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## Chapter Seven: Goals, Objectives and Recommendations

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### GOALS AND OBJECTIVES

At the March 16, 2004 meeting of the Thunder Bay River Watershed Initiative Phase Two steering committee a discussion of possible goals for the watershed was held, and a list of watershed goals was drafted. The goals are intended to enhance, improve, and protect the quality of the watershed, and to ensure the waters meet all seven of the state mandated designated uses and the desired uses proposed by the community (see *Designated Uses* Chapter 2, pp. 25 & 26).

At a subsequent meeting on June 16, 2004 this list of goals was posted and reviewed by committee members. A few last minute changes were made to the list before voting took place.

A simple voting method was used. Each committee member present was given four "sticky dots". Members were asked to attach the dots to the goals on the posted list that they felt were most important. Votes were tallied, and goals received a priority rating according to the number of votes each received. The following table shows the results of this voting process.

PRIORITY NUMBER	GOAL
1	Establish Responsible Land-Use Practices
2	Reduce the amount of erosion and sedimentation entering water bodies.
3	Improve, Restore and Protect the Coldwater Fisheries
4	Reduce the amount of stormwater runoff to lakes and rivers of the watershed
5	Develop Educational Tools for Citizens of the Watershed
6	Complete a comprehensive lake assessment of Lake Hubbard
7	Develop an emergency first action response plan to reduce reaction time following a hazardous materials spill
7	Reduce amount of chemical/nutrient runoff

In order to define the scope of each goal, a list of objectives was drafted. The objectives are the means in which the goals are achieved. **Table 34** lists the watershed goals along with the objectives for reaching those goals.

Each objective is further broken down into specific tasks that will need to be accomplished in order to reach the watershed goals. Milestones that will ensure the tasks are accomplished in a timely fashion will document the progress of the watershed plan. The tasks and milestones for the goals and objectives of each component of the plan are shown in the recommendation section.

<b>TABLE 34: PROPOSED GOALS FOR THE THUNDER BAY RIVER WATERSHED INITIATIVE, PHASE TWO</b>		
<b>Goal 1:</b>	<b>Improve the quality of watershed lakes and rivers through an enhanced knowledge of the ecological &amp; biological integrity of the water resources.</b>	<b>Priority</b>
Objective 1:	Complete a comprehensive lake assessment of Hubbard Lake	1
Objective 2:	Encourage local governments to develop land use management plans	1
Objective 3:	Protect/restore sensitive areas such as wetlands and riparian corridors	1
Objective 4:	Encourage riparian landowners to maintain/create native conservation buffers	2
Objective 5:	Provide model zoning ordinances and encourage the adoption of zoning laws establishing setbacks	3
Objective 6:	Encourage enforcement of "no wake" laws through signage, working with enforcement agencies and river watch groups	4
<b>Goal 2:</b>	<b>Reduce the amount of erosion and sediments entering water bodies.</b>	
Objective 1:	Stabilize eroding streambanks through installation of corrective measures	1
Objective 2:	Reduce sedimentation from road/stream crossings by implementing sound best management practices.	2
Objective 3:	Improve public access sites by creating canoe launch pads, steps etc.	3
<b>Goal 3:</b>	<b>Improve, Restore and Protect the Coldwater Fisheries of the Thunder Bay River Watershed</b>	
Objective 1:	Reduce/eliminate sedimentation from road/stream crossings by implementing appropriate BMPs	1
Objective 2:	Stabilize eroding streambanks	1
Objective 3:	Protect and restore the riparian shade vegetation through landowner education and involvement	1
Objective 4:	Restore aquatic habitat in the watershed where impairment is suspected.	2
Objective 5:	Increase fish passage at hydroelectrical dams	2
Objective 6:	Restrict livestock access to the river	3
Objective 7:	Educate public as to the importance of using native vegetation when restoring greenbelts	3
<b>Goal 4:</b>	<b>Reduce the amount of stormwater runoff to lakes and rivers of the watershed</b>	
Objective 1:	Implement stormwater BMPs to eliminate storm drains discharging directly to water bodies of the watershed	1
Objective 2:	Develop method to conduct water quality testing to ensure the water is suitable for total body contact	2
<b>Goal 5:</b>	<b>Develop Educational Tools for Citizens of the Watershed</b>	
Objective 1:	Involve and educate the public on actions they can take to reduce nonpoint source pollution	1
Objective 2:	Create and have installed: watershed signs, logo, drain stenciling etc.	2
Objective 3:	Create a series of detailed water drainage maps, 100 year flood	3
Objective 4:	Create and distribute residential landowner brochures "Protect Your Watershed"	4
Objective 5:	Supply emergency first action response information for accidental spills, educate public on who to call, include contact information in watershed brochures	5
<b>Goal 6:</b>	<b>Complete a comprehensive lake assessment of Lake Hubbard</b>	
Objective 1:	Develop plan to assess such indicators of lake water quality as DO, condition of biological communities, temperature, conductivity, pH, flow, trophic state, nutrients, land cover types, types & quality of habitat, presence of invasive species, and presence of metals & chemicals.	1
Objective 2:	Develop an educational component to increase public awareness about causes of and methods to prevent the spread of invasive species.	2
<b>Goal 7:</b>	<b>Reduce Amount of Chemical and Nutrient Runoff</b>	
Objective 1:	Educate landowners to identify and correct improperly sited, maintained or installed septic systems	1
Objective 2:	Reduce the amount of nutrients entering the river system from agricultural practices. Encourage Best Management Practices through the use of greenbelts & proper manure storage/utilization.	2
Objective 3:	Encourage residential landowners to reduce the amount of fertilizer used & consider type used (i.e. no phosphorus)	3
Objective 4:	Reduce or eliminate existing stormwater runoff directly in the Thunder Bay River and its tributaries	4
Objective 5:	Eliminate or treat sewage discharge into the watershed on-site	4
Objective 6:	Institute a consistent, reliable water quality monitoring program	5
<b>Goal 8:</b>	<b>Develop an emergency first action response plan to reduce reaction time following a hazardous materials spill</b>	
Objective 1:	Include emergency contact numbers in watershed brochures	1
Objective 2:	Work with Local Emergency Planning Commissions on the inclusion of water resource protection measures	

