

CHAPTER 7 IMPLEMENTATION TASKS

7.1 *Summary of Implementation Tasks*

In an effort to successfully accomplish the goals and objectives listed in Chapter 6, specific and tangible recommendations were developed based on the prioritization of watershed pollutants, sources, and causes while also looking at the priority areas in the watershed (Tables 20, 21, 24, and 25). These implementation tasks (also known as Best Management Practices or BMPs – See next section for discussion) are listed in Section 7.3 and represent an integrative approach, combining watershed goals and covering more than one pollutant at times, to reduce existing sources of priority pollutants and prevent future contributions.

It is intended that these BMPs be implemented in priority areas in the watershed (Figure 17, Table 25). Table 35 suggests guidelines for locating some of the BMPs listed and notes specific watershed areas for implementation.

The project steering committee found it helpful to summarize the implementation tasks by the pollutant and/or source it deals with, placing all implementation tasks into various categories. In this way, organizations may work on a specific issue (i.e., urban stormwater or shoreline restoration) that may contribute more than one type of watershed pollutant and meet more than one watershed goal.

The categories are as follows:

1. Shoreline Protection and Restoration
2. Road Stream Crossings
3. Agriculture
4. Hydrology
5. Habitat, Fish and Wildlife
6. Stormwater
7. Wastewater
8. Human Health
9. Wetlands
10. Invasive Species
11. Land Protection and Management
12. Development
13. Zoning and Land Use
14. Groundwater
15. Monitoring
16. Desired Uses

For each action step, the organization(s) best suited to help implement the task along with estimated costs to implement each item has been identified where possible. A timeframe of 10 years was used to determine the scope of activities and the estimated costs for implementing the

tasks. Tasks that should be done in the short term were given a timeframe of 3 years. Tasks that should be undertaken annually were given a timeframe of “ongoing.”

Finally, the project steering committee looked at the major sources of pollution in the watershed and carefully considered the impacts of each and measures that need to be taken to reduce their impacts. Feasibility of task implementation and its likelihood of pollutant reduction were considered as well. It was decided that focusing on reducing and/or eliminating the following pollutant sources will address the bulk of pollution entering the Grand Traverse Bay and its surrounding watershed (listed in no particular order):

- Streambank and Shoreline Erosion
- Stormwater
- Road Stream Crossings
- Fertilizer Use
- Lack of Riparian Buffer
- Reduction of Wetlands

7.2 *Best Management Practices*

Best Management Practices (BMPs) are any structural, vegetative, or managerial practices used to protect and improve surface water and groundwater (DEQ 2001). It is important to note that 1) no BMP can be used at every site, and 2) no BMP can include so many specifications that all possible uses and all possible conditions are included. Each site must be evaluated, and specific BMPs can be selected which will perform under the site conditions. For Best Management Practices to be effective, the correct method, installation, and maintenance need to be considered for each site. Addressing each of these factors will result in a conservation practice that can prevent or reduce nonpoint source pollution.

Structural BMPs are physical systems that are constructed for pollutant removal and/or reduction. This can include rip-rap along a streambank, rock check dams along a steep roadway or detention/retention basins, oil/grit separators, and porous asphalt for stormwater control.

Non-structural BMPs include managerial, educational, and vegetative practices designed to prevent or reduce pollutants from entering a watershed. These BMPs include buffers and filter strips, but also include education and public involvement programs, land use planning, natural resource protection, regulations, operation and maintenance or any other initiative that does not involve designing and building a physical structure.

Although most of these non-structural BMPs are difficult to measure quantitatively in terms of overall pollutant reduction and other parameters, research demonstrates that these BMPs have a large impact on changing policy, enforcing protection standards, improving operating procedures and changing public awareness and behaviors to improve water quality and quantity in a watershed over the long term. Moreover, they target source control which has been shown to be more cost effective than end-of-the-pipe solutions (i.e. “An ounce of prevention is worth a pound of cure”). Therefore, these BMPs should not be overlooked, and in some cases, should be the emphasis of a water quality management program.

It is important to note that installing a single BMP has the potential to reduce more than one type of pollutant (and source as well). For example, installing a riparian buffer will reduce a number of different pollutants (sediment, nutrients, toxins, etc.), as well as reduce impacts from fertilizer use and streambank erosion. Also, installing more than one BMP at a single site will increase the likelihood of pollutant reduction, but the effects will not be *cumulative*.

The following table (Table 35) suggests general guidelines to use when deciding specific locations to install or use BMPs in the Grand Traverse Bay watershed. The last row on the table suggests different areas within the watershed to apply types of BMPs.

TABLE 35: GENERAL GUIDELINES FOR LOCATING BMPs

Amount of Development	<i>Undeveloped</i>	<i>Developing</i>	<i>Developed</i>
Philosophy	Preserve	Protect	Retrofit
Amount of Impervious Surface	< 10%	11 – 26%	> 26%
Water Quality	Good	Fair	Fair – Poor
Stream Biodiversity	Good – Excellent	Fair – Good	Poor
Channel Stability	Stable	Unstable	Highly Unstable
Stream Protection Objectives	Preserve biodiversity; Channel stability; Maintain key elements of stream quality; Minimize pollutant loads	Maintain key elements of stream quality; Minimize pollutant loads	Minimize pollutant loads delivered to downstream waters and GT Bay
Pollutants to Address	<ul style="list-style-type: none"> • Sediment • Nutrients • Hydrologic Flow • Loss of Habitat 	<ul style="list-style-type: none"> • Sediment • Nutrients • Hydrologic Flow • Loss of Habitat • Toxics 	<ul style="list-style-type: none"> • Sediment • Nutrients • Hydrologic Flow • Toxics • Pathogens
BMP Selection and Design Criteria	<ul style="list-style-type: none"> • Maintain pre-development hydrology and prevent loss of habitat • Minimize sediment and nutrient inputs • Emphasize filtering systems 	<ul style="list-style-type: none"> • Maintain pre-development hydrology and prevent loss of habitat • Maximize pollutant removal • Emphasize filtering systems 	<ul style="list-style-type: none"> • Focus on stormwater management • Maximize pollutant (sediment, nutrients, toxics) removal and quantity control • Implement systems that reduce hydrologic instability • Emphasize filtering systems
Example Locations in Designated Priority Areas	<u>Headwater Areas:</u> Chain of Lakes Upper Boardman River Leelanau County	<u>Sprawl Areas:</u> Garfield Township East Bay Township Acme Township Elmwood Township Village of Elk Rapids Village of Suttons Bay	City of Traverse City Garfield Township

Table concept taken from Mill Creek Watershed Management Plan (HRWC 2003); BMP location guidelines are adapted from the rapid watershed assessment protocol of the Center for Watershed Protection (CWP 1998)

Table 36 lists potential systems of commonly used Best Management Practices (BMPs) that deal with various types of pollutant sources, as well as where to find more information about each type of BMP. The table also lists, where possible, the potential load reduction for each type of BMP. However, some of this information was not obtained due to the timeframe and scope of this project, and the fact that some of this type of information is not readily available. In addition, some of the research found was not relevant because it was either conducted in a vastly different region (i.e. southern United States) or done on a much smaller scale.

TABLE 36: BMP EXAMPLES BY SOURCE

Major Source or Cause	Affected Pollutant	Potential System of BMPs (not inclusive)	Potential Load Reduction	BMP Manual or Agency Contact
Bank/Shoreline Erosion	Sediment Habitat Loss	Stream bank stabilization	Varies (<i>see milestones in Section 7.3</i>)	Guidebook of BMPs for Michigan Watersheds Michigan Ag BMP Manual
Lack of Streamside Canopy and Riparian Buffer	Nutrients Thermal Poll.	Riparian buffers	See Table 37	Guidebook of BMPs for Michigan Watersheds Natural Resources Protection Strategy for Michigan Golf Courses
Stormwater and Impervious Surfaces	Sediment Nutrients Toxins Pathogens Thermal Poll Changes to Hydro Flow	*Numerous – See Table 37 *Develop stormwater management plans	See Table 37	Stormwater Management Guidebook Guidebook of BMPs for Michigan Watersheds Public Information and Education Strategy Center for Watershed Protection – Stormwater Center Website
Road Crossings - eroding, failing, outdated	Sediment Changes to Hydro Flow	Road Crossing BMPs (vary widely – See Road Stream Crossings in Section 7.3)	Varies (<i>see milestones in Section 7.3</i>)	Guidebook of BMPs for Michigan Watersheds
Residential/Commercial Fertilizer Use	Nutrients	Workshops, Brochures, Flyers, Videos, Etc.	Varies/ Not available/ See Riparian Buffer	Public Information and Education Strategy
Agriculture Fertilizers	Nutrients	*Cover crops *Grassed Waterway *Grade Stabiliz. Structures *Conservation Crop Rotation w/ Tillage *Other Ag BMPs from manual *NRCS Cost-Share Programs	Varies/ Not available	Michigan Ag BMP Manual USDA – NRCS
Agriculture – Fuel Spills	Toxins	Spill centers for fueling stations	Not available	Michigan Ag BMP Manual USDA – NRCS

TABLE 36: BMP EXAMPLES BY SOURCE CONT'D

Major Source or Cause	Affected Pollutant(s)	Potential System of BMPs (not inclusive)	Potential Load Reduction	BMP Manual or Agency Contact
Animal Waste	Nutrients Pathogens	*Watercourse crossings *Fence livestock out of streams *Waste Storage Facility *Riparian buffers *NRCS Cost-Share Programs	Not available (Riparian Buffer – See Table 37)	Michigan Ag BMP Manual Guidebook of BMPs for Michigan Watersheds USDA – NRCS
Septic Systems (Leaking)	Nutrients Pathogens	*Workshops, Brochures, Flyers, Videos, Etc. *Mandatory inspections *Ensure proper septic system design *Demo projects for alternative wastewater treatment systems	Varies/ Not available	Public Information and Education Strategy
Reduction of Wetlands	Sediment Nutrients Changes to Hydro Flow	Restoration of wetlands	See Table 37	Guidebook of BMPs for Michigan Watersheds Center for Watershed Protection
Development and Construction	Sediment Habitat Loss	*Initiatives to promote open space and land preservation and protection *Encourage ‘watershed friendly design’ *Implement soil erosion control measures *Construction BMPs (Construction barriers, Staging and scheduling, Access roads, Grading) *Workshops, Brochures, Flyers, Videos, Etc.	Varies/ Not available	Guidebook of BMPs for Michigan Watersheds Public Information and Education Strategy

TABLE 36: BMP EXAMPLES BY SOURCE CONT'D

Major Source or Cause	Affected Pollutant(s)	Potential System of BMPs (not inclusive)	Potential Load Reduction	BMP Manual or Agency Contact
Erosion stemming from human access problems	Sediment	Barriers, signs, stairs to prevent human access	Not available	Guidebook of BMPs for Michigan Watersheds
Marinas and Gas Stations	Toxins	Spill containment kits	Not available	
Dams	N/A	*Dam Removal *Cold Water Outlet Installation *Bypass for Fish Ladder	Not available	MDNR
Purposeful or Accidental Introduction of Invasive Species	Invasive Species	*Boat washing stations *Workshops, Brochures, Flyers, Videos, Etc. *Educational Programs	Not available	Public Information and Education Strategy
Reduction of Groundwater Recharge	Changes to Hydro Flow	*Infiltration basins *Grassed waterways *Plug abandoned wells properly *Groundwater and wellhead protection programs	Not available	Guidebook of BMPs for Michigan Watersheds Stormwater Management Guidebook

Pollutant Reduction Estimates for Stormwater BMPs

The Center for Watershed Protection has compiled a considerable amount of information regarding the effectiveness of selected stormwater BMPs. However, in total, very little information is available regarding the effectiveness of stormwater BMPs. Table 37 lists the total percent removal of phosphorus, nitrogen, sediment (total suspended solids), and metals and bacteria for selected stormwater BMPs.

Listing BMP effectiveness by percentage is a much more useful way of displaying the data rather than using specific values, which can be deceiving depending on the size of BMP implemented or installed. This is because specific values for pollutant removal depend on 1) the size of BMP implemented (feet of riparian buffer installed or acres of stormwater detention ponds), and 2) how much pollution was initially coming from the source.

It should be noted that it is assumed that the percent removal values in Table 37 are comparative numbers that state how much pollutant was removed **compared to no BMP implementation at the site**. For example, it is assumed that Porous Pavement values state the percentage of pollutant removed compared to if regular pavement were there instead; or that Riparian Buffer values state the percentage of pollutant removed compared to if no buffer was there and it was landscaped lawn instead. For more specific information on these stormwater BMPs, please see the Center for Watershed Protection’s Stormwater Center website at www.stormwatercenter.net.

Additionally, keep in mind that not every BMP may be the best selection for every site. Some places are better suited for specific kinds of BMPs. There are other factors to consider besides pollutant removal efficiency when deciding which BMP to use at a site. Other factors include the size of site, money available for implementation, and the purpose of the land (i.e., what the site will be used for).

TABLE 37: POLLUTANT REMOVAL EFFECTIVENESS OF SELECTED STORMWATER BMPs

Management Practice	Total % Phosphorus Removal	Total % Nitrogen Removal	Total % Suspended Solids Removal	% Metal and Bacteria Removal	Other Considerations
Riparian Buffer*	Grass: 39-88 Forest: 23-42	Grass: 17-87 Forest: 85	Grass: 63-89 Forest: N/A	n/a	- Increase in property value - Public education necessary
Porous Pavement	65	82	95	Metals: 98%	\$2-3/ft ² (traditional asphalt is \$0.50-1.00/ft ²)
Infiltration Basin	60-70	55-60	75	Metals: 85-90 Bacteria: 90	\$2/ft ³ of storage for a ¼-acre basin - Maintenance is essential for proper function
Infiltration Trench	100	42.3	n/a	n/a	\$5/ft ³ (expensive compared to other options)

**TABLE 37: POLLUTANT REMOVAL EFFECTIVENESS OF SELECTED STORMWATER BMPs
CONT'D**

Management Practice	Total % Phosphorus Removal	Total % Nitrogen Removal	Total % Suspended Solids Removal	% Metal and Bacteria Removal	Other Considerations
Bioretention (Rain Gardens, etc.)	29	49	81	Metals: 51-71 Bacteria: -58	\$6.80/ft ³ of water treated - Landscaped area anyway - Low maintenance cost - Note possible export of bacteria
Grassed Filter Strip (150 ft)	40	20	84	n/a	- Cost of seed or sod
Sand and Organic Filter Strip	<u>Sand:</u> 59 +/-38 <u>Organic:</u> 61 +/-61	<u>Sand:</u> 38 +/-16 <u>Organic:</u> 41	<u>Sand:</u> 86 +/-23 <u>Organic:</u> 88 +/-18	<u>Sand:</u> Metals: 49-88 Bacteria: 37 +/-61 <u>Organic:</u> Metals: 53-85	Not much information, but typical costs ranged from \$2.50 - \$7.50/ft of treated stormwater
Grassed Channel/Swale	34 +/-33	31 +/-49	81 +/-14	Metals: 42-71 Bacteria: -25	\$0.25/ft ² + design costs - Poorer removal rates than wet and dry swales - Note the export of bacteria
Constructed Wetlands** 1) Shallow Marsh 2) Extended Detention Wetland 3) Pond/Wetland 4) Submerged Gravel Wetland	1) 43 +/-40 2) 39 3) 56 +/-35 4) 64	1) 26 +/-49 2) 56 3) 19 +/-29 4) 19	1) 83 +/-51 2) 69 3) 71 +/-35 4) 83	1) Metals: 36-85 Bacteria: 76 2) Metals: (-80)-63 3) Metals: 0-57 4) Metals: 21-83 Bacteria: 78	- Relatively inexpensive; \$57,100 for a 1 acre-foot facility - Data for 1 and 2 based on fewer than five data points
Dry Extended Detention Pond	20 +/-13	31 +/-16	61 +/-32	Metals: 29-54 Bacteria: 78	\$41,600 for a 1 acre-foot pond - Least expensive stormwater treatment
Wet Pond	51 +/-21	33 +/-20	80 +/-27	Metals: 29-73 Bacteria: 70 +/-32	\$45,700 for a 1 acre-foot pond - Proper design and maintenance improves performance - Relatively inexpensive

**TABLE 37: POLLUTANT REMOVAL EFFECTIVENESS OF SELECTED STORMWATER BMPs
CONT'D**

Management Practice	Total % Phosphorus Removal	Total % Nitrogen Removal	Total % Suspended Solids Removal	% Metal and Bacteria Removal	Other Considerations
Street Sweeping (dry-vacuum assisted)	15-40	15-40	50-88	n/a	Sweeper: \$60,000 - \$180,000 - Costs also include staff and training
Stabilize Soils on Construction Sites	n/a	n/a	80-90	n/a	
Sediment Basins or Traps at Construction Sites	n/a	n/a	65	n/a	
Oil Grit Separator***	37	15	41	Metals: Lead: 10 Zinc: 39	- Should be 'off-line' from major stormwater conveyance system - Sand filters much more effective

*Pollutant removal efficiencies will increase as buffer width increases. Grasses in this case mean native grasses and not regular lawn or turf grass.

