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## CHAPTER TWO: LAND USE AND WATER QUALITY

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### INTRODUCTION

Phase Two of the Thunder Bay River Watershed Initiative (TBRWI) contains over 16,000 acres of surface water in its lakes, in addition to hundreds of miles of rivers, streams and tributaries. The quality of these important waterbodies becomes increasingly at risk as development of natural areas continues and forested lands are converted to commercial and residential parcels. As these and other land use changes continue to take place, the associated pollution impacts to lakes, streams and rivers increase. During periods of high runoff (rainstorms, snowmelts, etc.) contaminants such as fertilizers, sediments, nutrients, oil, grease, road salt and toxic chemicals are flushed from streets, parking lots, yards and agricultural lands. The pollutant-laden water can either move overland to the nearest lake, stream or wetland or percolate through the soil into the groundwater. Storm sewers and drains, which increase with development, provide an even more direct route for runoff to reach the water resources.

Numerous water quality studies have been conducted within the Thunder Bay River Watershed that contain information specific to the North, Upper South and Lower South Branches of the Thunder Bay River. Although pollutants such as sediment from eroding streambanks and road/stream crossings have been identified, Phase Two of the TBRWI presently exhibits a *Good to Excellent* water quality rating. With the ever-increasing demands development puts on water resources, however, great care will need to be taken to ensure continued high water quality for the future.

### DESIGNATED USES OF THE THUNDER BAY RIVER

Designated uses are those activities which are dependent on good water quality. Part 31 (formerly known as the Water Resources Commission Act) of the Natural Resources and Environmental Protection Act, P.A. 451 of 1994, as amended requires all waters of the State of Michigan to be of the quality to meet seven designated uses:

- 1.) Agriculture
- 2.) Industrial water supply
- 3.) Public water supply at the point of intake
- 4.) Navigation
- 5.) Warm or cold water fisheries
- 6.) Other indigenous aquatic life and wildlife
- 7.) Partial or total body contact recreation

At the present time, Phase Two of the TBRWI meets the requirements of all seven Designated Uses. As the population within the watershed continues to grow, however, the impact of human activities on the quality of water will become increasingly noticeable. Residential and commercial development, along with increased recreational activities may stress watershed critical areas, threatening some designated uses and degrading the status of others to "impaired".

**Table 11** lists the status of the seven Designated Uses and shows the causes and sources of threats to those uses.

<b>Table 11: STATUS OF DESIGNATED USES</b>			
<b>Designated Use</b>	<b>Impaired?</b>	<b>Threatened?</b>	<b>Cause or Source of Threat</b>
Agriculture	No	No	
Industrial	No	No	
Public Water Supply	No	Yes	Inadequate septic systems; Livestock access to streams; Groundwater contamination
Navigation	No	Yes	Sedimentation
Warm or Cold Water Fisheries	No	Yes	Impact of dam; Sedimentation from construction/development sites; Nutrients from lawn care/ agriculture practices
Aquatic Life/Wildlife	No	Yes	Development/ construction along shorelines; Invasive species; Nutrients from lawn care/ agriculture practices
Partial/Total Body Contact	No	Yes	Failing septic systems

## **DESIRED USES**

Desired Uses are those uses not required by law to meet the seven Designated Uses, but which the community has deemed important to the watershed. Although Desired Uses are not required, they are nevertheless an important component of the watershed plan. A list of desired uses for Phase Two of the TBRWI was developed by the steering committee based on input from the technical committee and concerned community members. The Desired Uses selected for the watershed to preserve the "natural " characteristics of the watershed protection measures are listed below:

- Increased opportunities for wildlife viewing
- Enhance the aesthetically pleasing quality of the watershed for scenic enjoyment
- Adequate recreational opportunities such as boating, camping, hiking, skiing, snow-shoeing, hunting and fishing on public lands

## **INITIAL WATER QUALITY SUMMARY**

In conjunction with existing data, steering committee input was used to establish the initial water quality summary. As noted above, the Thunder Bay River system has good to excellent water quality and meets the requirements for all seven designated uses. The river system is actively used for agriculture; navigation; industrial water supply; partial/total body contact recreation; indigenous aquatic life/wildlife and warm/cold water fisheries.

Headwater tributaries that meet the criteria for coldwater fisheries include the Upper South Branch to its confluence with Webber Creek, Cole Creek, Marsh Creek, Pike Creek, Beaver

Creek, McGinn Creek, Silver Creek, Little Wolf Creek, Wolf Creek, Wildcat Creek, Davis Creek, Comstock Creek, Little North Creek, West Branch River, Sucker Creek, Fish Creek, and Pettis Creek. All of the identified trout streams are located in the Upper South and Lower South Branches of the watershed.