## RECOMMENDATIONS

Even though the Thunder Bay River Watershed currently exhibits high water quality, both remedial and proactive measures are necessary to provide for the protection and enhancement of the river system. Remediation of identified areas of degradation should include streambank erosion control measures, road/stream crossing upgrades, stormwater controls and installation of BMP's at agriculture areas of concern. A proactive approach to watershed management would include such measures as information and education programs, land use controls, zoning ordinances, septic maintenance programs and establishment of greenbelts.

Based on inventory results, the Thunder Bay River Watershed steering committee developed the following strategies for reduction of nonpoint sources of pollutants in the river system. The recommendations utilize a combination of both reactive and proactive measures. Each recommendation integrates Best Management Practices (BMPs), information and education strategies, partnerships and intergovernmental coordination. Each task targets a specific objective of the plan. Responsible parties, appropriate BMPs, milestones, a timeline, estimated costs and evaluation methods are outlined below.

The order of implementation of the recommendations will be based on steering committee input, and in many cases the order will be determined by available funds. Considering sediment and nutrients ranked as the highest pollutants of concern, strategies aimed at reducing these nonpoint pollutants will be given higher priority. When installing structural BMP's, the sites ranked most severe will be considered first. **Table 35** indicates the approximate cost of implementation for each inventory, as well as the total for the entire implementation project.

<b>TABLE 35: APPROXIMATE COST OF PROJECT IMPLEMENTATION</b>	
Shoreline Protection Projects	\$49,000
Stream Bank Protection Projects	\$158,960
Agricultural Treatments	\$415,125
Road/Stream Crossing Treatments	\$421,000
Land Use Projects	\$25,000
Voluntary Land Protection Projects	\$10,000
<b>Total Costs of Implementation</b>	<b>\$1,079,085</b>

### ***Shoreline Recommendations***

While the shoreline survey does not replace the need for regular water quality monitoring, results of the survey can give a general overview of water quality. Hubbard Lake appeared to have very high water quality. However, as development of the Hubbard Lake shoreline and subwatershed continues and as seasonal cottages are converted to larger, year-round residences, increased pollution from nonpoint sources can be expected to occur. Minimizing nonpoint source pollution in the years to come will require a pro-active approach to land management by those that live along the riparian corridor, and by local government as well.

The practices listed in **Table 36** have been used with other lake shore communities and are recommended for Hubbard Lake.

**TABLE 36: SHORELINE PROTECTION-RIPARIAN LANDOWNER RECOMMENDATIONS**

	Recommendation	Timeline
<b>Objective One</b>	Follow up initial shoreline survey with an educational program for property owners around the lake.	
<b>Task 1</b>	Conduct workshops for property owners on proper methods of erosion control, lawn care practices that protect water quality, proper siting, installation, and maintenance of septic systems, maintaining a greenbelt, and reducing runoff.	
Milestones	Send <u>general</u> summary of survey results, brochures on practical & effective actions to protect water quality to shoreline residents. Develop & assemble educational packet (septic maintenance, maintaining greenbelts, proper fertilizer application, etc.) to distribute to riparian landowners Help landowners design a site plan to protect their shoreline. Develop & institute a consistent, reliable water quality monitoring program	<ul style="list-style-type: none"> <li>◆ 1 yr.</li> <li>◆ 2 yrs.</li> <li>◆ 3 yrs.</li> <li>◆ On-going</li> </ul>
BMPs	Produce and distribute educational material, site planning assistance, workshop	
Responsible Parties	NEMCOG, Huron Pines RC&D Council	
Anticipated Products	Educational packet for riparian landowners, workshop	
Evaluation Method	Survey landowners to determine presence or extent of Cladophora growth	◆ 5 yrs.
<i>Estimated Cost</i>	\$10,000	
<b>Task 2</b>	Educate new riparian landowners in shoreline stewardship practices	
Milestones	Work to familiarize Real estate agents, developers, excavators & landscape/lawn care companies with shoreline stewardship practices for protecting water quality.	◆ 3-5 yrs
BMPs	Educational materials, community outreach	
Responsible Parties	Huron Pines RC&D, NEMCOG, Montmorency Conservation District	
Anticipated Products	Educational materials	
Evaluation Method	Follow up survey of new landowners	
<i>Estimated Cost</i>	\$4,000	
<b>Objective Two</b>	Complete a comprehensive lake assessment of Hubbard Lake	
<b>Task 1</b>	Develop a plan to monitor water quality for Lake Hubbard	
Milestones	Develop comprehensive list of monitoring activities; include such indicators of lake water quality as DO, condition of biological communities, shoreline algae temperature, conductivity, pH, flow, trophic state, nutrients, land cover types, types & quality of habitat, non-native species, and presence of metals & chemicals. Draft plan for data management & reporting, develop QAPP Pursue funding for implementation of plan	<ul style="list-style-type: none"> <li>◆ 2 yrs.</li> <li>◆ 2 yrs.</li> <li>◆ 2-4 yrs.</li> </ul>
BMPs	Field surveys, water testing	
Responsible Parties	Huron Pines RC&D, NEMCOG, Montmorency Conservation District	
Anticipated Products	Water quality database for Lake Hubbard	
Evaluation Method	Plan review by environmental agency/agencies experienced in lake monitoring	◆ 2-3 yrs.
<i>Estimated Cost</i>	\$15,000	
<b>Task 2</b>	Educate public in ways to identify and deter the spread of invasive species	
Milestones	Develop & provide educational materials to riparian landowners, boaters & fisherman describing species found; effects on native species, habitat, recreation, & water quality; importance of deterring their spread by good lake usage practices	◆ 2-3 yrs
BMPs	Surveys, educational materials, community involvement	
Responsible Parties	Huron Pines RC&D, NEMCOG	
Anticipated Products	List of invasive species present in Hubbard Lake, educational materials	
Evaluation Method	Repeat lake survey, tabulate findings	◆ 10 yrs.
<i>Estimated Cost</i>	\$5,000	
<b>Objective Three</b>	Add information to database to facilitate identifying the locations of Cladophora growths during repeat shoreline surveys and in making property owner contacts.	
<b>Task 1</b>	Inform those owners of properties with Cladophora growths of the specific results for their property	