** Wetlands are among the most effective stormwater practices in terms of pollutant removal, and also offer aesthetic value. While natural wetlands can sometimes be used to treat stormwater runoff that has been properly pretreated, stormwater wetlands are fundamentally different from natural wetland systems. Stormwater wetlands are designed specifically for the purpose of treating stormwater runoff, and typically have less biodiversity than natural wetlands both in terms of plant and animal life. There are several design variations of the stormwater wetland, each design differing in the relative amounts of shallow and deep water, and dry storage above the wetland.

***Evidence for oil grit separators overwhelmingly suggests that oil-grit separators are a very poor stormwater practice and should probably be dropped as a treatment option unless these systems are designed off-line and with the same treatment volume of other stormwater practices.

Values obtained from Center for Watershed Protection's Stormwater Center website (www.stormwatercenter.net) and Practice of Watershed Protection Manual (Schueler and Holland 2000).

It should be noted that information regarding the pollutant removal efficiency, costs, and designs of structural stormwater BMPs is constantly evolving and improving. As a result, information contained in Tables 36 and 37 is dynamic and subject to change.

Calculating Streambank and Shoreline Erosion

Erosion from streambanks and shorelines can vary widely. In general, one can calculate the sediment and nutrients saved from entering a stream by eliminating the source of erosion using the MDEQ Pollutants Controlled Manual and the Channel Erosion Equation (DEQ 1999):

$$\text{Sediment Reduced (T/yr)} = \text{Length (ft.)} \times \text{Height (ft.)} \times \text{LRR (ft./yr.)} \times \text{Soil weight (ton/ft}^3\text{)}$$

LRR: Lateral Recession Rate

Soil weight: Values available in MDEQ Pollutants Controlled Manual, Exhibit 1 (DEQ 1999)

In turn, phosphorus and nitrogen attached to soil particles will be saved from entering the stream. The following calculations may be used to estimate the amount of phosphorus and nitrogen reduced by repairing an erosion source.

$$\text{Phosphorus Reduced (lb/yr)} = \text{Sediment reduced (T/yr)} \times 2000 \text{ lb/T} \times 0.0005 \text{ lb P/lb of soil} \times \text{correction factor}$$

$$\text{Nutrient Reduced (lb/yr)} = \text{Sediment reduced (T/yr)} \times 2000 \text{ lb/T} \times 0.001 \text{ lb N/lb of soil} \times \text{correction factor}$$

*Correction factor: Soil texture correction factors available in
MDEQ Pollutants Controlled Manual, Exhibit 2(DEQ 1999)*

7.3 List of Implementation Tasks by Category

IMPLEMENTATION TASKS

Categories:

1. Shoreline Protection and Restoration
2. Road Stream Crossings
3. Agriculture
4. Hydrology
5. Habitat, Fish and Wildlife
6. Stormwater
7. Wastewater
8. Human Health
9. Wetlands
10. Invasive Species
11. Land Protection and Management
12. Development
13. Zoning and Land Use
14. Groundwater
15. Monitoring
16. Desired Uses

Organization Acronyms:

A-CD – Antrim Conservation District
CDs – All Conservation Districts
City of TC – City of Traverse City
CGOV – County Governments
CRA – Conservation Resource Alliance
MDEQ – Michigan Department of Environmental Quality
MDNR – Michigan Department of Natural Resources
ERCOL – Elk River Chain of Lakes Steering Committee
EPA – Environmental Protection Agency
FERC – Federal Energy Regulatory Commission
GLEC – Great Lakes Environmental Center
GTBOCI – Grand Traverse Band of Ottawa and Chippewa Indians
GT-CD – Grand Traverse Conservation District
GT County – Grand Traverse County
GTRLC – Grand Traverse Regional Land Conservancy
Health Depts. – Local Health Departments
ISEA – Inland Seas Education Association
K-CD – Kalkaska Conservation District
LA – Lake Associations
LC – Leelanau Conservancy
L-CD – Leelanau Conservation District
LGOV – Local Governments
M-DOT – Michigan Department of Transportation

MLUI – Michigan Land Use Institute
MSU-E – Michigan State University Extension
NRCS – USDA Natural Resources Conservation Service
NWMCOG – Northwest Michigan Council of Governments
RCs – County Road Commissions
TART – Traverse Area Recreational and Transportation Trails Inc.
TCLP – Traverse City Light and Power
TOMWC – Tip of the Mitt Watershed Council
TWC – The Watershed Center Grand Traverse Bay
OWTTF – Onsite Wastewater Treatment Task Force
USGS – United States Geological Survey
USCG – United States Coast Guard

Other Organizations:

Chambers of Commerce, Convention Visitors Bureau
Economic Development Corporation
GT County Resource Recovery Office
Local Realtors, Businesses
MI Agricultural Stewardship Assoc.
MSU-E Groundwater Stewardship
New Designs for Growth
Northern Lakes Economic Alliance
Trash Haulers
Schools, Universities

Estimated Costs and Timeframe:

For costs associated with salaries, an average watershed technician rate of \$35/hour was applied. For tasks to be completed by a specialized consultant, a rate of \$50/hour was used. Tasks that will be done on a yearly or site by site basis are noted as such (\$X/yr or \$X/site). Appendix E lists average rates for costs associated with purchasing materials for and installing standard BMPs. Further details are noted where applicable. Tasks that should be completed in the short-term were given a timeframe of 3 years; long-term tasks were given a timeframe of 10 years; tasks that should be undertaken annually were given a timeframe of “ongoing.”

Task Milestones:

Project milestones for specific tasks were established where feasible. The milestones identify when the noted task should be completed. They are meant to guide implementation priorities and measure progress. Key milestones include completing streambank erosion restoration projects, repairing road stream crossings, developing stormwater management plans and starting stormwater remediation efforts in urban areas, and updating zoning ordinances (Table 38).

TABLE 38: SUMMARY OF PROJECT MILESTONES FOR IMPLEMENTATION TASKS

Task	Milestone and Timeline
<u>Shoreline Protection and Restoration</u>	
Task 3: Riparian buffers on publicly owned property in the watershed.	<ol style="list-style-type: none"> 1. 50% in priority area by 2010 2. 75% in priority area by 2015
Task 4: Riparian buffers on private property	10% in priority area by 2015
Task 5: Shoreline riparian buffer demonstration sites	2 demo sites by 2008
Task 6: Conduct or evaluate existing streambank and shoreline erosion surveys; compile list of priority areas.	Update again in 2015
Task 7: Stabilize streambanks at priority sites	<p><u>Boardman River</u></p> <ol style="list-style-type: none"> 1. Complete update – June 2006 2. Restore 12 road stream crossing or streambank erosion sites each year <p><u>Elk River Chain of Lakes</u></p> 3 moderate sites fixed by 2010
Task 8: Continue current streambank restoration efforts in Kid’s Creek and its tributaries; stabilize streambanks; install stormwater and road crossing BMPs where necessary; install riparian buffers	<ol style="list-style-type: none"> 1. Task list by 2008 2. Riparian buffer along 30% of Kids Creek length in Traverse City and Garfield Township by 2015
Task 10: Update local ordinances to ensure best management practices are utilized on private property along the water’s edge; Adopt ordinances or establish policies that maintain these practices for the maintenance of public lands as well.	<ol style="list-style-type: none"> 1. Update local ordinances in City of Traverse City and Garfield Township by 2010. 2. Update local ordinances in townships around Torch Lake by 2007 3. Adopt appropriate ordinance upgrades for other townships and municipalities along Grand Traverse Bay by 2015
Task 12: Marina BMPs	BMPs at 3 marinas on GT Bay by 2010.

TABLE 38: SUMMARY OF PROJECT MILESTONES FOR IMPLEMENTATION TASKS CONT'D

Task	Milestone and Timeline
<u>Road Stream Crossings</u>	
Task 2: Road stream crossing BMPs	<p><u>West Bay Shoreline and Tributaries</u> Fix 8 severe sites by 2015</p> <p><u>Boardman River</u> Complete update – June 2006 Restore 12 road stream crossing or streambank erosion sites each year</p> <p><u>Kalkaska County (Rapid River)</u> Fix last 3 sites on Rapid River by 2010</p> <p><u>Elk River Chain of Lakes – Antrim Co.</u> Fix 6 road crossing sites (2 severe, 4 moderate) by 2015</p>
<u>Agriculture</u>	
Task 1: Develop Conservation Plans, Resource Management Plans, or Progressive Plans	Complete 10-15 plans/yr
Task 2: Implement USDA-NRCS cost-share programs	Implement 10-15 plans/yr
<u>Hydrology</u>	
Task 4: Inventory and map existing dams and lake-level control structures	Complete by 2009
<u>Habitat, Fish, and Wildlife</u>	
Task 4: Continue to implement the Conservation Resource Alliance’s Wild-Link program	60-70% participation rate from private property owners in Grand Traverse Bay watershed corridor by 2015
<u>Stormwater</u>	
Task 1: Form an area-wide Stormwater Task Force	Task force formed by 2006
Task 2: Conduct impervious surface assessments	Complete assessment by 2010
Task 3: Map and count number of culverts/storm drain outlets in villages and other municipalities	Complete assessment by 2010
Task 4: Develop stormwater management plans and/or ordinances	Complete one management plan every 2 years
Task 5: Stormwater BMPs in urban areas	One major stormwater BMP installed each year
Task 6: Stormwater BMPs in Kid’s Creek within the urban areas of Traverse City including low impact design elements	BMPs installed and completed by 2015
Task 7: Construct wetland area in Suttons Bay at Inland Seas Education Association	Complete by 2006

TABLE 38: SUMMARY OF PROJECT MILESTONES FOR IMPLEMENTATION TASKS CONT'D

Task	Milestone and Timeline
<u>Stormwater cont'd</u>	
Task 9: Upgrade or update applicable ordinances for local governments to accommodate and encourage more innovative forms of stormwater management	<ol style="list-style-type: none"> 1. Update local ordinances in City of Traverse City and Garfield Township by 2010. 2. Update local ordinances in townships around Torch Lake by 2007 3. Adopt appropriate ordinance upgrades for other townships and municipalities along Grand Traverse Bay by 2015
<u>Wastewater and Septics</u>	
Task 1: Complete shoreline cladophora survey	Complete survey by 2010
Task 3: Demonstration projects utilizing alternative onsite wastewater treatment systems	One demonstration site in place by 2010
<u>Human Health Issues</u>	
None	
<u>Wetlands</u>	
None	
<u>Invasive Species</u>	
Task 1: Boat washing stations at marinas and boat launches	One boat washing station a year
Task 5: Purple loosestrife eradication program	Program in place by 2008
<u>Land Protection and Management</u>	
None	
<u>Development</u>	
Task 4: Monitor Soil Erosion and Sedimentation construction permits	Establish tracking system by 2007
<u>Zoning and Land Use</u>	
Task 2: Assist townships with zoning and master plans to develop ordinances that protect water quality and natural resources.	<ol style="list-style-type: none"> 1. Update local ordinances in City of Traverse City and Garfield Township by 2010. 2. Update local ordinances in townships around Torch Lake by 2007 3. Adopt appropriate ordinance upgrades for other townships and municipalities along Grand Traverse Bay by 2015
<u>Groundwater</u>	
None	

TABLE 38: SUMMARY OF PROJECT MILESTONES FOR IMPLEMENTATION TASKS CONT'D

Task	Milestone and Timeline
<u>Monitoring</u>	
Task 3: Update shoreline inventory of Grand Traverse Bay every 5 years	Update by 2008
Task 4: Inventory of near- and offshore areas along Grand Traverse Bay; sediment analysis of nearshore areas; aquatic weed bed surveys	Complete inventory by 2009
Task 8: Further evaluation and monitoring of nutrient, bacterial and toxic pollution sites identified in the Boardman Lake Watershed Management Plan	Complete task by 2009
Task 10: Document the effectiveness of BMP implementation; Work with partners to develop a standardized methodology	Develop standard methodology by 2008

Shoreline Protection and Restoration

Goal(s) Accomplished:

- 1) Aquatic and terrestrial ecosystems
- 2) Quality of water resources
- 3) Land and water management

- Task 1:** Inventory riparian corridors on public property (and parks) to determine priority areas where riparian vegetated stream and lakeshore buffers should be installed. (See Section 5.5 of protection plan for a discussion about buffers.)
Estimated Cost: \$10,000
Timeline: 3 years
Priority: High
Potential Project Partners: TWC, CRA, MDNR, CDs, GTBOCI, TOMWC, LA, LGOV, ERCOL
- Task 2:** Inventory riparian corridors on private property to determine priority areas where riparian vegetated stream and lakeshore buffers should be installed. (See Section 5.5 of protection plan for a discussion about buffers.)
Estimated Cost: \$40,000
Timeline: 3 years
Priority: High
Potential Project Partners: TWC, CRA, MDNR, CDs, GTBOCI, TOMWC, LA, LGOV, ERCOL
- Task 3:** Work with municipalities and other government organizations to install riparian buffers on publicly owned property in the watershed.
Pollutant/Environmental Stressors Reduced: Changes to Hydrology, Loss of Habitat, Nutrients, Thermal Pollution, Toxics, Sediment
Estimated Cost: \$50,000/yr
Timeline: 10 years
Priority: High
Potential Project Partners: TWC, CRA, CDs, GTBOCI, TOMWC, LA, MDNR, LGOV, ERCOL
Milestone: 50% of buffers established on public property by 2010, 75% established by 2015
- Task 4:** In areas that have already been inventoried, work with interested landowners to install riparian buffers in priority areas.
Pollutant/Environmental Stressors Reduced: Changes to Hydrology, Loss of Habitat, Nutrients, Thermal Pollution, Toxics, Sediment
Estimated Cost: \$50,000/yr
Timeline: 10 years
Priority: High
Potential Project Partners: TWC, CRA, CDs, GTBOCI, TOMWC, LA, ERCOL
Milestone: 10% of buffers established on private property by 2015

- Task 5:** Establish shoreline riparian buffer demonstration sites to show riparian landowners how to create buffers that are both aesthetic and effective.
Pollutant/Environmental Stressors Reduced: Changes to Hydrology, Loss of Habitat, Nutrients, Pathogens, Thermal Pollution, Toxics, Sediment
Estimated Cost: \$5,000/site
Timeline: 10 years
Priority: High
Potential Project Partners: TWC, CDs, MSU-E Groundwater Stewardship, TOMWC, LA, ERCOL
Milestone: 2 riparian buffers demo sites by 2008
- Task 6:** Conduct or evaluate existing streambank and shoreline erosion surveys to determine sites where bank stabilization and restoration is needed and compile list of priority areas.
Estimated Cost: \$90,000
Timeline: ongoing, update every 10 years
Priority: High
Potential Project Partners: TWC, CRA, CDs, GTBOCI, TOMWC, LA, ERCOL
Milestone: Update again in 2015
- Task 7:** Stabilize streambanks at priority sites and use biotechnical methods where possible. Include costs and time for maintenance of stabilized sites. (Note: There are many more sites that need streambank stabilization than what is listed here.)
Pollutant/Environmental Stressors Reduced: Changes to Hydrology, Loss of Habitat, Nutrients, Thermal Pollution, Toxics, Sediment
- Boardman River**
Estimated Cost: ~\$3,500/ea (varies depending on proposed BMPs)
Timeline: 10 years
Priority: High
Potential Project Partners: TWC, GT-CD, CRA, City of Traverse City
Milestone 1: Complete road stream crossing and streambank erosion update – June 2006
Milestone 2: Restore 12 road stream crossing/streambank erosion sites each year (combo of severe and moderate ranked sites).
- Elk River Chain of Lakes**
Estimated Cost: Lakeshore stabilization: \$160,000 (\$80/ft x 100ft lot x 20 lots)
Streambank Erosion Sites: ~\$3,000/ea
(varies depending on proposed BMPs)
Timeline: 10 years
Priority: High
Potential Project Partners: TWC, CRA, A-CD, TOMWC, LA, ERCOL
Milestone: 3 moderate sites fixed by 2010 (preventing 57 yd³ of soil, 79.8 lb P, and 159.6 lb N from entering watershed)

- Task 8:** Continue current streambank restoration efforts in Kid’s Creek and its tributaries. Work with municipalities and the Conservation District to stabilize eroding streambanks identified in 1991 erosion survey and install stormwater and road crossing BMPs where necessary (See Stormwater Task #6). Work with residents and municipalities to install riparian buffers where possible.
Pollutant/Environmental Stressors Reduced: Changes to Hydrology, Loss of Habitat, Nutrients, Thermal Pollution, Toxics, Sediment
Estimated Cost: \$150,000/year
Timeline: 10 years
Priority: High
Potential Project Partners: TWC, GT-CD, City of Traverse City, Garfield Twp.
Milestone 1: Task list developed (including specific priority sites for stormwater and road crossing BMPs and streambank erosion sites) by 2008
Milestone 2: Riparian buffer installed along 30% of Kids Creek length in Traverse City and Garfield Township by 2015
- Task 9:** Identify and work with landowners along portions of the Grand Traverse Bay identified in the 2002 shoreline inventory (Appendix C in Protection Plan) to stabilize the shoreline using biotechnical and soft engineering techniques. (Work with and gain permission from MDOT and private property owners.)
Pollutant/Environmental Stressors Reduced: Changes to Hydrology, Loss of Habitat, Nutrients, Thermal Pollution, Toxics, Sediment
Estimated Cost: \$15,000/year
Timeline: 10 years
Priority: Medium
Potential Project Partners: TWC, CRA, CDs, GTBOCI, M-DOT
- Task 10:** Update local ordinances to ensure best management practices are utilized on private property along the water’s edge including the retention or establishment of shoreline vegetative buffers, minimizing vegetation removal and mowing to the water’s edge, and eliminating the dumping of grass clippings and other yard/solid wastes into the water. Adopt ordinances or establish policies that maintain these practices for the maintenance of public lands as well.
Pollutant/Environmental Stressors Reduced: Changes to Hydrology, Loss of Habitat, Nutrients, Thermal Pollution, Toxics, Sediment, Pathogens
Estimate Cost: \$15,000 per ordinance
Timeline: 10 years
Priority: High
Potential Project Partners: LGOV, ERCOL, LA
Milestone 1: Update local ordinances in townships around Torch Lake by 2007 (A-CD).
Milestone 2: Update local ordinances in City of Traverse City and Garfield Township by 2010.
Milestone 3: Adopt appropriate ordinance upgrades for other townships and municipalities along Grand Traverse Bay by 2015 (see Zoning and Land Use Task #2).

