by natural processes of erosion and sinuosity. See Exhibit 13 in Appendix A.

2.1.7 *Soils in the Watershed*

The soil types that are specific to the Kawkawlin Watershed are primarily Tappan-Londo-Poseyville association, Londo-Tappan association, Wixom-Pipestone-Tappan association and Pipestone-Tobico-Rousseau association. The Tappan-Londo-Poseyville association are found in nearly level, somewhat poorly-drained soils that formed in loamy and sandy material on till plains modified by lake waters. Londo-Tappan association soils are nearly level, somewhat poorly-drained soils that formed as the association above. Whereas, the Wixom-Pipestone-Tappan association are found in nearly level, somewhat poorly-drained soils that formed in loamy and sandy material on outwash plains and till plains modified by lake waters. Pipestone-Tobico-Rousseau associations are nearly level to gently sloping, well-drained to poorly-drained soils formed in sandy material on outwash plains and beaches (Soil survey of Bay County, USDA SCS, 1980)

The predominate soil associations in the watershed are Tappan-Londo-Poseyville, followed by Londo-Tappan and then Wixom-Pipestone-Tappan (refer to Exhibit 10 in Appendix A). The first two soil associations work well for the agricultural industry, if drained properly. The latter soil association does well as woodland or pasturelands. These associations are generally poor for use as building sites because of seasonal high water tables, poor drainage and percolating tendencies. If the soils trends toward the Poseyville soils, the potential for construction is much better. When reviewing these soil associations the predominate aspect associated with them their potential is well suited for the agricultural industry. But to realize their full potential all must be drained with tile.

The rate that water infiltrates into the soil and moves through the soil affects the amount of runoff leaving a site. The infiltration rate is the rate at which water enters the soil at the surface and is controlled by surface conditions. The transmission rate is the rate at which the water

moves through the soil and is controlled by the soil layers. In general, when the rate of infiltration and transmission through the soil is higher, the volume of runoff is lower.

Fine textured soils, such as clay, produce higher runoff volume than do coarse textured soils, such as sand. Sites having clay soils may require the construction of more elaborate drainage systems than sites having sandy soils.

Soil scientists have assigned all soils to one of four hydrologic soil groups based infiltration and transmission rates. The four groups are:

Group A Soils: High infiltration rate, low runoff potential. Well-drained to excessively-drained sands or gravelly sands, and a high rate of water transmission.

Group B Soils: When thoroughly wet, but not saturated, these soils display moderate infiltration rates, moderately well to well-drained, and have a soil that is moderately fine to medium coarse in texture with a moderate rate of water transmission.

Group C Soils: These soils have slow infiltration and transmission rates and high runoff volume when wet. They have a layer that impedes downward movement of water consisting of moderately fine to fine texture.

Group D Soils: Very slow infiltration rate, high runoff potential. Clays with high shrink/swell potential, permanent high water table, clay pan or clay layer at or near the surface, shallow over nearly impervious material and very slow rate of water transmission.

The infiltration and transmission rates and runoff volumes of all soils are affected by climatic conditions such as freezing. Regardless of their hydrologic soil groups, all frozen soils have high runoff rates and volumes. Of the soils in the watershed, they vary based on location. Typically the soils around the South Branch and Main Branch are heavier soils, whereas the soils become "lighter" in the northern reach of the watershed. Over 85% of the occurring soils in the watershed area are classified by the USDA as poorly drained.

Table 2.4. Hydrologic Soil Groups in the Watershed

Soil type	Hydrologic Soil Group (HSG)
Londo	C
Pipestone	B
Poseyville	C
Rousseau	A
Tappan	D/B
Tobico	D/A
Wixom	B

A substantial amount of the soils in lower reaches and around the Main Branch are C or D types and, if drained well, are suited as productive agriculture soils. These soils present a challenge for best management practices requiring infiltration. For example, rain gardens, bio-swales, infiltration strips and other practices to recharge groundwater do not work well and must be designed with a system to provide for slow drainage of the soils to work properly. When looking at the soil groups above, it is easy to determine that the watershed is a "runoff" system and allows for substantial surface drainage. Agricultural practices to prevent erosion and sedimentation must be in place to filter surface runoff and delay the runoff as long as possible to prevent sediment transport and prolong baseflow as much as possible.