Milestones	Conduct landowner survey; use to interpret cause of growth, offer individualized recommendations (keep site specific info confidential to encourage participation) After survey, perform site visits/water testing; analyze survey results Repeat survey every 3-5 years	♦ 2-5 yrs ♦ 3-6 yrs Ongoing
BMPs	Educational materials, questionnaires, informative follow-up mailings after each survey	
Responsible Parties	Huron Pines RC&D Council, NEMCOG, Montmorency Conservation District	
Anticipated Products	Improved documentation of Cladophora, including causes, extent and location; shoreline database	
Evaluation Method	Survey of landowners, recheck of Cladophora sites	♦ 3-5 yrs
<i>Estimated Cost</i>	\$3,500-\$8,000	
<b>Task 2</b>	Compile accurate parcel & ownership information for shoreline database based on knowledge of Association members/shoreline residents & County Equalization Departments within the watershed.	
Milestones	Encourage lake associations in shoreline monitoring activities	Ongoing
BMPs	Shoreline surveys	
Responsible Parties	Huron Pines RC&D, NEMCOG, lake association volunteers	
Anticipated Products	Improved shoreline database for use in managing/monitoring lake shores of the watershed; Water resource information clearinghouse to be shared by agencies and the public	
Evaluation Method	Keep track of number of times database is accessed by agencies; water resource information is accessed by agencies, lake associations and other organizations	♦ 5-10 yrs.
<i>Estimated Cost</i>	\$3,000	
<b>Objective Four</b>	Reduce amounts of nutrients entering water bodies from septic systems	
<b>Task 1</b>	Encourage inspection of (& upgrades to substandard) septic systems around lake.	
Milestones	Meet with townships to amend ordinances; include a required inspection of septic systems at the time of property sale or transfer Meet with townships to phase in a septic system inspection program	♦ 3-5 yrs ♦ 10 yrs.
BMPs	Zoning ordinances	
Responsible Parties	Huron Pines RC&D Council	
Anticipated Products	Inspection program	
Evaluation Method	Compile and analyze inspection data	♦ 10 yrs.
<i>Estimated Cost:</i>	\$4,000	
<b>Total Shoreline Protection Costs: \$49,000</b>		

### **Streambank Protection Recommendations**

Erosion of streambanks and lake shorelines can result in sedimentation of lakes and rivers. This can lead to a degradation of water quality and to the impairment of designated uses, particularly uses for wildlife/aquatic habitat and navigation, within the watershed. Streambank erosion can occur in several ways such as foot traffic by humans and wildlife, boat and canoe access. Loss of vegetation to anchor streambanks also accelerates the erosion process. **Table 37** lists streambank protection recommendations for the North and South Branches of the Thunder Bay River Watershed.