- Task 11:** Install barriers, signage, or stairs where needed to manage human access to stream and lakeside banks at risk of erosion (steep slopes, sandy soils) from recreational foot traffic.
Pollutant/Environmental Stressors Reduced: *Changes to Hydrology, Loss of Habitat, Nutrients, Thermal Pollution, Toxics, Sediment*
Estimated Cost: \$35,000/year
Timeline: 10 years
Priority: Medium
Potential Project Partners: TWC, CRA, MDNR, CDs, LGOV, TOMWC, LA (Also: canoe, hiking, fishing and sportsman groups)
- Task 12:** Work with area marinas to install and promote BMPs (like spill response carts containing brooms, pads and absorbents; bilge sponges; emergency shut-off valves; and stormwater detention areas and buffer strips) that will reduce the amount of pollution coming from boat fuels, wastewater, erosion, and lack of riparian buffers.
Pollutant/Environmental Stressors Reduced: *Nutrients, Pathogens, Toxics, Sediment, Invasive Species*
Estimated Cost: \$10,000/year (cost for staff time and BMPs for one marina)
Timeline: 3 years
Priority: Medium
Potential Project Partners: TWC, GTBOCI, TOMWC, CDs, ERCOL, LA, Local Businesses
Milestone: BMPs installed at 3 marinas on GT Bay by 2010.
- Task 13:** Minimize stormwater contamination from vehicle fuel by installing and maintaining spill containment kits for gas and other fueling stations where necessary.
Pollutant/Environmental Stressors Reduced: *Toxics*
Estimated Cost: \$5,000/year
Timeline: 10 years
Priority: Medium
Potential Project Partners: TWC, NRCS, CDs, GTBOCI, LGOV, LA, ERCOL, Chambers of Commerce
- Task 14:** Continue Home*A*Syst, Lake*A*Syst, and Lawn*A*Syst programs in watershed and encourage residents to utilize them.
Pollutant/Environmental Stressors Reduced: *Changes to Hydrology, Loss of Habitat, Nutrients, Pathogens, Thermal Pollution, Toxics, Sediment*
Estimated Cost: \$35,000/yr
Timeline: 10 years
Priority: Medium
Potential Project Partners: MSU-E Groundwater Stewardship, CDs, TWC, NRCS, LA, ERCOL, Chambers of Commerce, Local Realtors

- Task 15:** Work with Conservation Districts to include native plants for riparian buffers in annual plant sales.
Pollutant/Environmental Stressors Reduced: *Changes to Hydrology, Loss of Habitat, Nutrients, Pathogens, Thermal Pollution, Toxics, Sediment*
Estimated Cost: \$2,500
Timeline: 10 years
Priority: Medium
Potential Project Partners: CDs, TWC
- Task 16:** Work with appropriate agencies to identify key areas where ‘no boat wake’ zones should be implemented and support enforcement of those zones.
Pollutant/Environmental Stressors Reduced: *Changes to Hydrology, Loss of Habitat, Nutrients, Thermal Pollution, Toxics, Sediment*
Estimated Cost: \$5,500/year
Timeline: 3 years, supporting enforcement is ongoing
Priority: Low
Potential Project Partners: TWC, MDNR, CDs, LGOV
- Task 17:** Assist local and state government groups in enforcing shoreline regulations where applicable.
Pollutant/Environmental Stressors Reduced: *Changes to Hydrology, Loss of Habitat, Nutrients, Pathogens, Thermal Pollution, Toxics, Sediment*
Estimated Cost: \$5,500/year
Timeline: Ongoing
Priority: Low
Potential Project Partners: TWC, LA, CDs
- Task 18:** Work with area businesses and property owners to encourage proper maintenance and monitoring of underground fuel storage tanks and replace them when there is a risk of leakage from tank age, poor maintenance, or damage.
Pollutant/Environmental Stressors Reduced: *Toxics*
Estimated Cost: \$5,500/year
Timeline: Ongoing
Priority: Low
Potential Project Partners: TWC, ERCOL, LA, Local Businesses

Road Stream Crossings

Goal(s) Accomplished:

- 1) Aquatic and terrestrial ecosystems
- 2) Quality of water resources

Task 1: Reevaluate list of priority road stream crossings needing remediation work every 10 years. Reevaluation work includes: 1) Obtain MDEQ completed road stream crossing inventory and expand the inventory of priority ranked areas to include a greater level of detail equal to other inventories in the area (completed for Antrim County streams), 2) Obtain any new data regarding road stream crossing inventories and completed improvement projects, 3) Inventory any remaining road stream crossings that have not been surveyed and determine priority areas.

Estimated Cost: \$10,000

Timeline: 3 years

Priority: High

Potential Project Partners: TWC, CRA, CDs, LGOV, ERCOL

Task 2: Where priority road stream crossings have been identified, improve, repair, or replace outdated, failing, or eroding road stream crossings by implementing the appropriate BMPs from the following;

1. Road Crossings
 - a) Remove obstructions that restrict flow through the culvert
 - b) Replace undersized (too small or too short) culverts
 - c) Remove and replace perched or misaligned culverts to avoid erosion and provide for fish passage
 - d) Install bottomless culverts and bridges where possible
 - e) Replace culverts with a length that allows for $\geq 3:1$ slope on embankments
 - f) Revegetate all disturbed or bare soils on embankments
2. Road Approaches
 - a) Create diversion outlets and spillways to direct road runoff and stormwater away streams
 - b) Pave steep, sandy approaches where feasible
 - c) Dig or maintain ditches where needed and construct check dams if required
3. Road Maintenance
 - a) Encourage Road Commissions to look at the long-term savings of crossing improvements over cumulative maintenance costs
4. Road Construction and Closure
 - a) Minimize the number of access roads needed for oil, timber and gas exploration.
 - b) When constructing new roads, avoid streams if possible and maintain natural channels to greatest extent possible.
 - c) Close private roads that are no longer needed and restore stream channel to natural condition if feasible.

Pollutant/Environmental Stressors Reduced: Changes to Hydrology, Loss of Habitat, Nutrients, Pathogens, Thermal Pollution, Toxics, Sediment

West Bay Shoreline and Tributaries

Milestone: Fix 8 severe sites by 2015
Estimated Milestone Cost: \$83,000 (includes costs for revegetation only)
Timeline: 10 years
Priority: High
Potential Project Partners: TWC, CRA, L-CD, GTBOCI, RCs

Boardman River watershed

Milestone 1: Complete road stream crossing and streambank erosion update – June 2006 (revise goals in 2006 if necessary)
Milestone 2: Restore 12 road stream crossing/streambank erosion sites each year (combo of severe and moderate ranked sites).
Estimated Milestone 2 Cost: \$50,000 each road stream crossing (highly variable depending on proposed BMPs)
Timeline: 10 years
Priority: High
Potential Project Partners: TWC, CRA, GT-CD, RCs

Kalkaska County (Rapid River)

Milestone: Fix last 3 sites on Rapid River by 2010
Estimated Milestone Cost: \$195,000 (costs obtained from KCD)
Timeline: 10 years
Priority: High
Potential Project Partners: TWC, CRA, K-CD, RCs

Antrim County (Elk River Chain of Lakes)

Milestone: Fix 6 road crossing sites (2 severe, 4 moderate) by 2015
Estimated Milestone Cost: \$295,000 (costs obtained from ACD)
Timeline: 10 years
Priority: High
Potential Project Partners: TWC, CRA, A-CD, RCs

Task 3: Map oil and natural gas well sites, pipelines, access roads that cross streams, and processing facilities and disseminate to city and township planning commissions.
Pollutant/Environmental Stressors Reduced: Changes to Hydrology, Thermal Pollution, Toxics, Sediment

Estimated Cost: \$11,000 (consultant rate)
Timeline: Ongoing
Priority: Medium
Potential Project Partners: TWC, CRA, CDs, TOMWC, NWMCOG, CGOV

Task 4: Work with appropriate agencies to establish minimum setback of oil and gas wells and their access roads from sensitive areas.
Pollutant/Environmental Stressors Reduced: Changes to Hydrology, Loss of Habitat, Nutrients, Pathogens, Thermal Pollution, Toxics, Sediment

Estimated Cost: \$2,500
Timeline: Ongoing
Priority: Medium
Potential Project Partners: TWC, TOMWC, LGOV, MDEQ, MDNR

Agriculture

Goal(s) Accomplished:

- 1) Aquatic and terrestrial ecosystems
- 2) Quality of water resources
- 3) Land and water management
- 6) Distinctive character and aesthetic qualities of watershed

Note: The Natural Resources Conservation Service (NRCS) of the United States Department of Agriculture is the primary federal agency that works with private landowners to help them conserve, maintain and improve their natural resources. NRCS's conservation programs help people reduce soil erosion, enhance water supplies, improve water quality, increase wildlife habitat, and reduce damages caused by floods and other natural disasters. Public benefits include enhanced natural resources that help sustain agricultural productivity and environmental quality while supporting continued economic development, recreation, and scenic beauty.

The Grand Traverse Bay watershed was one of two Michigan watersheds selected for the 2006 Conservation Security Program (CSP) sign-up. CSP is a voluntary conservation program and has a unique role among USDA programs. It identifies and rewards those farmers and ranchers who meet the highest standards of conservation and environmental management on their operations. It creates powerful incentives for other producers to meet those same standards of conservation performance on their operations, and provides public benefits for generations to come.

Task 1: Develop Conservation Plans, Resource Management Plans, or Progressive Plans for all farms in the watershed that do not currently have one. As appropriate, information should be included on: crop nutrient management, weed and pest management, grassed waterways, sod centers in orchard rows, conservation buffers, proper manure management, conservation tillage, fencing off stream access to livestock, installing watercourse crossings, planting cover crops, and crop rotation. In addition, Conservation Plans that are more than 3 years old should be reviewed and updated to keep them eligible for USDA cost-share programs.

Pollutant/Environmental Stressors Reduced: Changes to Hydrology, Loss of Habitat, Nutrients, Pathogens, Thermal Pollution, Toxics, Sediment

Estimated Cost: \$200,000/year

Timeline: Ongoing

Priority: High

Potential Project Partners: NRCS, CDs, TWC, MSU-E

Milestone: Complete 10-15 plans/yr

- Task 2:** Work with agricultural producers that have an approved Conservation Plan to implement USDA-NRCS cost-share programs that provide cost incentives and/or rental payments to farmers who implement eligible conservation practices on their land. Examples of these types of programs include: Environmental Quality Incentives Program (EQIP), Conservation Security Program (CSP) and the Conservation Reserve Program (CRP). More information on these and other cost-share programs are on the USDA-NRCS website at <http://www.nrcs.usda.gov/>.
Pollutant/Environmental Stressors Reduced: Changes to Hydrology, Loss of Habitat, Nutrients, Pathogens, Thermal Pollution, Toxics, Sediment
Estimated Cost: \$200,000/year
Timeline: 10 years
Priority: High
Potential Project Partners: NRCS, MSU-E, CDs
Milestone: Implement 10-15 plans/yr
- Task 3:** Where appropriate, work with farmers to plant cover crops in fall on agricultural lands vulnerable to runoff (i.e., corn, potatoes, etc.).
Pollutant/Environmental Stressors Reduced: Changes to Hydrology, Nutrients, Thermal Pollution, Toxics, Sediment
Estimated Cost: \$5,500 (salary costs only)
Timeline: Ongoing
Priority: High
Potential Project Partners: NRCS, CDs, TWC
- Task 4:** Minimize water contamination from farm vehicle fuel by installing and maintaining spill containment centers for above ground fueling stations where necessary and possible.
Pollutant/Environmental Stressors Reduced: Toxics
Estimated Cost: \$5,500/station
Timeline: 10 years
Priority: High
Potential Project Partners: TWC, NRCS, CDs, GTBOCI
- Task 5:** Fence livestock and other animals out of streams and wetlands and establish riparian buffers where needed in agricultural areas (Boardman River Valley and Elk River Chain of Lakes).
Pollutant/Environmental Stressors Reduced: Nutrients, Pathogens, Thermal Pollution, Sediment
Estimated Cost: Varies with length of fence and buffer, the type of watercourse crossing, and water supply needed
Timeline: 10 years
Priority: Medium
Potential Project Partners: NRCS, CDs, TWC

- Task 6:** Continue Farm*A*Syst program in watershed and encourage farmers to utilize it.
Pollutant/Environmental Stressors Reduced: Changes to Hydrology, Nutrients, Thermal Pollution, Toxics, Sediment
Estimated Cost: \$35,000/yr
Timeline: 10 years
Priority: Medium
Potential Project Partners: MSU-E Groundwater Stewardship, NRCS, CDs, TWC
- Task 7:** Promote sustainable agriculture (both financial and ecological) and value-added ventures (taking a raw commodity and making their own product) for farmers. Value added ventures may include: bottling your own milk or operating a farm market/road side stand.
Pollutant/Environmental Stressors Reduced: Nutrients, Toxics
Estimated Cost: \$2,500/yr
Timeline: Ongoing
Priority: Low
Potential Project Partners: NRCS, CDs, MI Agricultural Stewardship Assoc., Northern Lakes Economic Alliance, MLUI, Economic Development Corporation, TWC, Chambers of Commerce, Local Businesses
- Task 8:** Explore the benefits, need for, and feasibility of developing local ordinances to ensure appropriate management of and to protect against the negative water quality impacts of confined animal feeding operations (CAFOs) of 1,000 animal units or more.
Pollutant/Environmental Stressors Reduced: Changes to Hydrology, Nutrients, Thermal Pollution, Toxics, Sediment
Estimated Cost: \$1,500
Timeline: 10 years
Priority: Low
Potential Project Partners: MSU-E Groundwater Stewardship, NRCS, CDs, TWC, NWMCOG
- Task 9:** Promote local agriculture and encourage watershed residents to buy locally made/grown agricultural products.
Pollutant/Environmental Stressors Reduced: Changes to Hydrology, Nutrients, Thermal Pollution, Toxics, Sediment
Estimated Cost: \$2,500/yr
Timeline: 10 years
Priority: Low
Potential Project Partners: MSU-E Groundwater Stewardship, NRCS, CDs, TWC, MLUI, Convention Visitors Bureau, Economic Development Corporation, Northern Lakes Economic Alliance

Hydrology

Goal(s) Accomplished:

- 1) Aquatic and terrestrial ecosystems
- 2) Quality of water resources
- 3) Land and water management

See also: Road Stream Crossings; Stormwater

- Task 1:** Map groundwater flow and major aquifers in the watershed.
Estimated Cost: \$350,000
Timeline: 3 years
Priority: High
Potential Project Partners: TWC, USGS, CGOV, MDEQ, Universities
- Task 2:** Conduct in-depth hydrologic analysis to determine year-round stream flows as well as water quality measurements during baseflow, storm events, and spring runoff in order to provide a better estimate of pollutant loading throughout the Grand Traverse Bay watershed.
Estimated Cost: \$25,000 - \$50,000/yr
Timeline: 10 years
Priority: High
Potential Project Partners: TWC, LGOV, MDNR, MDEQ
- Task 3:** Install BMPs where needed to constrain unnaturally wide channels and concentrate channel flow into deeper, narrower channels.
Pollutant/Environmental Stressors Reduced: Changes to Hydrology, Loss of Habitat, Nutrients, Thermal Pollution, Sediment
Estimated Cost: \$25,000/year
Timeline: 10 years
Priority: High
Potential Project Partners: TWC, CRA, MDNR, CDs, TOMWC
- Task 4:** Inventory and map existing dams and lake-level control structures to identify inoperative, failing, or economically unfeasible dams that should be removed.
Estimated Cost: \$5,500
Timeline: 3 years
Priority: Medium
Potential Project Partners: TWC, CRA, MDNR, TCLP, City of TC, CGOV
Milestone: Complete inventory by 2009

Task 5: Work with owners and operators of dams and lake-control structures to ensure these structures are operated so that they mimic natural flow conditions of the river.