2.1.8 *Wetlands*

The Department of Natural Resources and Environment (DNRE) has developed a wetlands resource status and trends for this project, see Appendix B. Based on the GIS analysis the following results were presented at a stakeholders meeting:

Table 2.5. Wetland Status and Trends

	Pre-settlement Wetland Conditions	2005 Wetland Conditions
Total Acres of Wetland	71,968	23,264
Number of Polygons	1,461	4,160
Average size (acres)	49	5.5

From the data provided in the report from the DNRE staff, 32% of the original wetland acreage remains in the watershed, but there is a 68% loss of total wetland resources. In Chapter 3, each

of the eight sub-watersheds will be presented and prioritized based on the percentage of wetland loss.

Wetland definitions include three main components. Wetlands:

1. Are distinguished by the presence of water, either at the surface or within the root zone;
2. Have unique soils conditions (hydric) that differ from adjacent uplands;
3. Support vegetation adapted to wet conditions (hydrophytes) and conversely are characterized by the absence of flooding intolerant vegetation.

Wetlands are essential in a watershed, especially in a watershed that, as indicated by the soils, is essentially a "runoff" system. Long regarded as wastelands, wetlands are now recognized as important features in the landscape that provide numerous beneficial services for people and for fish and wildlife. Some of these services, or functions, include protecting and improving water quality, providing fish and wildlife habitats, storing floodwaters and maintaining surface water flow during dry periods. These beneficial services, considered valuable to societies worldwide, are the result of the inherent and unique natural characteristics of wetlands. Wetlands affect adjacent or nearby ecosystems within a watershed. For example, wetlands can help by storing runoff to prevent flooding for downstream communities or by removing sediments and their attached nutrients in runoff from the watershed's land uses by acting as a filter.

If something has "value," then it is worthwhile, beneficial or desirable. The value of a wetland lies in the benefits that it provides to the environment or to people, something that is not easily measured. Wetlands can have ecological, social or economic values. Wetland products that have an economic value, such as commercial fish or timber, can be assigned a monetary value. True wetland value, however, goes beyond money. How much value does one place on the beauty of a wetland or its archeological significance? Wetland values are not absolute. What is valuable and important to one person may not be valuable to another person. As an example, the value of a wetland as duck habitat may be important to the hunter or birdwatcher but not to the farmer who owns the land.

According to Act 451, Section 30301(d), wetlands "contiguous to the Great Lakes or Lake St. Clair, an inland lake or pond, or a river or stream" or "more than 5 acres in size" are regulated by

the State. Construction activities are prohibited in a regulated wetland without a permit. Certain activities, such as farming and forestry, are allowed in regulated wetlands.

2.1.9 *Fisheries of the Kawkawlin River*

The North Branch of the Kawkawlin River has a wetland complex that provides for important walleye and northern pike spawning habitat during the spring of the year. There is significant interest in maintaining or improving habitat for the sustainability of this spawning region. Overall, the habitat of the North Branch is considered fair to moderately impaired per MDEQ reports. Per these reports, the upper reach is homogeneous but lacks diversity of pools, riffles and bends. Sedimentation of the existing habitat has created conditions that indicate this niche is not diverse or well balanced. In the far upper reaches of the North Branch (Herner Drain near Jefferson Road), has indications of good coldwater habitat. Restoration and preservation tasks need to occur to protect the area for long-term benefits of fisheries.

There is a walleye rearing pond on the South Branch of the Kawkawlin that has been in place for decades and has provided a substantial amount of fingerlings for planting to maintain the walleye fishery of Saginaw Bay. Water quality issues that affect the river can have detrimental effect on this economically important fish habitat. The Saginaw Bay is nationally recognized as a great walleye fishing destination and the Bay hosts substantial amateur and professional tournaments. The established tourist economy of this Great Lakes Bay Region has grown to depend on the fisheries of the local water resources. Many service oriented jobs in the region such as the hotel, restaurants, marine and sporting are supported by the regions sport fishing. The Kawkawlin Watershed is an integral part of this complex fishery and the Saginaw Bay's greater ecosystem.