**TABLE 37: STREAMBANK PROTECTION RECOMMENDATIONS**

<b>Recommendation</b>		<b>Timeline</b>
<b>Objective One</b>	Stabilize priority streambank erosion sites through the installation of corrective measures.	
<b>Task 1</b>	Implement structural BMP's to reduce the amount of sediment from entering the river.	
Milestones	Develop site plans, obtain proper permits and landowner permission for 16 sites recommended for treatment (SB01; SB02; SB06; SB08; SB09; SB10; SB11; SB12; SB13; SB14; SB15; SB16; SB17; SB18; SB19; & SB20 ) Secure funding and organize materials Organize work crew and install BMP's at each of the 16 sites	<ul style="list-style-type: none"> <li>◆ 5 yrs</li> <li>◆ 1-2yrs</li> <li>◆ 10 yrs</li> </ul>
BMP's	Tree revetment, brush placement, re-vegetation, stairways, fencing, bank sloping	
Responsible Parties	Huron Pines RC&D Council, Conservation Districts, NEMCOG	
Anticipated Products	Site plans for streambank erosion sites	
<i>Estimated Cost</i>	\$128,460	
Evaluation	Take before and after photographs and document number of sites completed	
<b>Objective Two</b>	Improve existing access sites by creating stairs, walkways, fishing platform, etc.	
<b>Task 1</b>	Develop site plans, obtain proper permits and landowner permission for improvement to/construction of access structures and stairways at sites	
Milestones	Secure funding and organize materials Organize work crew and implement BMP's for 1 site per year	<ul style="list-style-type: none"> <li>◆ 2-5 yrs</li> <li>◆ 3-4 yrs</li> </ul>
BMP's	Provide parking, create launch pads, steps, walkway	
Responsible Parties	Huron Pines RC&D Council, Conservation Districts, NEMCOG	
Anticipated Products	Site plans for access sites	
<i>Estimated Cost</i>	\$25,100	
Evaluation	Before and after photographs; document number of sites completed	◆ 3-9 yrs
<b>Objective Three</b>	Protect/restore riparian shade vegetation; restore aquatic habitat where impairment is suspected	
<b>Task 1</b>	Educate landowners as to importance of shade vegetation	
Milestones	Include greenbelt restoration/maintenance information in workshops for riparian landowners, stress connection between loss of vegetation and increased temperatures of coldwater fisheries, and importance of using native vegetation when restoring greenbelts	◆ 1 yr.
BMP's	Educational materials, workshops	
Responsible Parties	Huron Pines RC&D Council, Conservation Districts, NEMCOG	
Anticipated Products	Information packets, workshop	
<i>Estimated Cost</i>	\$0 (cost included in shoreline recommendations)	
Evaluation	Re-survey lake shorelines, streambanks; note increase/decrease in presence of shade vegetation	◆ 3-5 yrs.
<b>Task 2</b>	Restore impaired aquatic habitat	
Milestones	Organize river/lake cleanup days, recruit volunteers Conduct yearly river/lake cleanups utilizing volunteers Increase amount of woody debris at suitable sites	<ul style="list-style-type: none"> <li>◆ 2-5 yrs.</li> <li>◆ 2-5 yrs.</li> </ul>
BMP's	Woody debris, community involvement	
Responsible Parties	Huron Pines RC&D Council, Conservation Districts, NEMCOG	
Anticipated Products	Volunteer database	
<i>Estimated Cost</i>	\$2,400	
Evaluation	Before and after photos, riparian landowner surveys	◆ 3-6 yrs.
<b>Task 3</b>	Develop plan to increase fish passage at hydroelectric dams	
Milestones	Work with organizations such as Thunder Bay Power & Thunder Bay River Restoration Committee to determine BMP's for fish passage Select best alternative; draft work plan & timetable for implementation	<ul style="list-style-type: none"> <li>◆ 2-3 yrs.</li> <li>◆ 2-6 yrs.</li> </ul>
BMP's	Compile information on fish passage alternatives for dams	
Responsible Parties	Huron Pines RC&D Council, Conservation Districts, NEMCOG	
Anticipated Products	Plan for fish passage improvement at hydroelectric dams	
<i>Estimated Cost</i>	\$3,000	
Evaluation	Focus group	◆ 3-6yrs.
<b>Total Streambank Protection Cost: \$158,960</b>		

## Agriculture Recommendations

The agricultural community is a vital component of the Thunder Bay River Watershed. Crops, and livestock produced locally benefit the area's economy, and provide a rural atmosphere many visitors and permanent residents alike find aesthetically pleasing. Unfortunately, like many other land activities, the agricultural industry can contribute significant amounts of pollution to the watershed. Sediments, nutrients, and bacteria are natural by-products of farming activities. Best Management Practices such as exclusionary fencing to keep livestock out of streams, adequate manure storage facilities, proper livestock crossings, nutrient management and buffers along streambanks can significantly lower the amounts of pollutants entering the water system. In many cases, funding to correct these problems may be available in the form of cost/share funds from various programs and agencies working within the watershed.

Actions recommended to reduce the negative impacts of agriculture on water quality while promoting environmentally sound uses for agricultural lands are listed in **Table 38** below.

<b>TABLE 38: AGRICULTURE RECOMMENDATIONS</b>		
	<b>Recommendation</b>	<b>Timeline</b>
<b>Objective One</b>	Restrict livestock access to the rivers and streams	
Task 1	Develop site plans, provide water source for livestock and create proper stream crossings	
Milestones	Create site plans for 11 sites recommended for treatment: ALC 02-04; ALC 06; ALP 01; ALP 04; ALP 16; ALP 19; ALP 21; MO 02; PI 03 Obtain proper permits and landowner permission Secure funding and organize materials Organize work crew and install BMP's	<ul style="list-style-type: none"> <li>◆ 1-3 yrs.</li> <li>◆ 1-3 yrs.</li> <li>◆ 2-3 yrs.</li> <li>◆ 2-6 yrs.</li> </ul>
BMP's	Fencing, stream crossings, watering devices,	
Responsible Parties	NRCS, NEMCOG, Conservation Districts, Huron Pines RC&D Council	
Anticipated Products	Site plans for limiting access of livestock to rivers and streams	
Estimated Cost	\$166,580	
Evaluation	Before and after photographs; document number of sites completed	◆ 3-6 yrs.
<b>Objective Two</b>	Install corrective measures to reduce runoff at agricultural sites of concern.	
Task 1	Develop plans; install devices to reduce runoff.	
Milestones	Develop plans for 14 identified areas of concern: ALC 02-04; ALC 06; ALP 01; ALP 04; ALP 06; ALP 16; ALP 19; ALP 21; MO 02; MO 05; PI 02 and PI 03 Obtain proper permits and landowner permission Secure funding and organize materials Organize work crew and install BMP's	<ul style="list-style-type: none"> <li>◆ 1 yr.</li> <li>◆ 1 yr.</li> <li>◆ 1-4 yrs.</li> <li>◆ 2-7 yrs.</li> </ul>
BMP's	Buffer strips, water runoff diversion, runoff basins, waste storage/utilization	
Responsible Parties	NRCS, Conservation Districts, NEMCOG	
Anticipated Products	Site plans for controlling runoff at agricultural sites of concern	
Estimated Cost	\$248,545	
Evaluation	Before and after photographs; document number of sites completed	◆ 3-8 yrs.
<b>Total Agriculture Costs: \$415,125</b>		

## Road/Stream Crossing Recommendations

Sediments, including dirt and gravel from shoulders of the roads (especially unpaved roads) can be deposited into the river system wherever a road and stream intersect. Sedimentation of streams is a natural process. Excessive amounts of sediments can, however, negatively impact designated uses such as aquatic wildlife and habitat (including the watershed's cold water fisheries); birds and mammals dependent on an aquatic environment; and aquatic plant/animal

life. Sedimentation can also, by reducing the width and depth of the stream channel, restrict navigation and promote an increase in flooding of the stream. **Table 39** details the recommended actions needed to reduce the effects of the sedimentation process in the watershed.