Pollutant/Environmental Stressors Reduced: Changes to Hydrology, Loss of Habitat, Nutrients, Thermal Pollution, Sediment

Estimated Cost: \$2,500/year

Timeline: Ongoing

Priority: Medium

Potential Project Partners: TWC, FERC, CGOV

Task 6: Remove inoperative, failing, or economically unfeasible dams as well as priority dams that are blocking fish passage.

Pollutant/Environmental Stressors Reduced: Changes to Hydrology, Loss of Habitat, Thermal Pollution, Sediment

Estimated Cost: \$1,000,000/removal

Timeline: 10 years

Priority: Low

Potential Project Partners: TWC, MDNR, CDs, TCLP, City of TC, CGOV

Habitat, Fish, and Wildlife

Goal(s) Accomplished:

- 1) Aquatic and terrestrial ecosystems
- 2) Quality of water resources
- 3) Land and water management
- 6) Distinctive character and aesthetic qualities of watershed

Task 1: Conduct inventories of aquatic habitat conditions (debris, substrate, channel form, riparian corridor, erosion, etc.) throughout the watershed where needed to track trends in habitat condition.

Estimated Cost: \$35,000/yr

Timeline: Ongoing

Priority: High

Potential Project Partners: CRA, MDNR, CDs, GTBOCI, GTRLC, LC, LA, TWC, ERCOL

Task 2: Collect information that exists, and conduct stream inventories where needed, to evaluate appropriate sites for in-stream habitat improvement projects such as lunker structures, island structures, half-log structures or log jams. Criteria to be assessed includes: woody debris, bank stability, riparian vegetation, in-stream cover, flow dynamics, and fish population structure

Estimated Cost: \$35,000

Timeline: 3 years

Priority: High

Potential Project Partners: TWC, CRA, MDNR, CDs, GTBOCI, LA, ERCOL, TOMWC

Task 3: Install in-stream habitat improvements where appropriate, according to the inventory in Task 2

Pollutant/Environmental Stressors Reduced: Changes to Hydrology, Loss of Habitat, Thermal Pollution

Estimated Cost: \$100,000/year

Timeline: 10 years

Priority: High

Potential Project Partners: TWC, CRA, MDNR, CDs, GTBOCI, TOMWC, ERCOL, LA

- Task 4:** Continue to implement the Conservation Resource Alliance’s Wild-Link program in the Grand Traverse Bay watershed to protect and enhance fish and wildlife habitat on private property within ecological corridors throughout the watershed.
Pollutant/Environmental Stressors Reduced: *Loss of Habitat*
Estimated Cost: \$72,000-\$100,000/year
Timeline: Ongoing
Priority: High
Potential Project Partners: CRA
Milestone: Have 60-70% participation rate from private property owners in selected Grand Traverse Bay watershed corridor by 2015. This would achieve the estimated amount of coverage needed for a wildlife corridor to function.
- Task 5:** Assist local land conservancies with protection of lands that maintain or expand wildlife corridors, protect sensitive wildlife and fisheries habitats such as wetlands, riparian corridors, etc., and protect habitat for threatened and endangered species.
See Land Protection and Management Tasks
- Task 6:** Work with local units of government to explore feasibility of a locally funded purchase of development rights/conservation easement acquisition program focused on preserving lands critical to water quality and wildlife habitat preservation. Use Peninsula Township as an example.
See Land Protection and Management Tasks
- Task 7:** Work with owners and operators of dams and lake-control structures to 1) prevent structural failures that often result in the release of sediments behind the dams and to ensure the proper disposal of dredge spoils, 2) install fish ladders where appropriate and necessary, and 3) install cold water withdrawals/outlets where needed.
Pollutant/Environmental Stressors Reduced: *Changes to Hydrology, Loss of Habitat, Nutrients, Thermal Pollution, Toxics, Sediment*
Estimated Cost: \$2,500/year
Timeline: Ongoing
Priority: Medium
Potential Project Partners: TWC, MDNR, CGOV

Stormwater

Goal(s) Accomplished:

- 1) Aquatic and terrestrial ecosystems
- 2) Quality of water resources
- 3) Land and water management

Task 1: Form an area-wide Stormwater Task Force to tackle urban stormwater issues and to provide a forum for discussing and finding solutions to problems by implementing stormwater BMPs and education initiatives.

Pollutant/Environmental Stressors Reduced: Changes to Hydrology, Loss of Habitat, Nutrients, Pathogens, Thermal Pollution, Toxics, Sediment

Estimated Cost: \$15,000

Timeline: 3 years

Priority: High

Potential Project Partners: TWC, LGOV

Milestone: Task force formed by 2006

Task 2: Conduct impervious surface assessments in the following subwatersheds: West Bay Shoreline and Tributaries, Boardman River (upstream of Sabin Pond and Kid's Creek), Old Mission Peninsula, Ptobego Creek, East Bay Shoreline and Tributaries, and the Elk River Chain of Lakes.

Estimated Cost: \$100,000 (consultant rate)

Timeline: 3 years

Priority: High

Potential Project Partners: TWC, CGOV

Milestone: Complete assessment by 2010.

Task 3: Map and count number of culverts/storm drain outlets in villages and other municipalities that drain to major rivers, lakes, streams, and the Grand Traverse Bay. This has already been completed for the Boardman Lake watershed downstream of Sabin Pond, excluding Kid's Creek, and for the rest of Traverse City.

Estimated Cost: \$100,000 (consultant rate)

Timeline: 3 years

Priority: High

Potential Project Partners: TWC, LGOV, NWMCOG, RCs

Milestone: Complete assessment by 2010.

Task 4: Work cooperatively with local units of government to develop stormwater management plans and/or ordinances for each community using a variety of tools including mapping of existing storm sewers; identifying locations where retrofitting is needed; working with adjacent townships to manage joint stormwater; and ensure that emergency response plans exist for pollutant spills.
Pollutant/Environmental Stressors Reduced: Changes to Hydrology, Loss of Habitat, Nutrients, Pathogens, Thermal Pollution, Toxics, Sediment
Estimated Cost: \$25,000
Timeline: 10 years
Priority: High
Potential Project Partners: TWC, LGOV
Milestone: Complete one management plan every 2 years.

Task 5: Work with local governments, area businesses, and property owners to install the following stormwater BMPs in urban areas where appropriate. See Section 7.2 for stormwater BMP ideas and their pollutant removal effectiveness.
From the Center for Watershed Protection's Approaches to Stormwater Treatment and Stormwater Practice and Design CDs, Watershed Leadership Kit Volumes 4 and 5.

1. Vegetative Filter Strips: Filter Strips/Aquatic Buffers, Wet Swales, Dry Swales, Grass Channels
2. Stormwater Filtering Systems: Bioretention and Surface, Perimeter, Organic, Underground, Pocket Sand Filters
3. Infiltration Practices: Infiltration Trench or Basin, Porous Pavement
4. Retention and Detention Ponds
5. Other Low Impact Design Elements: Rain/Roof Gardens, Native Plantings, Riparian Buffers

Pollutant/Environmental Stressors Reduced: Changes to Hydrology, Loss of Habitat, Nutrients, Pathogens, Thermal Pollution, Toxics, Sediment
Estimated Cost: \$25,000/year (salary costs only)
>\$10,000,000 (BMP costs)
Timeline: 10 years
Priority: High
Potential Project Partners: TWC, LGOV, CDs, Local Businesses
Milestone: One major stormwater BMP installed each year

Task 6: Implement stormwater BMPs in Kid's Creek within the urban areas of Traverse City including low impact design elements (i.e. rain gardens), riparian buffers and filter strips, and stormwater filtering and retention systems.
Pollutant/Environmental Stressors Reduced: Changes to Hydrology, Loss of Habitat, Nutrients, Pathogens, Thermal Pollution, Toxics, Sediment
Estimated Cost: >\$1,000,000 (BMP costs)
Timeline: 10 years
Priority: High
Potential Project Partners: City of TC, GTCD
(Related Milestone from Shoreline Protection and Restoration Task #8: Riparian buffer installed along 30% of Kids Creek length in Traverse City by 2015)
Milestone: BMPs installed and completed by 2015

Task 7: Construct wetland area in Suttons Bay at Inland Seas Education Association property to filter out pollutants from stormwater coming from downtown Suttons Bay.

Pollutant/Environmental Stressors Reduced: Changes to Hydrology, Loss of Habitat, Nutrients, Pathogens, Thermal Pollution, Toxics, Sediment

Estimated Cost: \$40,000

Timeline: 3 years

Priority: Medium

Potential Project Partners: ISEA

Milestone: Complete by 2006

Task 8: Encourage the use of “low impact development” stormwater treatment techniques in the Boardman Lake watershed to minimize the impacts of impervious surfaces, runoff and other potential impairments to water quality.

Pollutant/Environmental Stressors Reduced: Changes to Hydrology, Loss of Habitat, Nutrients, Thermal Pollution, Toxics, Sediment, Pathogens

Estimate Cost: \$

Timeline: Ongoing

Priority: High

Potential Project Partners: TWC, City of TC, Garfield Township

Task 9: Upgrade or update applicable ordinances for local governments to accommodate and encourage more innovative forms of stormwater management.

Pollutant/Environmental Stressors Reduced: Changes to Hydrology, Loss of Habitat, Nutrients, Thermal Pollution, Toxics, Sediment, Pathogens

Estimate Cost: \$15,000 per ordinance

Timeline: 3 years

Priority: High

Potential Project Partners: TWC, LGOV

(Related Milestone from Shoreline Protection and Restoration Task #10)

Milestone 1: Update local ordinances in townships around Torch Lake by 2007 (A-CD).

Milestone 2: Update local ordinances in City of Traverse City and Garfield Township by 2010.

Milestone 3: Adopt appropriate ordinance upgrades for other townships and municipalities along Grand Traverse Bay by 2015 (see Zoning and Land Use Task #2).

See Zoning and Land Use Tasks

Wastewater and Septics

Goal(s) Accomplished:

- 1) Aquatic and terrestrial ecosystems
- 2) Quality of water resources
- 3) Land and water management

- Task 1:** Complete shoreline cladophora survey (follow TOMWC project conducted in Chain of Lakes) to determine potential sites where there may be improperly working septic systems. Work with landowners to conduct dye testing to determine which septic systems are leaking, if any, in potential sited areas.
Estimated Cost: \$72,000
Timeline: 10 years
Priority: High
Potential Project Partners: TWC, TOMWC, LGOV, ERCOL, LA
Milestone: Complete survey by 2010
- Task 2:** Offer advice and assistance to riparian landowners to help identify malfunctioning septic systems.
Pollutant/Environmental Stressors Reduced: Nutrients, Pathogens
Estimated Cost: \$2,500/year
Timeline: 10 years
Priority: High
Potential Project Partners: TWC, Health Depts., MDEQ, OWTF, ERCOL, LA, TOMWC
- Task 3:** Select and install demonstration projects utilizing alternative onsite wastewater treatment systems.
Pollutant/Environmental Stressors Reduced: Nutrients, Pathogens
Estimated Cost: \$100,000
Timeline: 3 years
Priority: High
Potential Project Partners: TWC, OWTF, Health Depts., ERCOL, LA
Milestone: One demonstration site in place by 2010
- Task 4:** Develop regulatory and financial mechanisms to assure adequate financing at reasonable rates for onsite wastewater treatment systems, community collection and treatment systems, operation and maintenance.
Pollutant/Environmental Stressors Reduced: Nutrients, Pathogens
Estimated Cost: \$25,000
Timeline: 10 years
Priority: High
Potential Project Partners: OWTF, Health Depts., MLUI, LGOV

- Task 5:** Advocate for higher water quality standards (like those for Outstanding State Designated Resource Waters) for new and updated wastewater treatment systems.
Pollutant/Environmental Stressors Reduced: Nutrients, Pathogens
Estimated Cost: \$5,500/year
Timeline: 10 years
Priority: High
Potential Project Partners: TWC
- Task 6:** Work with local governments and health departments to establish regular, mandatory septic system inspections (through ordinances or by other means) in priority areas.
Pollutant/Environmental Stressors Reduced: Nutrients, Pathogens
Estimated Cost: \$2,500/year
Timeline: 10 years
Priority: Medium
Potential Project Partners: TWC, Health Depts., LGOV, OWTTF, ERCOL, LA
- Task 7:** Work with MDEQ and local governments to support actions to minimize nutrient and pathogen discharges from municipal wastewater treatment plants, industrial/commercial facilities, and sanitary sewer overflows.
Pollutant/Environmental Stressors Reduced: Changes to Hydrology, Loss of Habitat, Nutrients, Pathogens, Thermal Pollution, Toxics, Sediment
Estimated Cost: \$2,500/year
Timeline: Ongoing
Priority: Medium
Potential Project Partners: TWC, LGOV, Health Depts., MDEQ, EPA
- Task 8:** Evaluate the water quality merits of replacing septic systems with a community wastewater conveyance and treatment system where there is a high density of old or improperly working septic systems. Use the community wastewater treatment system being constructed at Northpoint Point as an example.
Pollutant/Environmental Stressors Reduced: Nutrients, Pathogens
Estimated Cost: \$2,500/year
Timeline: 10 years
Priority: Medium
Potential Project Partners: TWC, Health Depts., OWTTF, LGOV
- Task 9:** Work with local health department officials who issue permits for new septic systems to ensure property owners implement proper septic system design for the site conditions and consider their proximity to lakes, streams, and water table levels.
Pollutant/Environmental Stressors Reduced: Nutrients, Pathogens
Estimated Cost: \$1,500/year
Timeline: Ongoing
Priority: Medium
Potential Project Partners: TWC, Health Depts., OWTTF, ERCOL, LA

Task 10: Work with MDEQ, MDNR, and the Coast Guard to help monitor enforcement to prevent illegal boat (recreational and commercial) discharges of sewage and gray water.

Pollutant/Environmental Stressors Reduced: Changes to Hydrology, Loss of Habitat, Nutrients, Pathogens, Thermal Pollution, Toxics, Sediment

Estimated Cost: \$2,500/year

Timeline: Ongoing

Priority: Low

Potential Project Partners: TWC, LGOV, MDEQ, MDNR, USCG, ERCOL, LA

Task 11: Work with MDEQ to address improper land application of septage from pumped septic tanks.

Pollutant/Environmental Stressors Reduced: Nutrients, Pathogens

Estimated Cost: \$1,500/year

Timeline: Ongoing

Priority: Low

Potential Project Partners: TWC, Health Depts., MDEQ, LGOV

Human Health Issues

Goal(s) Accomplished: 2) Quality of water resources

See also: Wastewater and Septics; Monitoring

Task 1: Develop and promote Integrated Pest Management plans for agriculture, industrial facilities, businesses, golf courses, schools, and residences. (These plans generally begin with preventative measures for reducing pest infestations and involve less toxic treatment of infestations when they do occur, such as natural native predators.)

Pollutant/Environmental Stressors Reduced: Toxics, Nutrients

Estimated Cost: \$50,000/year

Timeline: 10 years

Priority: High

Potential Project Partners: TWC, MSU-E, NRCS, Local Businesses, Audubon Society (they certify golf courses that are using IPM, chemical and pesticide free, or env. friendly)

Task 2: Establish air quality monitoring stations to detect trends in air quality.

Estimated Cost: \$75,000/each

Timeline: 10 years

Priority: Medium

Potential Project Partners: TWC, GTBOCI, MDEQ, GLEC, CGOV

Task 3: Initiate burn barrel exchange program where people can trade in their burn barrels for a discount on waste hauling and/or garbage bags, or free or discounted compost bins.

Pollutant/Environmental Stressors Reduced: Toxics, Nutrients

Estimated Cost: \$75,000

Timeline: 10 years

Priority: Low

Potential Project Partners: TWC, GTBOCI, Health Dept., Trash Haulers, LGOV, GT County Resource Recovery Office

Task 4: Work with local authorities to develop ordinances that ban trash burning.