Although water quality in the watershed is good, impacts from past and present land use practices can adversely affect the future condition of the water resources. Northern Michigan is experiencing an increase in year-round population and seasonal residents. A population increase relates to an increase in construction activities, which often facilitate the delivery of nonpoint source pollution to adjacent water bodies.

## **KNOWN AND SUSPECTED POLLUTANTS**

A review of the studies listed in *Appendix A: Thunder Bay River Watershed Historical Water Quality Data* assisted steering committee members in the effort to determine threatened or impaired status of designated uses for the Thunder Bay River. Currently all designated uses are being met, however several were found to be threatened that may eventually become impaired if existing and potential nonpoint source pollution causes are not corrected.

A list of known and suspected pollutants was developed and then prioritized by steering committee members. Overall, the committee identified one or more pollutants that impaired or threaten each designated use. Streambank, agriculture, road stream crossing, and lake shoreline inventories were conducted within the watershed. Data from these inventories, as well as from biological surveys conducted by the MDNR, indicate that the water quality of the Thunder Bay River watershed is threatened primarily by *sediment* and secondarily by *nutrients*.

*Sediments* from road/stream crossings, streambank erosion, and erosion from livestock access/cropland practices are known sources of pollution in the watershed and are a serious threat to water quality. A lake shoreline inventory was conducted which indicated that an increased input of *nutrients* (namely phosphorus) has contributed to an expansion of cladophora growth in Hubbard Lake. Agricultural runoff, livestock access to streams, waterfowl, lawn maintenance practices, inadequate or poorly maintained septic systems, and animal manure are potential sources of nutrients. Other pollutants suspected of impacting the watershed include thermal pollution (increased temperature), pesticides, heavy metals, organic compounds, brine, bacteria, and invasive species. **Table 12** shows a detailed list of each known (k) or suspected (s) pollutant, ranked by steering committee members in the order of most harmful, and the sources and causes of each pollutant.

**Table 12: Known (k) and Suspected (s) Pollutants**

<b>Pollutant</b>	<b>Sources</b>	<b>Causes</b>	<b>Threatened/ Impaired Uses</b>
<b>Sediment (k)</b>	Road/stream crossings (k)	Short culverts; Steep slopes; Runoff directed to river	<b>Cold Water Fishery; Navigation</b>
	Stormwater runoff (k)	Untreated runoff into lakes & rivers	
	Streambanks (k)	Road/stream crossings; Angler access; Past logging practices; Unrestricted livestock; hydrologic fluctuations	
	Construction practices (k)	Improper erosion & sediment control, greenbelt removal	
	Land clearing (k)	Improper erosion & sediment control, greenbelt removal	
	Oil & Gas (k)	Improper erosion & sediment control, greenbelt removal; Stream crossings	
	Livestock Management (k) Cropland management (k) ORV crossings (k)	Unrestricted access to river Fall plowing Illegal or improper stream crossings	
<b>Nutrients (k)</b>	Septic Systems (k)	Improperly designed/maintained septic systems	<b>Cold Water Fishery; Public Water Supply</b>
	Lawn Fertilizers (k)	Improper application	
	Livestock Management (k)	Animal waste containment	
	Stormwater Runoff (k)	Untreated runoff into lakes and rivers	
	Cropland Management (k)	Winter spreading of manure; Improper fertilizer application	
	Impoundment (s)	Accumulated nutrients	
<b>Invasive Species</b>	Cross contamination with other lakes, streams (k) (Eurasian Watermilfoil)	Heavy boat use on shallow waters of Fletcher Pond	<b>Navigation; Warm Water Fishery</b>
<b>Thermal Pollution (k)</b>	Stormwater Runoff (k)	Influence of warmer waters; Sediments and chemicals deposited into river	<b>Cold Water Fishery</b>
	Land Development (s)	Increased residential & commercial areas; Loss of riparian vegetation; Over-fertilization	
	Impoundment (k)	Man-made impoundments; Beaver activity	
	Forest Management (s)	Land fragmentation; Inadequate shade	
<b>Heavy Metals/ Organic Compounds (s)</b>	Stormwater Runoff (k)	Industrial/Residential toxins in runoff; Improper use/disposal	<b>Cold Water Fishery; Indigenous Aquatic/ Wildlife; Public Water Supply</b>
	Road/stream crossings (k)	Chemicals from automobiles	
	Sites of Environmental Contamination (s)	Accidental spills; Unregulated/illegal activities	
<b>Pesticides/ Herbicides (s)</b>	Lawn Fertilizers (k)	Improper application	<b>Indigenous Aquatic/ Wildlife; Public Water Supply</b>
	Cropland (s)	Improper application	
<b>Bacteria(k)</b>	Septic Systems (k)	Improperly designed/maintained septic systems	<b>Total/Partial Body Contact</b>
	Stormwater Runoff (k)	Runoff from lawns & Impervious surfaces	
	Livestock Management (k)	Animal waste directly into water body	
<b>Chlorides &amp; Brine (k)</b>	Road Maintenance (k)	Dust control; Snow & Ice removal;	<b>Coldwater Fishery</b>
	Runoff (s)	Stormwater discharge directly into water bodies	