<b>TABLE 39: ROAD/STREAM CROSSING RECOMMENDATIONS</b>		
	<b>Recommendation</b>	<b>Timeline</b>
<b>Objective One</b>	Reduce the amount of sediment by establishing a road/stream crossing improvement program designed to correct identified problems	
Task 1	Stabilize erosion at 16 road/stream crossings recommended for treatment: ALC 11; ALC 12; ALC 15; ALC 29; ALC 52; ALP 01;ALP 21; ALP 51; ALP 65; ALP 66; ALP 80; MO 12; MO 13; MO 16; MO 18; and OS 01	
Milestones	Develop site plans, obtain proper permits and landowner permission for priority sites Secure funding and organize materials Organize work crew and implement BMP's at the selected sites	♦ 2 yrs ♦ 2 yrs ♦ 2-10 yrs
BMPs	Replace culverts, reduce grade of approaches, pave approaches, pave curb and gutter, re-vegetate, or install erosion control structures at 16 priority sites	
Responsible Parties	Huron Pines RC&D, County Road Commissions, NEMCOG, County Drain Commissions	
Anticipated Products	Site plans for road/stream crossings designed to reduce sediments entering rivers	
<i>Estimated Cost</i>	<i>\$421,000</i>	
Evaluation	Before and after photographs; document number of sites completed	♦ 5 yrs
<b>Total Road/Stream Crossing Cost: \$421,000</b>		

### **Land Use and Voluntary Land Protection Recommendations**

Implementation of land use policies and regulations can be an important strategy used by local, State and Federal units of government for protecting water quality. In addition to their benefits for aquatic resources, planning and zoning are tools used for ensuring the conservation of wildlife habitat, providing for sustainable development, protecting property values, and maintaining community character. **Table 40** lists Land Use Policies recommended for the Thunder Bay River Watershed Initiative, Phase Two. Another avenue for protecting the watershed's natural resources and rural characteristic is through voluntary land protection. Many options are available to those landowners wishing to protect high quality natural areas, critical areas, or areas where development may pose a risk of degrading the high water quality currently exhibited by the Thunder Bay River Watershed. Recommended Voluntary Land Protection projects are listed in **Table 41**.

**TABLE 40: LAND USE RECOMMENDATIONS**

	Recommendation	Timeline
<b>Objective One</b>	Establish Responsible Land-Use Practices	
<b>Task 1</b>	Develop Thunder Bay Watershed Land Use Development Guidelines; model after the Grand Traverse Bay Guidelines & Recommended Land Use Regulations	
Milestones	Work with local government on the adoption of guidelines & regulations that provide for the protection of the water resources. Develop and distribute at meetings: handouts covering model stormwater management, site plan review standards, recommended setback distances, stormwater management guidelines, greenbelt provision language, and a checklist; include emergency contact number for hazardous materials spill Encourage removal of sewage/storm drains which discharge directly to watershed	<ul style="list-style-type: none"> <li>◆ 1-2 yrs</li> <li>◆ 2 yrs</li> <li>◆ 2-5 yrs.</li> </ul>
BMP's	Ordinances; guidelines; educational materials	
Responsible Parties	Huron Pines RC&D Council, NEMCOG	
Anticipated Products	Informational packets	
<i>Estimated Cost</i>	\$10,000	
Evaluation	Review changes, if any, made to local plans & ordinances in subsequent years	◆ 5-10 yrs
<b>Task 2</b>	Deliver presentations to local units of government	
Milestones	Revise NEMCOG's PowerPoint Presentation on the connection between land use practices, nonpoint source pollution and water quality. Deliver presentations to County Planning Commissions and County Chapters of the Michigan Townships Associations	<ul style="list-style-type: none"> <li>◆ 1 yr</li> <li>◆ 2 yrs</li> </ul>
BMP's	Educational materials/presentations	
Responsible Parties	Huron Pines RC&D Council, NEMCOG	
Anticipated Products	PowerPoint presentation	
<i>Estimated Cost</i>	\$10,000	
Evaluation	Interview meeting attendees, analyze feedback	◆ 3 yrs
<b>Objective Two</b>	Protect/restore sensitive areas such as wetlands and riparian corridors	
<b>Task 1</b>	Involve Riparian Landowners in lake and stream protection efforts	
Milestones	Encourage compliance to "no wake" laws through signage explaining reason for "no wake", and by working with enforcement agencies and river watch groups Encourage riparian landowners to maintain/create native conservation buffers	<ul style="list-style-type: none"> <li>◆ On going</li> <li>◆ Ongoing</li> </ul>
BMP's	Educational materials, cooperation with enforcement agencies & community watch groups	
Responsible Parties	Huron Pines RC&D Council, NEMCOG	
Anticipated Products	"No wake" signs	
<i>Estimated Cost</i>	\$5000	
Evaluation	Focus group	◆ 5 yrs
<b>Total Land Use Recommendations Cost \$25,000</b>		