Pollutant/Environmental Stressors Reduced: Toxics

Estimated Cost: \$25,000

Timeline: 10 years

Priority: Low

Potential Project Partners: TWC, Local Gov

Wetlands

Goal(s) Accomplished:

- 1) Aquatic and terrestrial ecosystems
- 2) Quality of water resources
- 3) Land and water management

See also: Land Protection and Management; Development; Zoning and Land Use

- Task 1:** Work with local governments and lake associations to ground-truth existing wetland maps throughout the watershed and put information into a GIS format.
Estimated Cost: \$100,000 (consultant rate)
Timeline: 3 years
Priority: High
Potential Project Partners: TWC, TOMWC, CDs, LC, GTRLC, ERCOL, LA, LGOV
- Task 2:** Identify wetlands of particularly high value, based on plant/animal species, etc.
Pollutant/Environmental Stressors Reduced: All
Estimated Cost: \$100,000 (should be combined with Task 1)
Timeline: 3 years
Priority: High
Potential Project Partners: TWC, LGOV, GTRLC, LC
- Task 3:** Work with local governments, landowners, land conservancies, and other organizations to restore wetland areas where appropriate. Enroll landowners in the NRCS Wetland Reserve Program.
Pollutant/Environmental Stressors Reduced: All
Estimated Cost: \$35,000/year
Timeline: 10 years
Priority: Medium
Potential Project Partners: TWC, NRCS, CRA, CDs, TOMWC, ERCOL, LA, GTRLC, LC
- Task 4:** Monitor enforcement of possible wetland filling violations.
Pollutant/Environmental Stressors Reduced: All
Estimated Cost: \$3,500/year
Timeline: ongoing
Priority: Medium
Potential Project Partners: TWC, LGOV, MDEQ

Invasive Species

Goal(s) Accomplished:

- 1) Aquatic and terrestrial ecosystems
- 4) Recreational opportunities and quality, sustainable local economy

- Task 1:** Work with local governments and businesses to install boat washing stations at area marinas and public boat launches to avoid spread of invasive species.
Pollutant/Environmental Stressors Reduced: Invasive Species
Estimated Cost: \$10,000/year
Timeline: 3 years
Priority: High
Potential Project Partners: TWC, LGOV, ERCOL, LA, MDNR
Milestone: Install one boat washing station a year.
- Task 2:** Support Great Lakes United efforts toward reducing spread of invasive species throughout the watershed.
Pollutant/Environmental Stressors Reduced: Nutrients, Pathogens
Estimated Cost: \$2,500/year
Timeline: Ongoing
Priority: High
Potential Project Partners: TWC
- Task 3:** Monitor the spread of specific types of invasive species in the watershed (i.e., purple loosestrife, Eurasian watermilfoil, zebra mussels).
Pollutant/Environmental Stressors Reduced: Nutrients, Pathogens
Estimated Cost: \$5,500/year
Timeline: Ongoing
Priority: Medium
Potential Project Partners: TWC, CRA, TOMWC, CDs, ERCOL, LA
- Task 4:** Work with local service organizations and governments to clean up zebra mussels on beaches.
Pollutant/Environmental Stressors Reduced: Nutrients, Pathogens
Estimated Cost: \$2,500/year
Timeline: Ongoing
Priority: Low
Potential Project Partners: TWC, LGOV, ERCOL, LA
- Task 5:** Develop purple loosestrife eradication program as done in the Grass River Natural Area.
Pollutant/Environmental Stressors Reduced: Nutrients, Pathogens
Estimated Cost: \$100,000
Timeline: 10 years
Priority: Low
Potential Project Partners: TWC, ERCOL, LA, LGOV
Milestone: Program in place by 2008

Land Protection and Management

Goal(s) Accomplished:

- 1) Aquatic and terrestrial ecosystems
- 2) Quality of water resources
- 3) Land and water management

- Task 1:** Work with local units of government to develop and promote local initiatives that preserve open space and sensitive/important natural areas.
Pollutant/Environmental Stressors Reduced: All
Estimate Cost: \$120,000/initiative (one per county)
Timeline: 10 years
Priority: High
Potential Project Partners: GTRLC, LC, LGOV
- Task 2:** Assist local land conservancies with protection of lands that maintain or expand wildlife corridors, protect sensitive wildlife and fisheries habitats such as wetlands, riparian corridors, etc., and protect habitat for threatened and endangered species.
Pollutant/Environmental Stressors Reduced: All
Estimated Cost: \$5,500/year
Timeline: Ongoing
Priority: High
Potential Project Partners: TWC, TOMWC, CRA, CDs, LGOV
- Task 3:** Continue to implement the Conservation Resource Alliance's Wild-Link program in the Grand Traverse Bay watershed to protect and enhance fish and wildlife habitat on private property within ecological corridors throughout the watershed.
See Habitat, Fish, and Wildlife Tasks
- Task 4:** Create an endowment fund to assist the local land conservancies in purchasing conservation easements on key priority parcels within the Grand Traverse Bay watershed. Parcels targeted for protection would contain sensitive physical and hydrologic features that are essential to preserving water quality (e.g. wetlands, water frontage, groundwater recharge, steep slopes, etc.).
Pollutant/Environmental Stressors Reduced: All
Estimated Cost: \$1,500,000 (to start)
Timeline: 10 years
Priority: High
Potential Project Partners: GTRLC, LC

Task 5: Develop a Revolving Conservation Land Acquisition Fund for conservancies to purchase lands for conservation easement implementation and resale. This would be for critical properties that are on the market or in cases where landowners are unwilling to sell the conservation easement, but would rather sell the land outright. This would provide a mechanism to allow local land conservancies to purchase the land, restrict the land with a conservation easement prohibiting or severely limiting building/development, and then resell the land to “conservation buyers” at its restricted value. This would require funds to cover the cost of the conservation easement. (i.e. difference in value).

Pollutant/Environmental Stressors Reduced: All

Estimated Cost: \$1,500,000 (to start)

Timeline: 3 years

Priority: High

Potential Project Partners: GTRLC, LC, LGOV

Task 6: Assist local units of government and the State of Michigan in acquiring land for preservation of water quality and sensitive ecological features.

Pollutant/Environmental Stressors Reduced: All

Estimated Cost: \$70,000/year

Timeline: Ongoing

Priority: Medium

Potential Project Partners: GTRLC, LC, LGOV

Task 7: Work with local units of government to explore feasibility of a locally funded purchase of development rights/conservation easement acquisition program focused on preserving lands critical to water quality and wildlife habitat preservation where public support exists. Use Peninsula Township as an example. *This task should include a public opinion poll to determine the likelihood of voters to accept the program.*

Pollutant/Environmental Stressors Reduced: All

Estimate Cost: \$120,000 per initiative

Timeline: 10 years

Priority: Low

Potential Project Partners: GTRLC, LC, LGOV

Task 8: Develop additional Designated Natural Areas throughout the watershed for recreation and education.

Estimated Cost: \$100,000

Timeline: 10 years

Priority: Low

Potential Project Partners: TWC, LGOV, CDs, CRA, TOMWC, LA, GTRLC, LC

Development

Goal(s) Accomplished:

- 1) Aquatic and terrestrial ecosystems
- 2) Quality of water resources
- 3) Land and water management

- Task 1:** Work with homebuilders associations, contractors, developers, real estate agencies, local government entities, and other appropriate organizations to 1) encourage ‘watershed friendly’ design, construction and maintenance of new and existing developments in the watershed and 2) to stress the importance of avoiding shoreline hardening where possible. Where shoreline hardening is necessary, make sure the structures are sited, designed, and installed properly to minimize the impact on beaches and nearshore sand drift.
Pollutant/Environmental Stressors Reduced: Changes to Hydrology, Nutrients, Thermal Pollution, Sediment
Estimate Cost: \$50,000/yr
Timeline: Ongoing
Priority: High
Potential Project Partners: TWC, LGOV, CDs, ERCOL, LA, Local Businesses
- Task 2:** Work with appropriate local government agencies (i.e., County Drain Commission) to recommend BMP’s for developers on construction sites and to ensure compliance with those BMP’s. Potential systems of BMPs to require include: access roads, construction barriers, grading, staging, and proper scheduling for other BMPs.
Pollutant/Environmental Stressors Reduced: Changes to Hydrology, Nutrients, Thermal Pollution, Sediment
Estimate Cost: \$50,000/yr
Timeline: Ongoing
Priority: High
Potential Project Partners: TWC, LGOV, CDs, Local Businesses
- Task 3:** Work with counties and other appropriate local government entities to implement proper soil erosion control measures at construction sites.
Pollutant/Environmental Stressors Reduced: Changes to Hydrology, Nutrients, Thermal Pollution, Sediment
Estimate Cost: \$50,000/yr
Timeline: 10 years
Priority: High
Potential Project Partners: TWC, LGOV, CDs, ERCOL, LA, Local Businesses

Task 4: Monitor Soil Erosion and Sedimentation construction permits to determine the amount and location of new developments throughout the watershed.

Estimate Cost: \$5,000/yr

Timeline: 10 years

Priority: Medium

Potential Project Partners: TWC, CGOV, ERCOL, LA

Milestone: Establish tracking system by 2007

Zoning and Land Use

Goal(s) Accomplished:

3) Land and water management

- Task 1:** Inventory current Master Plans and Zoning Ordinances for counties, townships, and municipalities to determine the types of protection given to water quality and natural resources.
Estimated Cost: \$17,000
Timeline: *Completed 2005*
Priority: High
Potential Project Partners: TWC, LGOV, NWMCOG, ERCOL
- Task 2:** Assist townships with zoning and master plans to develop ordinances that protect water quality and natural resources. Examples of topics to cover in the model ordinances include: mandatory building setbacks from bodies of water, minimizing development clearings by landowners, stormwater management, establishing riparian buffers along waterways, and protecting wetlands.
Pollutant/Environmental Stressors Reduced: All
See also – Shoreline Protection and Restoration Task #10, Stormwater Task #9
Estimated Cost: \$70,000/yr
Timeline: Ongoing
Priority: High
Potential Project Partners: TWC, LGOV, ERCOL, LA, CDs
Milestone 1: Update local ordinances in townships around Torch Lake by 2007 (A-CD).
Milestone 2: Update local ordinances in City of Traverse City and Garfield Township by 2010.
Milestone 3: Adopt appropriate ordinance upgrades for other townships and municipalities along Grand Traverse Bay by 2015.
- Task 3:** Provide financial assistance to local units of government to amend or revise master plans and adopt zoning ordinances designed to protect water quality (i.e. cluster zoning, vegetation buffers, etc.) and provide public recognition for those that do.
Pollutant/Environmental Stressors Reduced: All
Estimated Cost: \$189,000 (estimate 50% of local units [27] at \$7,000 each)
Timeline: 10 years
Priority: High
Potential Project Partners: TWC, LGOV, New Designs for Growth

Task 4: Develop workable and practical strategies to strengthen enforcement of existing land use regulations, soil erosion programs, and ordinances by appropriate local government bodies.

Pollutant/Environmental Stressors Reduced: All

Estimated Cost: \$50,000

Timeline: Ongoing

Priority: Medium

Potential Project Partners: TWC, LGOV, ERCOL, LA

Task 5: Evaluate local zoning ordinances to determine the extent of use of the New Designs for Growth Guidebook for all development projects (including re-development) and provide financial incentives and public recognition of those that comply with the guidelines.

Pollutant/Environmental Stressors Reduced: All

Estimated Cost: \$17,000 (can be combined with Task 1)

Timeline: Ongoing

Priority: Low

Potential Project Partners: TWC, LGOV, ERCOL, LA,
New Designs for Growth

Task 6: Work with local units of government to explore feasibility of a locally funded purchase of development rights/conservation easement acquisition program focused on preserving lands critical to water quality and wildlife habitat preservation. Use Peninsula Township as an example.

See Land Protection and Management Tasks

Task 7: Upgrade or update applicable ordinances for Garfield Township and the City of Traverse City to accommodate and encourage more innovative forms of stormwater management.

See Stormwater Tasks

Groundwater

Goal(s) Accomplished:

- 2) Quality of water resources
- 3) Land and water management

See also: Wetlands

Task 1: Identify priority groundwater discharge and recharge areas and distribute maps to local governments and other organizations in the watershed.

Estimated Cost: \$100,000

Timeline: 10 years, map distribution ongoing

Priority: High

Potential Project Partners: TWC, LC, GTRLC, LGOV, MDEQ, USGS, Universities

Task 2: Map groundwater flow and major aquifers in the watershed.

See Hydrology Tasks

Task 3: Inventory and summarize the status of wellhead protection plans. Support groundwater/wellhead protection programs for municipal drinking water supplies.

Pollutant/Environmental Stressors Reduced: Changes to Hydrology, Nutrients, Thermal Pollution

Estimated Cost: \$5,000 (plan inventory); \$2,500/year (support programs)

Timeline: Ongoing

Priority: Medium

Potential Project Partners: TWC, LGOV, FERC

Task 4: Eliminate improperly capped abandoned wells to prevent contaminants from moving into and among groundwater aquifers via this route. Tasks will be to 1) inventory existing abandoned wells through surveys, well logs, and landowner interviews and 2) properly plug the abandoned wells.

Pollutant/Environmental Stressors Reduced: Nutrients, Pathogens, Toxins

Estimated Cost: \$25,000 (well inventory only) \$250K/county/yr (plugging wells)

Timeline: Ongoing

Priority: Medium

Potential Project Partners: MSU-E Groundwater Stewardship, LGOV, Health Depts.

Task 5: Abandon wells properly to prevent contaminants from moving into and among groundwater aquifers via this route.

Pollutant/Environmental Stressors Reduced: Nutrients, Pathogens, Toxins

Estimated Cost: \$750/each (includes equipment and staff costs)

Timeline: Ongoing

Priority: Low

Potential Project Partners: MSU-E Groundwater Stewardship, Health Depts., MDEQ

Monitoring

Goal(s) Accomplished:

All

- Task 1:** Continually update The Watershed Center's interactive water quality database (for the Grand Traverse Bay watershed) as new studies are completed each year.
Estimated Cost: \$7,000/yr
Timeline: Ongoing
Priority: High
Potential Project Partners: TWC
- Task 2:** Continue Stream Search program twice a year and expand to other areas of the watershed (currently in Traverse City region).
Estimated Cost: \$15,000/year
Timeline: Ongoing
Priority: High
Potential Project Partners: TWC, LA, Schools
- Task 3:** Continue annual beach E. coli monitoring program for public beaches in the Grand Traverse Region.
Estimated Cost: \$40,000/year
Timeline: Ongoing
Priority: High
Potential Project Partners: TWC, Health Depts., LA, LGOV
- Task 3:** Update shoreline inventory of Grand Traverse Bay every 5 years.
Estimated Cost: \$35,000/inventory
Timeline: 10 years
Priority: High
Potential Project Partners: TWC, LGOV
Milestone: Conduct update by 2008
- Task 4:** Conduct initial inventory of near- and offshore areas along Grand Traverse Bay by boat and reassess every 5 years. Include sediment analysis of nearshore areas. Revisit aquatic weed (macrophyte) beds previously identified in 1991 and 1998 macrophyte surveys, as well as identify newly formed weed beds.
Estimated Cost: \$35,000/inventory (salary cost only)
Timeline: 10 years
Priority: High
Potential Project Partners: TWC
Milestone: Complete inventory by 2009

- Task 5:** Annually inventory creeks (by walking/visual assessment) threatened by development to document ongoing land use and water quality changes due to increasing development in the greater Traverse City region. Creeks that should be inventoried include: Spencer Creek, Rapid River, Baker Creek, Mitchell Creek, Kid's Creek, Acme Creek, Boardman River in Traverse City and Garfield Township.
Estimated Cost: \$2,500/year
Timeline: Ongoing
Priority: High
Potential Project Partners: TWC, LA, ERCOL
- Task 6:** Monitor and track the changes to habitat and hydrology on area beaches due to the newly passed Beach Grooming laws (in Summer 2003).
Estimated Cost: \$2,500/yr
Timeline: Ongoing
Priority: High
Potential Project Partners: TWC, LGOV
- Task 7:** Annually evaluate monitoring results gathered from other groups conducting work in the watershed and assist with efforts when needed. (Update results in TWC water quality database – See Task #1).
Estimated Cost: \$2,500/yr
Timeline: Ongoing
Priority: High
Potential Project Partners: TWC, LA, ISEA, GTBOCI, USGS, MDEQ
- Task 8:** Undertake further evaluation and monitoring of nutrient, bacterial and toxic pollution sites identified in the Boardman Lake Watershed Management Plan.
Estimate Cost: \$20,000
Timeline: 3 years
Priority: High
Potential Project Partners: TWC, City of TC, Garfield Township
Milestone: Complete task by 2009
- Task 9:** Conduct clean-up event(s) on Boardman Lake and downstream in Boardman River to remove tires, drums, various scrap metal, wooden pallets, bricks, ceramics and other debris.
Pollutant/Environmental Stressors Reduced: Toxics
Estimate Cost: \$2,000/clean-up
Timeline: ongoing
Priority: High
Potential Project Partners: TWC, City of TC, Garfield Township

Task 10: Document the effectiveness of BMP implementation by taking photographs, completing site data sheets and gathering physical, chemical and/or biological site data. Work with partners to develop a standardized methodology implementation.

Estimated Cost: varies depending on project

Timeline: Ongoing

Priority: High

Potential Project Partners: TWC, MDEQ, CDs, CRA, LGOV, ERCOL, LA

Milestone: Develop standard methodology by 2008

Desired Uses

Goal(s) Accomplished:

- 4) Recreational opportunities and quality, sustainable local economy
- 6) Character and aesthetic qualities

See also: Shoreline Protection and Restoration; Habitat, Fish, and Wildlife; Wetlands; Land Protection and Management; Development

- Task 1:** The Watershed Center Grand Traverse Bay and local governments will actively pursue higher (more stringent) nutrient standards for Grand Traverse Bay under Michigan's Water Quality Standards.
Estimated Cost: \$10,000
Timeline: 3 years
Priority: High
Potential Project Partners: TWC
- Task 2:** Continue to implement the Conservation Resource Alliance's Wild-Link program in the Grand Traverse Bay watershed to protect and enhance fish and wildlife habitat on private property within ecological corridors throughout the watershed.
See Habitat, Fish, and Wildlife Tasks
- Task 3:** Extend planned recreational trail systems in watershed (includes TART and Kalkaska County trails).
Estimated Cost: \$2,000,000
Timeline: 10 years
Priority: Medium
Potential Project Partners: TWC, TART, Kalkaska CD
- Task 4:** Develop additional Designated Natural Areas throughout the watershed for recreation and education.
See Land Protection and Management Tasks

7.4 Information and Education Strategy

This Information and Education (IE) Strategy addresses the communication needs associated with implementing the Grand Traverse Bay Watershed Protection Plan.