A recent inland stream survey completed in August of 2008 on the South Branch of the Kawkawlin River showed the most common species were round gobies, which accounted for 45% of the catch during this survey. The yellow bullhead was the next most abundant species with 21% of the catch. Green sunfish and bluegill were present in substantial amounts. Various other species were accounted for as follows: black crappie, bluntnose minnow, blackside darter, golden shiner, largemouth bass, logperch, central mudminnow, northern pike, pirate perch, pumpkinseed sunfish, rock bass, stone cat and yellow perch. The representation of this piscine

community is typical of the warmwater habitat of this part of Michigan. The study confirms the standard finding of the watershed study which was excessive sedimentation and nutrient inputs into the riverine system. See Appendix C.

2.1.10 *Recreational Opportunities*

Bay County historically began as a lumbering/fishing area, when the land was cleared agriculture began to dominate. Because of its location on the Great Lakes and its establishment as a port on this lake transport system, Bay City began entry into the manufacturing portion of the State's economy. Bay City had automotive parts manufacturing, heavy construction equipment manufacturing (American Brownhoist), ship building (Defoe Shipbuilding yards) and other manufacturing, support industries and service-oriented jobs. The people settling in this region made use of the local water resources. Numerous marinas and yacht clubs are sustained in the County. The County also has the Bay City State Park, which is a well known beach and outdoor recreation complex. There are numerous public boat launches around the County.

The Kawkawlin River's lower reach has an established suburban population that enjoys its position along the river's edge. Boat docks and mooring facilities line the lower reach. The Kawkawlin River's South Branch has a small park and launching facility for recreation boating by shallow draft watercraft such as canoes and kayaks. The stakeholder group has expressed an interest in development of water trails for kayaks and canoes. However, the North and South Branches currently do not have much recreational boating traffic. Many residents would like to see the recreational aspects of the river improved for use by kayaks and canoes.

Another recreational aspect being considered is the development of bike touring trails to bring the biking public into the watershed and showcase project areas as part of a tour in the watershed. It would be beneficial to get a local or regional biking group to develop an interest in establishing a trail system within the watershed taking advantage of natural features. This could provide an opportunity to showcase the watershed's natural features, restoration projects and provide for public outreach and education through signage. The more people using the river and watershed would create a better opportunity for protection of this resource on a daily basis.

Some of the problems with navigation are related to low base flow, excessive sedimentation, excessive aquatic plant growth, woody debris, trees in the river, pipelines and channel blockage from debris. See the list of identified problem areas in Appendix H.

The northernmost reaches of the watershed have unique recreational opportunities. In Midland County the Kawkawlin River Flooding area hosts paddling sports such as canoeing and kayaking. This large expanse of water also provides for excellent bird and wildlife observations for those interested in such endeavors.

Also, in Midland County is the start of the Midland to Mackinaw Trail, which is an ancient 210 mile Native American footpath. This trail was restored by the Boy Scouts' Auburn based Lake Huron Area Council No. 265 and other volunteers. This hiking and cross country ski trail goes from Midland to Mackinaw City and only passes through two communities, Cheboygan and Mackinaw City. There is camping along the trail on public lands which is free, however a DNR permit is necessary for camping on state lands on the trail. A map of the trail can be obtained from the Lake Huron Council BSA for $2.00.
(Source; http://www.traillink.com/trail/midland-to-mackinac-trail.aspx)

The North Midland Family Center is located on East Shearer Road just south of the Kawkawlin River Flooding Area. It promotes programs and services for all individuals in the Northern Midland Community. Education programs from this Watershed Management Plan could be incorporated into their vision for their community and help the headwaters region of the Kawkawlin River Watershed.