**TABLE 41: VOLUNTARY LAND PROTECTION PROJECTS**

	<b>Recommendation</b>	<b>Timeline</b>
<b>Objective One</b>	Develop database of Priority Parcels within watershed	
<b>Task 1</b>	Identify priority Parcels within the watershed	
Milestones	Develop criteria for determining what constitutes a priority parcel Identify priority parcels of land utilizing GIS data from watershed inventory Develop priority parcel map for watershed Obtain land owner information of priority parcels from County Equalization Department	<ul style="list-style-type: none"> <li>◆ 1-2 yrs.</li> <li>◆ 1-2 yrs.</li> <li>◆ 2 yrs.</li> <li>◆ 2-3 yrs.</li> </ul>
BMP's	Database, priority parcel map	
Responsible Parties	Headwaters Land Conservancy, NEMCOG	
Anticipated Products	Maps, database	
<i>Estimated Cost</i>	\$5,000	
Evaluation	Review data for accuracy; conduct survey of agencies using data base	◆ 3-5 yrs.
<b>Objective Two</b>	Provide voluntary land protection information to riparian landowners	
<b>Task 1</b>	Develop and/or compile informational materials on easement and land donation programs to priority property owners.	
Milestones	Assemble information packets and distribute to owners of priority land parcels in the watershed	◆ 1-2 yrs.
BMP's	Educational materials	
Responsible Parties	Headwaters Land Conservancy, NEMCOG	
Anticipated Products	Informational packets for riparian landowners	
<i>Estimated Cost</i>	\$1,000	
Evaluation	Records of participation in programs/voluntary land protection measures taken by land owners	
<b>Task 2</b>	Organize and hold a workshop on voluntary land protection techniques.	
Milestones	Develop and assemble workshop materials Organize workshop Contact priority parcel landowners to participate in workshop	<ul style="list-style-type: none"> <li>◆ 1-2 yrs.</li> <li>◆ 1-2 yrs.</li> <li>◆ 1-2 yrs.</li> </ul>
BMP's	Educational materials	
Responsible Parties	Headwaters Land Conservancy, NEMCOG, Alpena & Montmorency Conservation Districts	
Anticipated Products	Workshop materials, workshop	
<i>Estimated Cost</i>	\$2,000	
Evaluation	Follow up surveys/interviews with workshop participants	
<b>Task 3</b>	Contact and meet with at least ten priority property owners for consideration of conservation easement, and/or land donation.	
Milestones	Contact and meet with at least 5 priority property owners each year	◆ 2 yrs.
BMP's	Community outreach, educational materials	
Responsible Parties	Headwaters Land Conservancy, NEMCOG	
Anticipated Products	Permanently protected priority parcels	
<i>Estimated Cost</i>	\$2,000	
Evaluation	Detailed records of any voluntary land protection measures taken by property owners contacted	
<b>Total Voluntary Land Protection Program Costs: \$10,000</b>		

**General Education Recommendations**

Education is the key to a successful watershed management program. The overall goal of the information and education component of the watershed plan is to provide educational information to local officials, shoreline residents, contractors and developers, school children and the general public, which will enable them to make decisions that will enhance the protection of the Thunder Bay River Watershed. Informed citizens can greatly affect the outcome of a watershed protection program. **Table 42** indicates projects recommended to increase the public's knowledge and understanding of the watershed and it's many components.

**TABLE 42: GENERAL EDUCATION RECOMMENDATIONS**

Recommendation		Timeline
<b>Objective One</b>	Encourage Co. Road Commissions to explore maintenance alternatives at road/stream crossings.	
<b>Task 1</b>	Create model road/stream crossing site in cooperation with county road commissions	
Milestones	Meet with road commissions to select model site & plan for implementation	1 yr.
BMPs	Educational materials, model road/stream crossing site	
Responsible Parties	NEMCOG, Huron Pines RC&D Council	
Anticipated Products	Brochure of BMPs; road/stream crossing facts; effects of sediments & road chemicals on designated uses; PowerPoint presentation with comparing pictures of sites in other watersheds using road maintenance alternatives, model site	
Evaluation Method	Follow up with erosion control officer	2-10 years
<i>Estimated Cost</i>	\$30,000	
<b>Objective Two</b>	Make public aware of importance of using Best Management Practices at road/stream crossings, streambank erosion sites, stormwater runoff and agricultural sites of concern.	
<b>Task 1</b>	Develop watershed protection display to take advantage of educational opportunities at local events	
Milestones	Develop brochures and/or information packets explaining the importance of using BMPs at road/stream crossings, streambank erosion sites, stormwater runoff and agricultural sites of concern Displays will include educational materials, photos, & brochures Set up display and distribute information at fairs and appropriate community events once or more each year	<ul style="list-style-type: none"> <li>◆ 1-2 yrs.</li> <li>◆ 1-2 yrs.</li> <li>◆ 3-5 yrs.</li> </ul>
BMPs	Educational materials	
Responsible Parties	Huron Pines RC&D Council, Conservation Districts, NEMCOG, Headwaters Land Conservancy	
Anticipated Products	Information packets, Watershed display	
Evaluation Method	Survey included with display materials, focus groups	3-5 yrs.
<i>Estimated Cost</i>	\$3,000	
<b>Objective Three</b>	Develop and implement school programs concerning water quality education.	
<b>Task 1</b>	Implement a water quality program in area schools	
Milestones	Conduct a water resource curriculum review Involve teachers and students in educational water testing/monitoring Establish interactive database to which students can enter classroom data Review and compile existing instructional materials for elementary and secondary students that focus on water resources, include list of water resource web-sites With input from teachers, modify selected materials to make more locally relevant Develop a lesson study project*	<ul style="list-style-type: none"> <li>◆ 1-2 yrs.</li> <li>◆ 2-5 yrs.</li> <li>◆ 2-5 yrs.</li> <li>◆ 2-3 yrs.</li> <li>◆ 2-3 yrs.</li> <li>◆ 2-5 yrs.</li> </ul>
BMPs	Educational materials, hands-on activities	
Responsible Parties	Huron Pines RC&D Council, Conservation Districts, NEMCOG, Headwaters Land Conservancy	
Anticipated Products	Interactive database, water resource library, lesson plan	
Evaluation	Conduct short survey of teachers whose classrooms participated in program to rate overall educational effectiveness of information, materials, presentation and activities	◆ 2-5 yrs
<i>Estimated Cost</i>	\$6,000	
<b>Objective Four</b>	Develop Educational Tools for Citizens of the Watershed	
<b>Task 1</b>	Involve and educate the public on actions they can take to reduce nonpoint source pollution	
Milestones	Create and have installed: watershed signs, logo, drain stenciling Create a series of detailed water drainage maps, 100 year flood Create and distribute residential landowner brochures "Protect Your Watershed"; include emergency numbers for hazardous substance spills	<ul style="list-style-type: none"> <li>◆ 1-3 yrs</li> <li>◆ 6 yrs.</li> <li>◆ 1 yr.</li> </ul>
BMPs	Educational materials, signage, maps	
Responsible Parties	Huron Pines RC&D Council, Conservation Districts, NEMCOG, Headwaters Land Conservancy	
Anticipated Products	Maps, brochures, signs	
Evaluation	Focus groups, conduct surveys	
<i>Estimated Cost</i>	\$15,000	
<b>Total Cost of General Education Recommendations: \$54,000</b>		