During the planning process, a variety of means were used to not only inform the public and other stakeholders regarding the planning process and outcomes, but to assess stakeholders' knowledge of watershed issues and concerns (Appendix A).

Newsletters, public meetings, presentations to clubs and civic groups, a project website and other tactics were used to keep stakeholders up-to-date with the planning process. At a series of meetings for both the public and governmental officials, a couple of simple assessment tools were used to gather input that was used in developing the plan. In addition, a phone survey was conducted regarding watershed residents' knowledge, behaviors and attitudes about the watershed and watershed issues. A series of focus groups were conducted with participants from various market segments (industry, small business, agriculture, etc.) to assess the attitudes of the business sector regarding water quality issues, barriers to protecting water quality from a businessperson's perspective and other relevant topics.

Other research, both regional and national, was utilized to develop this plan (Biodiversity Project 2003, Dement 1995, Roper 2001, Wolf HRWC).

Local Research Findings

During summer 2002 nearly 400 local residents were interviewed via phone utilizing a survey instrument developed by Northwestern Michigan College's MTEC Research Services and Watershed Center staff.

The most significant finding of the survey was the identification of a major gap in knowledge amongst watershed residents. 60% of the respondents answered "don't know" when asked which watershed they lived in. This basic fact indicates that watershed partner organizations have a long way to go in informing and engaging the public in watershed issues.

Although many area residents routinely express concern about environmental issues, there is a lack of understanding of the key issues that face the watershed. Residents perceive that business and industry (17%) and sewage treatment plants (16%) are the main causes of water pollution to the bay. In truth, the Grand Traverse Region is dominated by non-smokestack industries and comparatively few discharge permit holders. While there have been problems in the last few years with accidental and deliberate partially treated sewage discharges in both Traverse City and the Village of Suttons Bay; and a looming problem with septic systems and wastewater treatment in the Village of Northport, the primary sources of excess nutrients in the bay are non-point sources.

Additionally, when asked what they believe to be the "least cause of water pollution in the Bay, and area lakes, streams and rivers," respondents indicated the "day to day actions of individuals" as the second least likely pollutant. These two findings would seem to indicate that the general

public sees sources outside their individual control to be more responsible for existing and potential water quality problems.

Information Source	Percent
Newspaper	46.6%
TV News	13.7%
Environmental organization newsletters	7.3%
Friends, neighbors, coworkers	5.2%
Other organizations (churches, clubs, etc)	2.6
Magazines	2.3
Radio	1.6
Schools	1.3

Other key findings relevant to the development of this plan include data regarding where respondents get their information about the environment and water quality.

When this question was cross-tabulated with the respondents' age, more detail was revealed about where specific age demographic groups obtain their information about the environment.

Age Range	Preferred Source	Education Level	Preferred Source
18-25	Schools	Graduate Degree	Environmental newsletters or friends, neighbors and relatives
26-35	TV News	Some post grad	Environmental group newsletters, newspapers
36-55	Newspapers	College degree	Environmental group newsletters, newspapers
56-65	Environmental Newsletters	Some college, high school or some high school	Television news
66+	Newspapers		

Additional cross-tabulations were run to determine links between existing “environmentally-friendly” behaviors or education level and the respondents’ perceptions and level of knowledge about water quality issues. The results indicate a correlation between existing environmentally-conscious behaviors and the depth of understanding about regional water quality issues.

- Respondents indicating they do recycle materials, other than cans or bottles, were more likely to indicate they think lawn fertilizers are the main cause of water pollution. Those who do not recycle materials other than cans or bottles were more likely to indicate they think either sewage treatment plants or recreational boating are the main cause of water pollution.
- Respondents that recycle materials other than cans or bottles were also more likely to indicate they think sewage treatment plants are the least cause of water pollution. Respondents who do not recycle think excavation and construction are the least causes of pollution.
- Respondents reporting some post-graduate study were more likely to indicate they think sewage treatment plants are the least cause of pollution. Respondents reporting some college were more likely to indicate they think agriculture and the day to day actions of individuals were the least cause of water pollution. Respondents reporting some high

school were more likely than other educational groups to indicate they think recreational boating, exotic species and lawn fertilizers are the least cause of water pollution.

Other Research Findings

Recent regional and national research surveys regarding the environment confirm the basic findings of the Grand Traverse Bay surveys. A recent Roper study (Roper 2001) indicates that while there is increasing public concern about the environment, the majority of the public still does not know the leading causes of such problems as water pollution, air pollution and solid waste. This finding was also confirmed in work done by The Biodiversity Project as part of their Great Lakes Public Education Initiative. Their research involved both a public opinion poll and a survey of organizations, agencies and institutions engaged in public education efforts on Great Lakes topics. An excerpt follows:

“...organizations are making a concerted effort to provide reliable information to people who can make a difference when it comes to improving the environmental conditions in the Great Lakes Basin. However, the public opinion poll shows that, for the most part, people are just not grasping the importance of the issues facing the Great Lakes in three important ways: the seriousness of the threats, the need for urgency in taking action to address the threats, and ways that individuals can make a difference. This led us to examine the discrepancy between the level and focus of current communications and public education efforts and the gaps in public awareness. Because of this discrepancy, we concluded that the public knowledge gaps are likely to be attributed to other factors besides the content and volume of materials. Likely factors include the following three points.

- Limited use of targeting (tailoring messages and delivery strategies to specific audiences).
- Heavy reliance on printed materials and the Web – reaching already interested knowledge seekers; limited use of television and other communication tools that reach broader audiences.
- Multiple, complex, detailed information as opposed to broad, consistent unifying themes.”

The report goes on to conclude that educators need “to pay attention to a full spectrum of factors that act as barriers to the success and impact of public outreach.” Factors to be considered include:

- **Targeting** – Avoid the one-size-fits-all approach.
- **Delivery** – As resources allow, use the mediums and venues that best reach the target audience. Brochures are easy, the web is cheap, but television is the most used source of information about the environment.
- **Content** – Facts and figures are important to validate a point, but it is important to address the emotional connection needed to address why people should care, why the issue is relevant, effective solutions and what your audience can do about it.
- **Context** – Many environmental threats are viewed by the public as long term issues. Issues need to be communicated in a way that makes them more tangible. Beach closings, toxic pollution, sewage spills and water exports tend to feel more immediate than loss of habitat, land use planning and other big picture issues that citizens feel more disconnected from.

The study identified a list of educational needs and actions that should be incorporated consistently in educational efforts:

- Promote understanding of the system.
- Make the connection to individuals.
- Be local and specific.
- Include a reality check on “real threats.” (For example, industrial pollution was a hot topic ten years ago but, many organizations have shifted their education focus to other current and emerging threats, such as stormwater runoff, biodiversity, etc, but the public has not caught up with this shift.)
- Emphasis on “why is this important to you” messages.
- Make the connection to policy.

Research Summary

Both local and regional research indicates that there are considerable gaps in the public’s knowledge and understanding of current environmental issues. But, this knowledge gap is tempered by keen public interest and concern for the environment. Watershed organizations need to do a better job of making issues of concern relevant to their audiences. There is a need for ongoing, consistent and coordinated education efforts targeted at specific groups, addressing specific threats.

The following IE strategy addresses some of these concerns. Both local and regional opinion research findings will be considered carefully when developing messages and delivery mechanisms for IE strategy implementation.

Goals and Objectives

The goal of the IE strategy is to ***“Establish and promote educational programs that support effective implementation of watershed planning goals, objectives and tasks; and increase stewardship.”*** Fixing an erosion problem at a road stream crossing does not involve a high degree of public involvement. But, developing and carrying out a regional vision for stewardship of water resources will require the public and community leaders to become more knowledgeable about the issues and solutions, more engaged and active in implementing solutions and committed to both individual and societal behavior changes.

The objectives of this plan focus on building awareness, educating target audiences, and inspiring action. Five major objectives have been identified:

- To raise community awareness and knowledge of the bay and the entire watershed, the interconnectedness of the system and the role that an individual’s day-to-day activities play in protecting the resource.
- To develop a set of consistent messages that can be used by partners in a variety of communications.
- To involve citizens, public agencies, user groups and landowners in the implementation of the watershed protection plan.
- To regularly inform stakeholders about the watershed, implementation activities and successes and opportunities to participate.
- Motivate target audiences to adopt behaviors and implement practices that result in water quality improvements.

Target Audiences

A number of diverse regional audiences have been identified as key targets for IE strategy implementation. The targets are divided into user groups and decision-making groups.

User Groups

Households – The general public throughout the watershed.

Riparian Landowners – Due to their proximity to a specific waterbody, the education needs of riparian landowners are different.

Agriculture Industry – Agriculture represents a significant economic segment within the Grand Traverse Bay watershed. Fruit orchards and vineyards dominate significant portions of the landscape and row crops, like potatoes and corn, are also well represented.

Business and Industry – There is a fairly diverse mix of business and industry segments within the watershed, although, luckily, very little traditional “smokestack” type industry is present. Tourism, agriculture, retail and other service industries dominate the mix, with manufacturing and construction following.

Tourists – Tourism is the number one industry in the Grand Traverse Region. This area is known for its scenic beauty and recreational opportunities and it is estimated that the Grand Traverse Region plays host to more than hundreds of thousands of visitors in any given year. This influx of people puts a noticeable strain on area infrastructure and often the environment. There is a growing concern that this important economic segment is possibly destroying the very reason why it exists, and that the region’s tourism “carrying capacity” may soon be reached. Steering committee members and attendees at both public and government stakeholder meetings cited the need to “educate tourists about their role in protecting our environment.”

Builders/Developers/Real Estate – The Grand Traverse region is one of the fastest growing areas in Michigan in terms of population and land use. The area has enjoyed a boom in both residential and commercial development that has lasted more than a decade and shows no signs of slowing down significantly, despite the economic problems much of the nation is experiencing. Members of the development industry segment play a crucial role in this growth and providing ongoing education opportunities about their role in protecting water quality and environmental health is critical.

Education – Area educators and students, primarily K-12.

Partner Organizations – The Grand Traverse Bay watershed region boasts an impressive list of watershed partner groups with a broad range of expertise and important ongoing protection, restoration and education programs. Providing ongoing learning opportunities to watershed partner organizations regarding current research, BMPs, emerging issues and trends is important to keep implementation work moving forward.

Special Target Audiences: In addition to the above, certain user groups such as recreational boaters, other sports enthusiasts, garden clubs or smaller audience segments may be targeted for specific issues.

Local Government Decision Makers

Elected and Appointed Officials – Township, village, city, and county commissioners; planning commissions; zoning board of appeals; road commissioners; drain commissioners; etc.

Governmental Staff – Planners, managers, township supervisors, zoning administrators, etc.

Message Development

General message outlines have been established for each target audience. These messages will be refined as implementation moves forward. They may also be modified or customized depending on the message vehicle.

Target Audience	Messages
Households	<ul style="list-style-type: none"> • Watershed awareness, the water cycle, key pollutant sources, how individual behaviors impact the watershed • Water quality-friendly lawn and garden practices • Housekeeping practices and the disposal of toxic substances • Septic maintenance • Managing stormwater on your property
Riparian Landowners	<ul style="list-style-type: none"> • Watershed awareness, the water cycle, key pollutant sources, how individual behaviors impact the watershed • Riparian land management including the importance of riparian buffers • Water quality-friendly lawn and garden practices • Septic system maintenance • Housekeeping practices and the disposal of toxic substances
Agriculture Industry	<ul style="list-style-type: none"> • The importance of establishing sound agricultural BMPs • Advantages of and opportunities for buffer and filter strips • Impacts of fertilizer/pesticide use and mitigation options • Impacts of livestock waste and mitigation options • Farmland conservation opportunities
Business and Industry	<ul style="list-style-type: none"> • Watershed awareness, the water cycle, key pollutant sources, how individual behaviors impact the watershed • Proper toxic chemical use, storage and disposal • Advantages of and opportunities for innovative stormwater management • The leadership role area businesses can play in protecting the watershed

Target Audience	Messages
Tourists	<ul style="list-style-type: none"> • Watershed awareness, the water cycle, key pollutant sources, how individual behaviors impact the watershed • Help us protect the beauty that you enjoy when you are a guest • Clean boating practices • Their role in controlling the spread of aquatic invasive species
Builders, Developers, Real Estate	<ul style="list-style-type: none"> • Advantages of and opportunities for Low Impact Development • Identification and protection of key habitats and natural features: aquatic buffers, woodlands, wetlands, steep slopes, etc. • Advantages of and opportunities for open space protection and financial incentives for conservation • Impact of earthmoving activities, importance of soil erosion and sedimentation control practices, construction BMPs • Watershed awareness, the water cycle, key pollutant sources, how individual behaviors impact the watershed
Education	<ul style="list-style-type: none"> • Adoption and promotion of a state-approved watershed curriculum in K-12 schools. • Watershed awareness, the water cycle, key pollutant sources, how individual behaviors impact the watershed • The connection between watershed organization’s programs and school activities • Active participation in watershed protection activities and stewardship
Partner Organizations	<ul style="list-style-type: none"> • Consistent communication about key watershed issues to members and residents • Active participation in watershed activities and stewardship projects • Sharing data and developing comprehensive assessments of the health of the watershed
Local Government Decision Makers	<ul style="list-style-type: none"> • Watershed awareness, the water cycle, key pollutant sources, how individual behaviors impact the watershed • The leadership role that local governments can play in protecting the watershed • The importance of establishing sound, enforceable natural resource protection ordinances • Economic impact and advantages of environmental protection

Communication Strategies and Tasks

A complete list of tasks by category follows this narrative; the categories are the same as those used to outline the implementation tasks in Section 7.3. Over the next year, these tasks will be further organized by target audience.

Action Plan to Implement Strategies

Several priority areas for the Grand Traverse Bay watershed have been identified and the plan for rolling out the IE Strategy will correspond to these priority areas (Table 25, Figure 17). Additionally, the IE Strategy will support other implementation efforts to control nutrient loading, sedimentation, the impacts of stormwater throughout the watershed and other pollutants outlined in Section 7.3.

In the first year or two of implementation, considerable time and effort will be put toward introducing stakeholders to the watershed protection plan and its various findings and conclusions. Work to build awareness of basic watershed issues, pollutant sources and how individual behaviors impact the health of the watershed will also be completed.

The IE Strategy tasks use a diverse set of methods and delivery mechanisms. Workshops, presentations, demonstration projects, brochures, public and media relations, web sites and other communications tools will be used for the different tasks and target audiences. Broadcast media, most importantly television, is beyond the reach of most area partner organizations – at least at a level of reach, frequency and timing that can be expected to have any impact on awareness and behavior. This is a barrier to utilizing this effective medium, but effort will be placed on building coalitions that can pool resources to address larger picture issues through broader-based, more long-term communications efforts. It is hoped that this plan may be used to stimulate more and better collaboration in the area of public education.

INFORMATION AND EDUCATION STRATEGY IMPLEMENTATION TASKS

GOAL 6: Promote and establish educational programs that support watershed planning goals, objectives and tasks, and increase stewardship.

Pollutants Addressed: All

Categories:

- | | |
|-----------------------------------------|------------------------------------|
| 1. General | 9. Human Health |
| 2. Shoreline Protection and Restoration | 10. Wetlands |
| 3. Road Stream Crossings | 11. Invasive Species |
| 4. Agriculture | 12. Land Protection and Management |
| 5. Hydrology | 13. Development |
| 6. Habitat, Fish and Wildlife | 14. Zoning and Land Use |
| 7. Stormwater | 15. Groundwater |
| 8. Wastewater | 16. Monitoring |

Organization Acronyms:

All – Any Partner Group
CDs – All Conservation Districts
Chambers – Chambers of Commerce
City of TC – City of Traverse City
CGOV – County Governments
CRA – Conservation Resource Alliance
ERCOL – Elk River Chain of Lakes Steering Committee
GRNA – Grass River Natural Area
GTBOCI – Grand Traverse Band of Ottawa and Chippewa Indians
GTRLC – Grand Traverse Regional Land Conservancy
Health Depts. – Local Health Departments
ISEA – Inland Seas Education Association
LA – Lake Associations
LC – Leelanau Conservancy
LIAA – Land Information Access Association
LGOV – Local Governments
Local Papers – Area Newspapers (i.e., Record Eagle, Antrim County News)
MDEQ – Michigan Department of Environmental Quality
MDNR – Michigan Department of Natural Resources
NMC – Northwestern Michigan College
NWMCOG – Northwest Michigan Council of Governments
MLUI – Michigan Land Use Institute

MSU-E – Michigan State University Extension
NRCS – USDA Natural Resources Conservation Service
RCs – Road Commissions
Sea Grant – Michigan State University Sea Grant Program
OWTTF – Onsite Wastewater Treatment Task Force
TCCVB – Traverse City Convention and Visitors Bureau
TOMWC – Tip of the Mitt Watershed Council
TWC – The Watershed Center Grand Traverse Bay
USCG – United States Coast Guard

Other Organizations:

Area Libraries
Boat/Marine Retailers
County Park Departments
Garden Centers
Home Builders Association
Landscaping Companies
Local Businesses
Marine Patrol
MSU-E Groundwater Stewardship
Newcomer's Club
New Designs for Growth
Neighborhood Associations
Road Commissions
Realtors, Board of Realtors

Target Audiences Include:

Agriculture
Builder/Developer/Realtor
Business and Industry
Education
Households
Local Governments
Partner Organizations
Riparian Landowners
Tourists
General

Estimated Costs and Timeframe:

For costs associated with salaries, an average watershed technician rate of \$35/hour was applied. For tasks to be completed by a specialized consultant, a rate of \$50/hour was used. Tasks that will be done on a yearly or site by site basis are noted as such (\$X/yr or \$X/site). Further details are noted where applicable. Tasks that should be completed in the short-term were given a timeframe of 3 years; long-term tasks were given a timeframe of 10 years; tasks that should be undertaken annually or continuously were given a timeframe of “ongoing.”