2.1.11 *Invasive and Non Native Species*

Competitive non-native and invasive species are a threat to native wildlife, plants and fish in the watershed. The introduction of invasive species is the result of shipping, recreational boating, and landscaping activities. If these species are not addressed in a decisive manner, they can flourish in the natural areas and watercourses of the river system. For example, zebra mussels, round goby and spiny water fleas can reproductively out-compete native species and eliminate

food sources for mature fish and wildlife. These are just a few examples of species that can be easily transported by recreational boaters from one water body to another.

Invasive wetland plants such as purple loosestrife, canary grass and phragmites have become predominant species along the Saginaw Bay coastal region. The once beautiful multi-species coastal wetlands are slowly becoming a mono-species wetland zone. The phragmites can grow in height from 4 to 12 feet for a plant and block views of the lakes and rivers and create access problems for the public. The phragmites has even been known to anecdotally hinder winter rescue operations along the coastal areas of Saginaw Bay by preventing rescuers from seeing fishermen in distress and blocking access to the water by rescue vehicles and equipment.

- The spiny water flea (*Bythotrephes cederstroemi*), or "B.C.," is not an insect at all, but a tiny (less than half an inch long) crustacean with a long, sharp, barbed tail spine. A native of Great Britain and northern Europe east to the Caspian Sea, the animal was first found in Lake Huron in 1984 – probably imported in the ballast water of a transoceanic freighter. Since then, populations have exploded and the animal can now be found throughout the Great Lakes and in some inland lakes.

No one is really sure what effect spiny water fleas will have on the ecosystems of the Great Lakes region. But resource managers are worried, because the animals may compete directly with young perch and other small fish for food, such as "Daphnia" zooplankton.

Spiny water fleas also reproduce rapidly. During warm summer conditions each female can produce up to 10 offspring every two weeks. As temperatures drop in the fall, eggs are produced that can lie dormant all winter.

High numbers would not pose a problem if spiny water fleas were heavily consumed by predators. But its sharp spine makes it extremely hard for small fish to eat, leaving only some large fish to feed on them. As a result, spiny water flea populations remain high while populations of plankton, which they eat, have declined.

Likely means of spread: Spiny water flea eggs and adults may wind up unseen in bilge water, bait buckets and livewells. Also, fishing lines and downriggers will often be coated with both eggs and adults.

- Zebra mussels (*Dreissena polymorpha*) are small, fingernail-sized mussels native to the Caspian Sea region of Asia. They are believed to have been transported to the Great Lakes via ballast water from a transoceanic vessel. The ballast water, taken on in a freshwater European port, was subsequently discharged into Lake St. Clair, near Detroit, where the mussel was discovered in 1988. Since that time, they have spread rapidly to all of the Great Lakes and waterways in many states, as well as Ontario and Quebec.

  Diving ducks and freshwater drum eat zebra mussels, but will not significantly control them.

  Likely means of spread: Microscopic larvae may be carried in livewells or bilge water. Adults can attach to boats or boating equipment that is in the water.

- The goby is a bottom-dwelling fish that has great potential for causing impacts on Great Lakes fisheries. Originally, the round goby and the tubenose goby were introduced into the St. Claire River in 1990, probably via contaminated ballast water of transoceanic ships.

  Round goby are thriving in the Great Lakes Basin because they are aggressive, voracious feeders which can forage in total darkness. The round goby takes over prime spawning sites traditionally used by native species, competing with native fish for habitat and changing the balance of the ecosystem. The round goby is already causing problems for other bottom-dwelling Great Lakes native fish like mottled sculpin, logperch and darters. Goby can also survive in degraded water conditions and spawn more often and over a longer period than native fish. Unfortunately, they have

shown a rapid range of expansion through the Great Lakes.

Many of the characteristics of the round goby invasion parallel that of the Eurasian ruffe which is also now in the Great Lakes ecosystem.