\*Teachers from similar grade levels who wish to use the same instructional materials related to water resources can participate in a lesson study. These teachers meet several times and 'dissect' a particular lesson about water resources. One teacher volunteers to teach the lesson while other participants

observe that teacher's class. Then the group meets again to share impressions from the observation and revise the lesson. Another teacher then volunteers to teach the lesson and other teachers in the group observe. The group then meets a second time to discuss the classroom observation and revise the lesson a second time. Lesson study is a powerful form of professional development for teachers, and is one of the professional development strategies used in Japan's educational system.

### **Information/Education Strategies**

The primary function of the Information and Education Strategy portion of the watershed plan is to provide educational information to local officials, shoreline residents, contractors, developers, school children and the general public. The lakes and rivers of the watershed are fundamental to the sustainability of the region's economy and quality of life. Becoming informed of the human impacts and natural processes that influence water resources will enable citizens to make decisions that promote high water quality and provide protection for the waters of the Thunder Bay River Watershed.

**Table 43** lists the information and education strategies based on goals and objectives stated earlier. Educational strategies defined for each pollutant source will be directed towards a specific target audience.

<b>TABLE 43: INFORMATION AND EDUCATION STRATEGIES</b>	
<b>Pollutant</b>	<b>Sediments</b>
<b>Source</b>	Road/stream crossings
Target Audience	Road Commissions
Message	Explore alternatives to road maintenance at road/stream crossings
Delivery Mechanism	Presentations to County Road Commissions
<b>Source</b>	<b>Streambank erosion</b>
Target Audience	Riparian Landowners, developers, construction companies
Message	Encourage landowners to leave a conservation buffer, provide attractive landscaping for natural vegetation, inform developers, construction companies of importance of greenbelts
Delivery Mechanism	Information material distributed to Real Estate agencies, area businesses, riparian landowners
<b>Source</b>	<b>Uncontrolled livestock access to streams</b>
Target Audience	Landowners, agricultural operations
Message	Control livestock access, establish fencing, create proper stream crossings, provide information on alternate funding sources
Delivery Mechanism	Brochures, work with NRCS, provide information at fairs, trade-shows and local events
<b>Source</b>	<b>Lake and stream access sites</b>
Target Audience	Fishing enthusiasts, kayak/canoe/tube rentals and sales, ORV users, boat owners
Message	Protect river by using designated access sites and stairs when provided, staying on designated trails, and reducing wake speeds
Delivery Mechanism	Post signs at access points, provide information to canoe liveries, sporting goods stores and at ORV parking
<b>Pollutant</b>	<b>Nutrients</b>
<b>Source</b>	<b>Wastewater/ residential septic systems/lawns</b>
Target Audience	Homeowners, riparian businesses
Message	Properly maintain septic systems to prevent degradation of water quality: Discourage improper/over application of fertilizers on lawns; encourage soil tests and the use of low/no phosphate fertilizers
Delivery Mechanism	Create an educational water quality kit for homeowners including brochures for septic system maintenance, environmentally friendly lawn care
<b>Source</b>	<b>Agricultural lands</b>
Target Audience	Agricultural operations; landowners
Message	Unrestricted livestock access to surface water threatens the health of the watershed
Delivery Mechanism	Brochures, work with NRCS, provide information at fair, trade-shows and local events