## WATER QUALITY THREATS OR IMPAIRMENTS

Many factors can contribute to the degradation of water quality. A list of factors that are impacting water quality and future uses for the watershed was developed by the steering committee for the Thunder Bay River Watershed. Steering committee members expressed concern over several potential threats to the stability and health of the watershed. Threats cited include: sediments and contaminants introduced to lakes and streams by stormwater runoff; increased development of lake and river shorelines; loss of wetlands and wildlife habitat due to development and other human impacts; inadequate or poorly maintained septic systems and agricultural runoff that contribute bacteria and nutrients to the water system; increased sedimentation from shoreline erosion, erosion at road/stream crossings and impairment of recreation and aquatic/wildlife habitat with the introduction and spread of invasive species. **Table 13** is a compilation of the water quality concerns expressed by the steering committee, and the relationship of each concern to the affected designated use.

<b>Table 13: Threats to Water Quality</b>	
<b>Water Quality Threats</b>	<b>Threatened Designated Use</b>
Excessive plant life, log jams, dams	Navigation
Streambank/shoreline erosion	Cold fishery, aquatic/wildlife
Increased turbidity	Aquatic/wildlife
Habitat loss	Aquatic/wildlife
Bio-accumulation of pollutants	Aquatic/wildlife, coldwater/warmwater fishery,
Riparian stewardship	Coldwater fishery, aquatic/wildlife, total body contact
Septic tank management	Coldwater fishery, aquatic life/wildlife, total body contact
Riparian development, construction	Coldwater fishery, aquatic/wildlife
Road maintenance practices	Coldwater fishery, aquatic/wildlife
Manure application	Coldwater fishery, aquatic/wildlife, total body contact, public water supply
Local ordinances/enforcement/building codes	Coldwater fishery, aquatic/wildlife
Livestock access to rivers	Coldwater fishery, aquatic/wildlife, total body contact, public water supply
Riparian stewardship/Education	Coldwater fishery, aquatic/wildlife, total body contact

## INITIAL GOALS FOR THE THUNDER BAY RIVER WATERSHED, PHASE TWO

Watershed goals outline the anticipated future state of the watershed. After reviewing the pollutants found to be threatening the watershed and discussing the watershed concerns expressed by the steering committee, a list of initial goals was drafted. The purpose of the list of goals is to guide the restoration and protection of the designated and desired uses for the watershed and is based on those uses found to be threatened or impaired. **Table 14** shows each threatened use, and the goal developed to alleviate or eliminate the threat.

<b>Table 14: Initial Watershed Goals</b>	
<b>Threatened Use</b>	
<b>Public Water Supply</b>	Develop an emergency first action response plan to reduce reaction time following a hazardous materials spill
	Reduce the amount of stormwater runoff to lakes and rivers of the watershed
	Develop educational tools for citizens of the watershed
	Reduce the amount of chemical, bacterial and nutrient runoff to lakes & streams
<b>Navigation</b>	Establish responsible Land Use practices
	Reduce the amount of erosion and sediments entering water bodies
<b>Warm or Cold Water Fisheries</b>	Improve, restore and protect the coldwater fisheries
	Reduce the amount of stormwater runoff to lakes and rivers of the watershed
	Reduce the amount of chemical, bacterial and nutrient runoff to lakes & streams
	Reduce the amount of erosion and sediments entering water bodies
<b>Habitat</b>	Complete a comprehensive lake assessment of Hubbard Lake
	Establish responsible Land Use practices
	Reduce the amount of chemical, bacterial and nutrient runoff to lakes & streams
	Reduce the amount of erosion and sediments entering water bodies
<b>Partial/Total Body Contact</b>	Develop educational tools for citizens of the watershed
	Reduce the amount of chemical, bacterial and nutrient runoff to lakes & streams