Task Milestones:

Project milestones for specific tasks in the IE Strategy were established where feasible. The milestones identify when the noted task should be completed. They are meant to guide implementation priorities and measure progress of the IE Strategy. Similar milestones were defined for the implementation tasks outlined in Section 7.4.

Milestones for the IE Strategy were harder to define because many of the tasks are ongoing. Additionally, the best way to conduct outreach activities is continually evolving and depends on the audience one is trying to reach. This is why many of the IE tasks are general and only outline the audience to reach and the message to convey, but don't include specifically how to convey that message.

Key milestones for the IE Strategy include publishing the annual Freshwater Focus, conducting workshops for landowners on proper lawn care and the benefits of riparian buffers, establishing an educational program for stormwater, and providing information in the protection plan to local government officials (Table 39).

TABLE 39: SUMMARY OF PROJECT MILESTONES FOR IMPLEMENTATION TASKS IN THE INFORMATION AND EDUCATION STRATEGY

Task	Milestone and Timeline
<u>IE: General</u>	
Task 1, Subtask A: Quarterly newsletter.	Publish 3-4 newsletters/yr
Task 1, Subtask B: Annual <i>Freshwater Focus</i>	One issue/yr
Task 6: Operate Baykeeper hotline	Hotline established by 2007
<u>IE: Shoreline Protection and Restoration</u>	
Task 1, Subtask A: Provide education materials and conduct landowner workshops re lawn care, soil testing, and fertilizers	Host at least one workshop each year
Task 1, Subtask D: Promotions with landscaping and garden centers to provide relevant information	Make initial contact with businesses by 2006; promotional program in place by 2007
Task 2: Shoreline and riparian landowner workshops about riparian buffers	Host at least one workshop each year
Task 3: Develop native landscaping education program	Program developed and in place by 2007
Task 6: Establish or identify already existing shoreline buffers for demonstration projects and invite the public for tours; produce accompanying brochure	Produce accompanying brochure for buffer demonstration sites by 2008
<u>IE: Road Stream Crossings</u>	
None	
<u>IE: Agriculture</u>	
Task 1: Identify existing farms with conservation practices to serve as a demonstration site; Invite the public for tours and workshops.	Establish 1-2 demonstration farms by 2010; Host annual tour for public at each farm
<u>IE: Hydrology</u>	
None	
<u>IE: Habitat, Fish, and Wildlife</u>	
None	
<u>IE: Stormwater</u>	
Task 1: Public education program regarding the control of stormwater	Public education program in place by 2007
Task 3: Storm drain stenciling	One stormdrain stenciling event/yr
<u>IE: Wastewater and Septics</u>	
None	

TABLE 39: SUMMARY OF PROJECT MILESTONES FOR IMPLEMENTATION TASKS IN THE INFORMATION AND EDUCATION STRATEGY CONT'D

Task	Milestone and Timeline
<u>IE: Human Health Issues</u>	
Task 3: Print and distribute brochures regarding beach monitoring and factors affecting public health at swimming beaches.	Brochure developed by 2006
<u>IE: Wetlands</u>	
None	
<u>IE: Invasive Species</u>	
None	
<u>IE: Land Protection and Management</u>	
None	
<u>IE: Development</u>	
Task 1: Educate developers and contractors on proper stormwater and sediment management at construction sites.	One-two workshop/seminar/site tour each year
Task 3: Develop watershed information packet for realtors, developers, and other businesses to hand out to customers, new homeowners, and others on activities they can do to improve/protect water quality on their property.	Information packet developed and ready for distribution by 2007
<u>IE: Zoning and Land Use</u>	
Task 1: Provide key public officials with summary version of GT Bay Watershed Protection Plan and basic recommendations	Plan summary provided by 2006
Task 2: Educate and inform local planning and zoning officials regarding up-to-date information on planning, zoning, and design innovations relating to the protection of water quality.	Host one-two educational workshops for local officials each year (in addition to face-to-face meetings and phone calls)
<u>IE: Groundwater</u>	
None	
<u>IE: Monitoring</u>	
Task 1: Expand marketing and promotion efforts for Stream Search program	Expand Stream Search program into Leelanau County by 2007
Task 4: Develop public attitude survey (as well as follow up surveys) to determine and monitor the public's awareness regarding watershed and water quality issues.	Develop and conduct first public attitude survey by 2008

Information and Education Strategy:
General

Task 1: Regularly inform the public about activities, study findings, successful example projects, and opportunities for contribution in the Grand Traverse Bay watershed.

Subtask A: Publish quarterly newsletter.

Estimated Cost: \$3,500 each
Timeline: Ongoing
Priority: High
Potential Project Partners: TWC
Target Audience: General
Milestone: Publish 3-4 newsletters/yr

Subtask B: Publish annual *Freshwater Focus* (State of the Watershed) tabloid summarizing the overall condition of the region's water resources and highlighting current research, implementation accomplishments, monitoring programs and other topics relevant to the water quality of the bay.

Estimated Cost: \$10,000/year
Timeline: Ongoing
Priority: High
Potential Project Partners: TWC
Target Audience: General
Milestone: One issue/yr

Subtask C: Provide watershed information and news to the local and regional media on a regular basis in the form of press releases, PSAs, feature stories, story ideas, editorials, etc.

Estimated Cost: \$25,000/year
Timeline: Ongoing
Priority: High
Potential Project Partners: All
Target Audience: General

Subtask E: Develop TV and radio ads, public service announcements, print ads, etc., focusing on relevant water quality issues and basic watershed messages.

Estimated Cost: \$25,000 development/\$100,000-200,000 per year in media placement costs
Timeline: 3 years
Priority: High
Potential Project Partners: TWC, TOMWC, GTCD, CRA, ISEA
Target Audience: General

- Task 2:** Maintain and promote a comprehensive website containing information about the watershed along with activities, events, ways to get involved, plan documents, links to relevant organizations and resources, etc.
Estimated Cost: \$7,500/year
Timeline: Ongoing
Priority: High
Potential Project Partners: TWC, LIAA
Target Audience: All
- Task 3:** Host periodic, regional “Water Summit” for regional stakeholders to address priority issues impacting water quality, review implementation efforts and accomplishments, share resources, etc.
Estimated Cost: \$10,000/year
Timeline: Ongoing
Priority: High
Potential Project Partners: TWC, TOMWC, NMC, NWMCOG, MSU-E
Target Audience: Local Government, Partners, General Public, Community Leaders (special target audience)
- Task 4:** Establish educational signage and kiosks throughout the watershed at parks, demonstration projects, beaches, marinas, boat launches, etc.
Estimated Cost: \$250,000
Timeline: 10 years
Priority: Medium
Potential Project Partners: CDs, TWC, TOMWC, MDNR, County Park Departments, RCs, ERCOL, LA, ISEA
Target Audience: General
- Task 5:** Develop “tourist stewardship” brochure for dissemination at area hotels and tourist attractions regarding key watershed issues and desired visitor behaviors (i.e., keep the beach clean, don’t dump waste, etc.).
Estimated Cost: \$5,000
Timeline: 3 years
Priority: High
Potential Project Partners: TWC, TCCVB, Chambers, ERCOL, LA
Target Audience: Tourists
- Task 6:** Operate 1-800-BAYKEEPER hotline to provide concerned citizens with a means to report known or suspected environmental regulation violations, seek help or guidance, get questions answered, etc.
Estimated Cost: \$2,500/year
Timeline: 3 years
Priority: High
Potential Project Partners: TWC, Local Businesses (for sponsors)
Target Audience: General
Milestone: Hotline established by 2007

- Task 7:** Develop comprehensive set of watershed maps and make available to landowners, local governments and others.
Estimated Cost: \$5,000
Timeline: 3 years
Priority: Medium
Potential Project Partners: TWC, LIAA, LGOV
Target Audience: Local Governments, General Public, Partner Organizations
- Task 8:** Create a set of resources such as publications, maps, and other references re watershed issues to be housed at area libraries for public use. Examples include Clean Water Act references, watershed plans, maps, land use planning and land protection information, limnology, relevant periodicals, research, government reports, etc.
Estimated Cost: \$7,500 first year, \$1,000 year after
Timeline: 3 years
Priority: Medium
Potential Project Partners: TWC, Area Libraries
Target Audience: General
- Task 9:** Create small displays that would include a watershed brochure and a suggestion/concern box that could be placed in high tourist traffic areas.
Estimated Cost: \$2,500
Timeline: 3 years
Priority: Medium
Potential Project Partners: TWC, TCCVB, Chambers
Target Audience: Tourists, Households
- Task 10:** Provide training to local citizens regarding environmental advocacy and the Clean Water Act.
Estimated Cost: \$7,500
Timeline: 3 years
Priority: Medium
Potential Project Partners: TWC, TOMWC, ERCOL, LA
Target Audience: Households, Riparians
- Task 11:** Publish watershed or region-wide “Environmental Resource Directory” on a regular basis including mix of resources lists, simple tips, and advertising to support. (TWC/Record Eagle)
Pollutant/Environmental Stressors Reduced: Toxics
Estimated Cost: \$10,000
Timeline: 3 years
Priority: Medium
Potential Project Partners: TWC, Local Papers, MSU-E
Target Audience: General

- Task 12:** In partnership with area tourism industry reactivate hotel program encouraging guests to re-use towels and sheets to conserve water resources using brochures, tent cards, etc,
Estimated Cost: \$10,000 first year, \$5,000 annually
Timeline: 3 years
Priority: Medium
Potential Project Partners: TWC, TCCVB, Chambers
Target Audience: Tourists
- Task 13:** Host annual “Get to Know Your Watershed” guided and/or self-guided tours.
Estimated Cost: \$5,000
Timeline: 10 years
Priority: Low
Potential Project Partners: TWC, TOMWC, CDs, GTRLC, LC, ERCOL, LA, GRNA
Target Audience: General
- Task 14:** Develop a watershed-wide speaker’s bureau as a resource for civic clubs and organizations, workshops, conferences, etc.
Estimated Cost: \$2,500
Timeline: 10 years
Priority: Low
Potential Project Partners: TWC
Target Audience: General
- Task 15:** Develop educational 10-12 minute video about priority watershed issues for use in presentations.
Estimated Cost: \$15,000
Timeline: 3 years
Priority: Low
Potential Project Partners: TWC
Target Audience: All

Information and Education Strategy:
Shoreline Protection and Restoration

- Task 1:** Educate the public about environment-friendly lawn care, maintenance, and the application and use of fertilizers and pesticides.
- Subtask A:** Provide education materials (brochures, door hangers, pamphlets, etc.) and conduct landowner workshops regarding 1) the need for soil testing prior to fertilizer application, 2) the proper use of residential and commercial fertilizers with respect to the application amount, timing, frequency, location, method, and phosphorus content, and 3) the appropriate use of pesticides, etc.
- Estimated Cost:** \$25,000/year
Timeline: 3 years
Priority: High
Potential Project Partners: TWC, CDs, TOMWC, MSU-E, ERCOL, LA, GRNA
Target Audience: Household, Riparians
Milestone: Host at least one workshop each year
- Subtask B:** Increase public knowledge of the consequences of improper disposal of lawn and garden chemicals through news articles, workshops, and other media sources.
- Estimated Cost:** \$10,000
Timeline: 3 years
Priority: High
Potential Project Partners: TWC, CDs, TOMWC, MSU-E, ERCOL, LA, GRNA
Target Audience: Households, Riparians
- Subtask C:** Provide information to the public regarding environment-friendly lawn care contractors, where to buy low-phosphorous fertilizers, alternatives pest management practices and products, etc.
- Estimated Cost:** \$10,000
Timeline: 3 years
Priority: Medium
Potential Project Partners: TWC, CDs, TOMWC, MSU-E, ERCOL, LA, GRNA
Target Audience: Households, Riparians

Subtask D: Develop promotions with landscaping and garden centers to provide educational brochures and workshops regarding native planting, “green landscaping,” etc.

Estimated Cost: \$10,000
Timeline: 3 years
Priority: Medium
Potential Project Partners: TWC, CDs, TOMWC, MSU-E, LA Garden Centers, ERCOL, GRNA
Target Audience: Households, Riparians
Milestone: Make initial contact with businesses by 2006; promotional program in place by 2007

Subtask E. Develop a certification or recognition program for “earth-friendly” landscapers and related businesses.

Estimated Cost: \$10,000
Timeline: 3 years
Priority: Medium
Potential Project Partners: TWC, CDs, TOMWC, MSU-E, ERCOL, LA
Target Audience: Households, Riparians

Task 2: Conduct shoreline and riparian landowner workshops to stress the benefits and importance of riparian buffers to protect water quality.

Estimated Cost: \$10,000
Timeline: 3 years
Priority: High
Potential Project Partners: TWC, CDs, TOMWC, MSU-E, ERCOL, LA, GRNA
Target Audience: Riparians
Milestone: Host at least one landowner workshop each year

Task 3: Develop native landscaping education program including workshops, demonstrations, and brochures.

Estimated Cost: \$50,000
Timeline: 3 years
Priority: High
Potential Project Partners: TWC, CDs, TOMWC, MSU-E, ERCOL, LA Landscaping Companies, GRNA
Target Audience: Households, Riparians
Milestone: Program developed and in place by 2007

- Task 4:** Initiate education efforts in Boardman Lake watershed that promote the essential link between land use and water quality protection and improvement. This includes promoting the retention or establishment of shoreline vegetative buffers, the minimizing of vegetation removal and mowing to the water's edge, and discouraging the dumping of grass clippings and other yard/solid wastes into the water.
Pollutant/Environmental Stressors Reduced: Changes to Hydrology, Loss of Habitat, Nutrients, Thermal Pollution, Toxics, Sediment, Pathogens
Estimate Cost: \$15,000
Timeline: 3 years
Priority: High
Potential Project Partners: TWC, LGOV
- Task 5:** Produce or distribute existing riparian and/or shoreline landowners' guidebooks.
Estimated Cost: \$10,000
Timeline: 3 years
Priority: Medium
Potential Project Partners: TWC, CDs, TOMWC, MSU-E, LA
Target Audience: Riparians
- Task 6:** Establish or identify already existing shoreline buffers for demonstration projects and invite the public for tours; produce accompanying brochure.
Related Task: See Section 7.3 – Shoreline Protection and Restoration Task 4
Estimated Cost: \$10,000
Timeline: 3 years
Priority: Medium
Potential Project Partners: TWC, CDs, TOMWC, MSU-E, LA, GRNA
Target Audience: Riparians
Milestone: Produce accompanying brochure for buffer demonstration sites by 2008
- Task 7:** Develop comprehensive composting education program including workshops and demonstrations.
Estimated Cost: \$25,000
Timeline: 3 years
Priority: Medium
Potential Project Partners: TWC, CDs, TOMWC, MSU-E, GTBOCI, LA, GRNA
Target Audience: Households, Riparians

Task 8: Educate boaters and marina operators regarding environmentally-friendly boating and fueling practices including: avoiding illegal sewage and graywater discharges, fuel spills, engine maintenance, etc.

Estimated Cost: \$25,000

Timeline: 3 years

Priority: High

Potential Project Partners: TWC, MDNR, Marine Patrol, Boat/Marine Retailers, USCG, ERCOL, LA, ISEA

Target Audience: Recreational Boaters, Marinas (special target audience)

Task 9: Develop a realtor and developer educational program aimed at providing new homeowners with information regarding water quality and watershed issues at the point-of-sale.

Estimated Cost: \$10,000

Timeline: 3 years

Priority: Medium

Potential Project Partners: TWC, TOMWC, Board of Realtors, ERCOL, LA

Target Audience: Builder/Developer/Realtor, Households

Information and Education Strategy:
Road Stream Crossings

- Task 1:** Host workshops for County Road and Drain Commissions to provide education regarding possible BMPs to establish at road crossings to reduce the harmful effects of sedimentation and stormwater runoff.
- Estimated Cost:** \$5,000
- Timeline:** 10 years
- Priority:** Medium
- Potential Project Partners:** CDs, TWC, TOMWC, CRA, ERCOL, LA, GRNA
- Target Audience:** Local Governments

Information and Education Strategy:
Agriculture

Task 1: Identify existing farms with conservation practices to serve as a demonstration site. Invite the public for tours and workshops.