<b>TABLE 43: INFORMATION AND EDUCATION STRATEGIES, CONTINUED</b>	
<b>Pollutant</b>	<b>Invasive Species</b>
<b>Source</b>	<b>Recreational boats, fishing pails</b>
Target Audience	Boaters, sports fisherman
Message	Be sure to check boats and bait pails for invasive "hitchhikers" when moving from one body of water to another
Delivery Mechanism	Distribute educational materials to riparian landowners, and to boaters and fisherman through marinas, sporting goods stores and bait shops
<b>Pollutant</b>	<b>Increased Temperature</b>
<b>Source</b>	<b>Stormwater runoff, land development</b>
Target Audience	Homeowners, riparian businesses, contractors, developers
Message	Inform developers, construction companies of connection between loss of greenbelts and warming water temperatures, and of warming effect of increased sedimentation
Delivery Mechanism	Information packets, watershed protection display & handouts at community events.
<b>Pollutant</b>	<b>Heavy Metals/Organic Compounds</b>
<b>Source</b>	<b>Stormwater runoff</b>
Target Audience	Riparian landowners and businesses, local government
Message	Provide surface runoff control to reduce and filter harmful substances from entering the river via stormwater runoff
Delivery Mechanism	Brochures covering such topics as hazardous household wastes and where stormwater goes; tours of model stormwater site
<b>Pollutant</b>	<b>Pesticides</b>
<b>Source</b>	<b>Residential lawns; agricultural operations</b>
Target Audience	Landowners, agriculture managers
Message	Encourage proper application of pesticides to protect aquatic/wildlife habitats; and promote a healthy watershed
Delivery Mechanism	Brochures, work with various agencies such as lake associations, NRCS; provide information at fairs, trade-shows and events
<b>Pollutant</b>	<b>Bacteria</b>
<b>Source</b>	<b>Septic systems</b>
Target Audience	Riparian landowners and businesses
Message	Properly maintain septic systems to prevent degradation of water quality; Improper septic systems can allow contamination of surface water/groundwater
Delivery Mechanism	Create an educational water quality kit including brochures for septic system maintenance, environmentally friendly lawn care; distribute to landowners and businesses
<b>Source</b>	<b>Livestock management</b>
Target Audience	Agricultural operation managers
Message	Restricting livestock access to streams and properly managing animal waste will minimize contamination potential by agricultural operations.
Delivery Mechanism	Watershed protection display, informational packets distributed at community events

### ***Evaluating Success***

In order to determine the overall effectiveness of the watershed management plan, an evaluation process is essential. An effective evaluation process will indicate whether watershed management efforts are successful, and implementation methods can be modified or improved as information gathered from evaluations is analyzed. A sound evaluation program will increase the likelihood of continued support from partnering agencies, community organizations and community members if results of the implementation efforts are well documented and made available to the public. Listed below are the evaluation methods for the Thunder Bay River Watershed Initiative, as recommended in the DEQ Handbook: *Developing a Watershed Management Plan for Water Quality*.

- ♦ Physical water quality monitoring
- ♦ Chemical water quality monitoring

- ♦ Biological life measurements
- ♦ Photographic or visual evidence, before and after photos
- ♦ Documentation of site BMPs installed
- ♦ Pollutant loading measurements
- ♦ Stakeholder surveys, evaluate knowledge or change in behavior
- ♦ Focus groups, to determine effectiveness of project activities

Detailed evaluation methods for each task are outlined above in the Recommendations section. Several different evaluation methods were incorporated into the plan to accommodate the variety of strategies recommended for implementation. In order to document the installation of BMP's, before and after photos will be taken at road/stream crossings, streambank restoration sites, newly installed greenbelts and livestock crossings. Focus groups, interviews and surveys will be used when changing viewpoints and management strategies needed to be documented and structural BMP's were not recommended. A timeline for the completion of the evaluations is included in each recommendation table. **Table 44** below summarizes the evaluation process for the Thunder Bay River Watershed Initiative: Phase Two.

<b>TABLE 44: EVALUATION PROCESS</b>				
<b>Evaluation Method</b>	<b>Watershed Concern</b>	<b>Property Measured</b>	<b>Characteristics of Method</b>	<b>Strategy</b>
Public Surveys	Shoreline/Streambank Protection; Information/Education Program	Knowledge & Awareness, Current Practices, Concerns	Moderate cost; Low response rate	Before & after implementation. Distribute through mailings, displays
Written Evaluations	Land Use Program; Voluntary Land Protection; Information/Education	Knowledge & Awareness	Good response rate; Low cost	Brief evaluations completed on site after event; questions on strengths/weaknesses of program, suggestions for improvement
Field Surveys	Streambank Protection; Agricultural & Road/Stream Crossing Programs	Extent of buffers, flow, erosion, impacts & trends	Time consuming, Moderate cost, Provides current & detailed data	Record observations on inventory sheets, Take Before & After photos, Analyze data
Documentation	All Projects & Programs	Participation; aesthetics; pre-& post-conditions	Low cost; Easy; Provides quick review of progress	Before & after photos, trend tables, database
Communication Records	All Projects & Programs	Public concerns; problem areas; level of community interest/participation	Information is subjective; Limited number of contacts	Keep records of phone calls, e-mails, letters; track trends, concerns, suggestions, complaints
Participation Tracking	All Projects & Programs	Numbers & Geographic distribution of participants, results of participants' efforts	Low cost; Easy to document, Easy to understand	Sign-in/evaluation sheets, document with photos, end results
Focus Groups	Streambank Protection; Land Use Program; Information/Education	Knowledge & Awareness, Perceptions, Current practices	Medium to high cost; Motivations/barriers to change readily identified; Instant feedback	Select 6-8 people randomly from watershed area. Draft questions, facilitate discussion. Record session.
Agency Reviews	Shoreline Protection; Information/Education	Accuracy/validity of data collected, Observations	Low Cost; Valuable insight from experienced professionals	Partnering agency will review data, BMPs, level of improvement & offer input on methods/results