- Phragmites (*Phragmites australis*), also known as Common Reed, is native to the United States. However, the more invasive strains originated in Europe and are thought to have been introduced in the late 1800s through ship ballasts. This tall plumed perennial wetland grass is found along roadside ditches, drains and marsh areas of the Great Lakes. In the Saginaw Bay and Kawkawlin Watershed, it has been forming colonies that cover expansive areas and chokes out beneficial vegetation such as cattails and other native plants that provide cover, habitat and food for native wildlife and fish.

- Purple loosestrife (*Lythrum salicaria*) is a wetland plant from Europe and Asia. It was introduced into the east coast of North America in the 1800s. First spreading along roads, canals and drainage ditches, then later distributed as an ornamental, this exotic plant is in 40 states and all Canadian border provinces.

  The plant can form dense, impenetrable stands that are unsuitable as cover, food or nesting sites for a wide range of native wetland animals, including ducks, geese, rails, bitterns, muskrats, frogs, toads and turtles. Many rare and endangered wetland plants and animals also are at risk.

  Purple loosestrife thrives on disturbed, moist soils, often invading after some type of construction activity. Eradicating an established stand is difficult because of an enormous number of seeds in the soil. One adult can disperse 2 million seeds annually. The plant is able to re-sprout from roots and broken stems that fall to the ground or into the water.

A major reason for purple loosestrife's expansion is a lack of effective predators in North America. Several European insects that only attack purple loosestrife are being tested as a possible long-term biological control in North America.

Likely means of spread: Seeds escape from gardens and nurseries into wetlands, lakes and rivers. Once in aquatic systems, seeds are easily spread by moving water and wetland animals.

(Source: www.great-lakes.net/envt/flora-fauna/invasive/)

These are but a few of the invasive species that have created problems in the Saginaw Bay region and the Great Lakes in general. Other aquatic plants have become a problem along the Kawkawlin also such as Eurasian milfoil and curly-leafed pondweed are also problems that must be addressed. With the phosphorus loading of the Kawkawlin River and with phosphorus as the limiting nutrient, aquatic vegetation in the lower reach of the Kawkawlin will be a significant problem. The Main Branch has an aquatic plant treatment program in place; however, limiting the nutrient sources would help divert funds from aquatic plant management to matching funds for other projects to implement in the watershed, such as determining locations and targeting "hot spots" of phosphorus laden sediments for removal from the South and Main Branches of the River to remove the source of nutrients for aquatic vegetation.

2.1.12 *Debris and Trash*

The dumping of trash at remote crossings and along drain banks is common place in rural areas of the watershed and is a result of human activities. This activity is detrimental to wildlife and fish causing and increase in mortality and disease and reduced aesthetics of the watershed. Additionally, this dumping of large quantities of trash can block waterways and increase the incidence of erosion by changing channel hydraulics. This anthropomorphic activity results in water quality degradation. It is important that the residents understand their roles as stewards of the watershed. Otherwise there is a general lack of concern for the water resources of the region. A summary of sites can be found in Appendix H.

2.1.13 *Point Sources*

The NPDES discharge inventory lists the watersheds townships involved in Phase II storm water discharge, which are: Charter Township of Bangor, Kawkawlin Township, and Monitor Township. Additionally, the White Birch Village Mobile Home Park has a permit to discharge storm water to a county drain. There are a total of 21 industrial permits in the watershed, of these only two have monitoring requirements. The Huron and Eastern Railway Company which discharges to the Kawkawlin River and Dow Corning Corporation which discharges to Hoppler Creek have general permits to discharge to these surface waters and the permits can be viewed on the DNRE websites as necessary. A complete list of the 26 permit holders and their permit numbers is located in Table 2.7.

Wastewater and Industrial Discharges:

The following table is a list of permitted point source discharges to the North Branch of the Kawkawlin River TMDL Watershed.

Table 2.6. NPDES Permitted Discharges for North Branch of the Kawkawlin

Facility	Permit No.	County	Receiving Waters
Individual Permit			
MDOT MS4	MI0057364	Statewide	----------
MIG580000 General Permit	**WWSL**		
White Birch Village MHP	MIG580079	Bay	Hembling Drain
MIS119000	**Storm Water From Industrial Activities**		
R & W Auto Sales	MIS210465	Bay	N. Br. Kawkawlin
MIG610000	**Municipal Separate Storm Sewer System (MS4)**		
Bay CDC MS4-Bay	MIG610195	Bay	County wide
Bay CRC MS4- Bay	MIG610196	Bay	County wide
Kawkawlin Twp MS4-Bay	MIG610188	Bay	Township wide
Monitor Twp MS4-Bay	MIG610189	Bay	Township wide

The following Table 2.7 is a list of NPDES Permitted Point Source Discharges to the Kawkawlin River Watershed.

2.7: NPDES Point Source Discharge Permits in the Kawkawlin Watershed

NPDES Permit_no	Facility_Location_Name	Industry Type	Certificate_of_Coverage_Type	Receiving Waters
MIS210504	3M Scientific Anglers	Manufacturing facility	SW Industrial CY2 General Permit	Labonzinski Drain
MIG490270	Beaver Road Pit		Unknown	
MIS210805	Bennett Construction, Incorporated	Sand Mining	SW Industrial CY2 General Permit	unnamed trib. of Pashok Dr
MIG610187	Charter Township of Bangor	MS4	SW Municipal	Kawkawlin River & Drains
MIS210808	DeShano Sand Mining	Mining	SW Industrial CY2 General Permit	Kawkawlin River
MI0000329	Dow Corning Corporation	Manufacturing facility	SW-Containment CY2 General Permit	Dell Creek
MIS220041	Dow Corning Corporation	Manufacturing facility	Monitoring Requirements	Hoppler Creek
MIS210176	Eddy Brothers Auto Parts, Incorporated	Automotive	SW from Industrial activity CY2	Unnamed Dr. (to Kawk. R.)
MIS210163	General Housing Corporation	Modular Homes Manufacturer	SW Industrial CY2 General Permit	Culver Creek
MIS210464	Holsinger Manufacturing Corporation	Furniture manufacturer	SW Industrial CY2 General Permit	Kawkawlin River
MIS210562	Hooper Auto Sales	Auto parts/salvage	SW Industrial CY2 General Permit	Kaiser Drain
MIS210755	Howe Auto Sales	Auto parts/salvage	SW Industrial CY2 General Permit	Kawkawlin River
MI0027545	Huron and Eastern Railway Company	Railroad	Monitoring Requirements	Kawkawlin River
MIG610188	Kawkawlin Township	MS4	SW-Municipal	Kawkawlin River & Drains
MIS210467	Metro Fabricating	Metal fabricating	SW Industrial CY2 General Permit	Cole Drain
MIS210167	Michigan Department Military & Vet Affairs	MS4 (Nat'l Guard Armory)	SW from Industrial activity CY2	Larry Lake
MIG610189	Monitor Township	MS4	SW-Municipal	Kawkawlin River & Drains
MIS210526	Plyforms, Incorporated	Manufacturing	SW Industrial CY2 General Permit	Culver Creek
MIS210645	Quantum Composites, Incorporated	Manufacturing facility	SW Industrial CY2 General Permit	Wilcox Drain
MIS210465	R & W Auto Sales	Automotive	SW Industrial CY2 General Permit	N. Br. Kawkawlin R.
MIS210629	Repair & Leasing Services	Automotive ?	SW Industrial CY2 General Permit	Kawkawlin River
MIS210450	Terry's Auto Parts	Automotive	SW Industrial CY2 General Permit	Unnamed trib to Millpond Dr.
MIS210175	Tri City Used Cars, Incorporated	Automotive	SW Industrial CY2 General Permit	Unnamed trib to Kawk. R.
MIS210561	Unit Step	Concrete	SW Industrial CY2 General Permit	Millpond Dr. Branch 2
MIG580079	White Birch Village Mobile Home Park	MS4	Unknown	
MIS210511	Wieland Sales, Incorporated	Retail	SW Industrial CY2 General Permit	Bradford Creek