Estimated Cost: \$10,000

Timeline: 10 years

Priority: Medium

Potential Project Partners: MSU-E, CDs, NRCS

Target Audience: Agriculture, Households

Milestone: Establish 1-2 demonstration farms by 2010; Host annual tour for public at each farm

Task 2: Educate farmers using manure about proper manure management for their fields. Stress the use of 1) properly designed, constructed, and sited (including consideration of the proximity to surface waters) manure storage facilities, 2) properly maintained and operated manure storage facilities to prevent leaks, overflows, and the need for untimely emptying, and 3) applying manure to properly designated fields at appropriate times

Estimated Cost: \$15,000

Timeline: 10 years

Priority: High

Potential Project Partners: NRCS, CDs, MSU-E

Target Audience: Agriculture

Task 3: Encourage farm market vendors to provide information about BMPs they are using on their farms.

Estimated Cost: \$2,500

Timeline: Ongoing

Priority: Medium

Potential Project Partners: TWC, City of TC, LGOV, MSU-E, NRCS

Target Audience: Households

Information and Education Strategy:
Hydrology

Task 1: Work with public officials to educate affected residents and others regarding key issues surrounding the removal of dams along the Boardman River.

Estimated Cost: \$2,500

Timeline: 3 years

Priority: High

Potential Project Partners: TWC, CDs, MDNR, MDEQ, MLUI, LGOV

Target Audience: Riparians

Task 2: Work with local officials when needed to educate them and affected citizens regarding key issues and benefits surrounding the removal of dam and other water control structures in the watershed.

Estimated Cost: \$2,500 per occurrence

Timeline: 10 years

Priority: Low

Potential Project Partners: TWC, CDs, MDNR, MDEQ, MLUI, LGOV

Target Audience: Riparians

Information and Education Strategy:
Habitat, Fish, and Wildlife

Task 1: Provide education to the general public on the importance of maintaining diverse wildlife habitats and developing wildlife corridors on their property.

Estimated Cost: \$25,000

Timeline: 3 years

Priority: High

Potential Project Partners: CRA, CDs, NRCS, GRNA, ERCOL, LA

Target Audience: Households, Agriculture, Local Government

Task 2: Educate the public regarding CRA's Wild-Link program through 1) conducting tours to existing lands enrolled in Wild-Link program and 2) mailed packets of information to potential landowners.

Estimated Cost: \$10,000

Timeline: 3 years

Priority: High

Potential Project Partners: CRA, CDs

Target Audience: Households, Agriculture, Local Government

Task 3: Educate public officials through workshops, demonstration tours, and information packets regarding the impacts of increased land fragmentation on wildlife habitat and corridors.

Estimated Cost: \$10,000

Timeline: 3 years

Priority: High

Potential Project Partners: CRA, CDs, NRCS, GRNA, ERCOL, LA

Target Audience: Local Government

Information and Education Strategy:
Stormwater

Task 1: Develop comprehensive public education program regarding the control of stormwater including the following components: door hangtags, utility bill inserts, workshops, brochures, newspaper articles, PSAs, radio and TV advertisement campaigns, radio talk shows, and print advertising.

Estimated Cost: \$100,000/year

Timeline: Ongoing

Priority: High

Potential Project Partners: TWC, TOMWC, CDs, LGOV, GRNA, ERCOL, LA

Target Audience: Households, Riparians

Milestone: Public education program in place by 2007

Task 2: Provide general stormwater education for local units of government that stresses the benefits of 1) managing the amount of impervious surfaces in the watershed, 2) reducing the filling and development of wetlands, which provide temporary holding of stormwater, and 3) implementing stormwater BMPs and low-impact design practices to minimize stormwater flows. Examples of BMPs and low-impact design practices include:

- Vegetative Filter Strips: Filter Strips/Aquatic Buffers, Wet Swales, Dry Swales, Grass Channels
- Stormwater Filtering Systems: Bioretention and Surface, Perimeter, Organic, Underground, Pocket Sand Filters
- Infiltration Practices: Infiltration Trench or Basin, Porous Pavement
- Retention and Detention Ponds
- Other Low Impact Design Elements: Rain/Roof Gardens, Native Plantings, Riparian Buffers

(From the Center for Watershed Protection's Approaches to Stormwater Treatment and Stormwater Practice and Design CDs, Watershed Leadership Kit Volumes 4 and 5.)

Estimated Cost: \$25,000

Timeline: 3 years

Priority: High

Potential Project Partners: TWC, MDEQ, TOMWC, NWMCOG, GRNA, ERCOL, LA

Target Audience: Local Governments

Task 3: Implement an annual watershed-wide storm drain stenciling event involving municipalities, neighborhood associations, and other volunteer groups.

Estimated Cost: \$3,500/year

Timeline: 3 years

Priority: High

Potential Project Partners: TWC, LGOV, Neighborhood Associations, GRNA, ERCOL, LA

Target Audience: Households, Riparians

Milestone: One stormdrain stenciling event/yr

Task 4: Partner with neighborhood associations to host presentations and workshops on controlling stormwater on their properties, etc.

Estimated Cost: \$5,000

Timeline: 10 years

Priority: Medium

Potential Project Partners: TWC, Neighborhood Associations, GRNA, ERCOL,
LA

Target Audiences: Households, Riparians

Information and Education Strategy:
Wastewater

- Task 1:** Develop comprehensive public education program regarding septic systems including:
- Using proper septic system design for the site conditions and considering the proximity to bodies of water when siting them,
 - Properly maintain existing septic systems, and
 - Providing education regarding the development of alternative onsite wastewater treatment systems.
- The following components will be used: door hangtags, utility bill inserts, workshops, brochures, newspaper articles, PSAs, radio and TV advertisement campaigns, radio talk shows, and print advertising.
- Estimated Cost:** \$75,000/year
- Timeline:** 3 years
- Priority:** High
- Potential Project Partners:** TWC, TOMWC, Health Depts., OWTF, GRNA, ERCOL, LA
- Target Audience:** Households, Riparians

Information and Education Strategy:
Human Health

Task 1: Implement a ‘Do Not Feed the Waterfowl or Seagulls’ campaign in watershed including PSAs, signage, articles, brochures, etc.

Estimated Cost: \$100,000

Timeline: 10 years

Priority: High

Potential Project Partners: TWC, LGOV, GRNA, ERCOL, LA

Target Audience: Households, Tourists, Riparians

Task 2: Implement a ‘Pick Up Your Pet Waste’ program in urban areas throughout the watershed.

Estimated Cost: \$100,000

Timeline: 10 years

Priority: High

Potential Project Partners: TWC, LGOV

Target Audience: Households, tourists

Task 3: Print and distribute brochures regarding beach monitoring and factors affecting public health at swimming beaches.

Estimated Cost: \$5,000

Timeline: 3 years

Priority: High

Potential Project Partners: TWC, Health Depts.

Target Audience: Households, Riparians, Tourists

Milestone: Brochure developed by 2006

Task 4: Educate the public regarding health risks associated with backyard trash burning and encourage alternative methods of disposal such as composting, recycling and utilizing hazardous materials disposal facilities and drop-off events.

Estimated Cost: \$10,000

Timeline: 3 years

Priority: Medium

Potential Project Partners: GTBOCI, TWC, Health Depts., GRNA, ERCOL,
LA, County Resource Recovery Departments

Target Audience: Households, Riparians, Agriculture

Task 5: Provide education regarding health risks to individuals and communities from improper disposal of hazardous wastes. Provide information regarding proper disposal of household hazardous waste and pharmaceuticals. Provide information on alternative products and methods and promote participation in household hazardous waste collection events.

Estimated Cost: \$25,000

Timeline: 3 years

Priority: High

Potential Project Partners: GTBOCI, TWC, Health Depts., ERCOL, LA, GRNA, CDs, LGOV, County Resource Recovery Departments

Target Audience: Households, Riparians

Task 6: Encourage and promote the proper disposal of used electronic devices; provide information regarding disposal options and promote periodic drop off events.

Estimated Cost: \$5,000

Timeline: Ongoing

Priority: High

Potential Project Partners: County Resource Recovery Departments, TWC, GTBOCI, ERCOL, LA, LGOV

Target Audience: Households, Riparians, Business and Industry

Information and Education Strategy:
Wetlands

- Task 1:** Educate local governments, developers, contractors, and others through workshops and presentations, press releases, brochures, etc, regarding the ecological consequences of developing unregulated wetland areas, especially in headwater/recharge areas and along the Grand Traverse Bay shoreline.
Estimated Cost: \$10,000
Timeline: 3 years
Priority: High
Potential Project Partners: TWC, TOMWC, GRNA, ERCOL, LA
Target Audience: Local Governments, Builder/Developer/Realtor
- Task 2:** Educate the public and public officials regarding the benefits of wetlands through workshops, demonstrative site tours, newspaper articles, PSAs, radio and TV advertisement campaigns, radio talk shows, print advertising, etc.
Estimated Cost: \$100,000
Timeline: 3 years
Priority: High
Potential Project Partners: TWC, TOMWC, GRNA, ERCOL, LA
Target Audience: Households, Riparians, Local Governments, Builder/Developer/Realtor
- Task 3:** Educate and communicate to Great Lakes shoreline owners the current beach maintenance regulations, the value and proper care of emergent coastal wetlands, and the benefit of keeping these wetlands in a natural state. Disseminate existing brochures, mail letters, host ‘town meetings’, etc.
Estimated Cost: \$10,000
Timeline: 3 years
Priority: High
Potential Project Partners: TWC, TOMWC, LGOV
Target Audience: Riparians, Tourists, Local Governments
- Task 4:** Host a series of workshops and seminars throughout the watershed to educate public officials regarding appropriate and successful methods for restoring wetlands.
Estimated Cost: \$10,000
Timeline: 3 years
Priority: Medium
Potential Project Partners: TWC, TOMWC
Target Audience: Local Governments

Information and Education Strategy:
Invasive Species

- Task 1:** Educate local residents and visitors regarding the negative impacts of and appropriate control and eradication measures for both aquatic and terrestrial invasive species (including Eurasian water milfoil, purple loosestrife, zebra mussels, etc).
Estimated Cost: \$25,000
Timeline: 3 years
Priority: High
Potential Project Partners: TWC, GRNA, MSU-E, ISEA, CDs, Sea Grant, GRNA, ERCOL, LA
Target Audience: Households, Riparians, Tourists
- Task 3:** Develop simple fact sheet or brochure to use as a handout at garden centers regarding terrestrial invasive species, including photos, drawings and eradication methods.
Estimated Cost: \$5,000
Timeline: 3 years
Priority: Medium
Potential Project Partners: TWC, MSU-E, Sea Grant, GRNA, ERCOL, LA, Local Businesses
Target Audience: Households, Riparians
- Task 4:** Create and distribute a resource list for native plant species.
See related tasks under Shoreline Protection and Restoration category.
Estimated Cost: \$5,000
Timeline: 3 years
Priority: Medium
Potential Project Partners: TWC, MSU-E, CDs, GRNA, ERCOL, LA
Target Audience: Households, Riparians

Information and Education Strategy:
Land Protection and Management

Task 1: Provide landowner education regarding voluntary conservation easements and other available land protection measures utilizing direct mail, publications, etc. Schedule bus tours of areas already in conservation easements to provide examples of successful efforts.

Estimated Cost: \$50,000

Timeline: 10 years

Priority: High

Potential Project Partners: GTRLC, LC, CDs

Target Audience: Households, Riparians

Task 2: Develop a public awareness program to inform the public of ecologically sound riparian and coastal wetland land management practices.

See related tasks under Shoreline Protection and Restoration category.

Estimated Cost: \$50,000

Timeline: 3 years

Priority: High

Potential Project Partners: GTRLC, LC, LGOV, MDEQ

Target Audience: Households, Riparians

Information and Education Strategy:
Development

Task 1: Host workshops, seminars, and site tours to educate developers and contractors on proper stormwater and sediment management at construction sites.

Estimated Cost: \$10,000

Timeline: 3 years

Priority: High

Potential Project Partners: TWC, ERCOL, LA, Home Builders Association, Realtors

Target Audience: Builder/Developer/Realtor

Milestone: One-two workshop/seminar/site tour each year

Task 2: Compile information packet and host workshops, luncheons, or small seminars for area realtors providing them with basic information regarding environmental laws (wetlands, beach maintenance, onsite wastewater treatment, etc.) that might impact new homeowners.

Estimated Cost: \$10,000

Timeline: 3 years

Priority: High

Potential Project Partners: TWC, TOMWC, ERCOL, LA

Target Audience: Households, Riparians, Builder/Developer/Realtor

Task 3: Develop watershed information packet for realtors, developers, and other businesses to hand out to customers, new homeowners, and others on activities the can do to improve/protect water quality on their property.

Estimated Cost: \$10,000

Timeline: 3 years

Priority: High

Potential Project Partners: TWC, TOMWC, ERCOL, LA, Chambers, Newcomer's Clubs

Target Audience: Households, Riparians, Builder/Developer/Realtor

Milestone: Information packet developed and ready for distribution by 2007

Task 4: Encourage design, construction and maintenance of new and existing development in the watershed that utilizes Best Management Practices to protect water quality.

Estimated Cost: \$10,000

Timeline: 3 years

Priority: High

Potential Project Partners: TWC, ERCOL, LA, Home Builders Association, TOMWC, New Designs for Growth

Target Audience: Builder/Developer/Realtor, Local Government

Information and Education Strategy:
Zoning and Land Use

Task 1: Provide key elected/appointed public officials (planning commissioners, etc.) with summary version of Grand Traverse Bay Watershed Protection Plan and basic recommendations relevant to local units of government.

Estimated Cost: \$2,500

Timeline: 3 years

Priority: High

Potential Project Partners: TWC, LA, GRNA

Target Audience: Local Governments

Milestone: Plan summary provided by 2006

Task 2: Educate and inform local planning and zoning officials regarding up-to-date information on planning, zoning, and design innovations relating to the protection of water quality. Utilize MDEQ book titled “Filling the Gaps: Environmental Protection Options for Local Governments”.

Estimated Cost: \$10,000

Timeline: 3 years

Priority: High

Potential Project Partners: TWC, LGOV, NWMCOG, GRNA, LA

Target Audience: Local Governments

Milestone: Host one-two educational workshops for local officials each year (in addition to face-to-face meetings and phone calls)

Task 3: Develop an information packet for Zoning Boards of Appeals and Planning Commissions to assist them in developing reasonable conditions to place on requests for variances (i.e., installing or providing riparian buffers and/or other BMPs on site).

Estimated Cost: \$10,000 initial year; \$2,500/yr after packet is completed

Timeline: 3 years

Priority: High

Potential Project Partners: TWC, LGOV, NWMCOG, GRNA, LA

Target Audience: Local Government

Task 5: Facilitate meetings between townships regarding the sharing of model ordinances that protect water quality and natural resources.

Estimated Cost: \$5,000

Timeline: 3 years

Priority: High

Potential Project Partners: TWC, TOMWC, LGOV, NWMCOG, LA

Target Audience: Local government

Information and Education Strategy:
Groundwater

Task 1: Educate local governments, developers, contractors, and others regarding headwater and groundwater recharge areas (how they work, soils, vegetation, etc.) and why it is important to protect them and avoid overdeveloping them.

Estimated Cost: \$25,000

Timeline: 3 years

Priority: High

Potential Project Partners: TWC, MSU-E Groundwater Stewardship, CDs, ERCOL, LA

Target Audience: Local Government, Builder/Developer/Realtor

Information and Education Strategy:
Monitoring

- Task 1:** Expand marketing and promotion efforts for TWC’s Stream Search program utilizing public relations, giveaways for participants, sponsorships, etc.
Estimated Cost: \$10,000
Timeline: 3 years
Priority: High
Potential Project Partners: TWC
Target Audience: General
Milestone: Expand Stream Search program into Leelanau County by 2007
- Task 2:** Provide ongoing information to stakeholders regarding research and monitoring efforts conducted by the TWC and various partner organizations in the watershed and what it means to various target audiences (through documents such as the annual *Freshwater Focus* newspaper insert, TWC website, press releases, etc).
Estimated Cost: \$5,000
Timeline: 3 years
Priority: High
Potential Project Partners: TWC, ISEA, TOMWC, GTBOCI, ERCOL, LA, GRNA
Target Audience: All
- Task 3:** Enter results of WQ testing into TWC’s online, interactive water quality database.
Estimated Cost: \$5,000/year
Timeline: ongoing
Priority: High
Potential Project Partners: TWC
Target Audience: All
- Task 4:** Develop public attitude survey (as well as follow up surveys) to determine and monitor the public’s awareness regarding watershed and water quality issues.
Estimated Cost: \$15,000/survey
Timeline: ongoing
Priority: High
Potential Project Partners: TWC
Target Audience: All
Milestone: Develop and conduct first public attitude survey by 2008

Task 5: Maintain a list of ongoing and completed environmental projects in the watershed, along with their accomplishments and what organizations are working on them.

Estimated Cost: \$500/yr

Timeline: ongoing

Priority: High

Potential Project Partners: TWC

Target Audience: N/A

7.5 Evaluation Procedures

An evaluation strategy will be utilized to measure progress during the Grand Traverse Bay Watershed Protection Plan's implementation phase and to determine whether or not water quality is improving. The timeline for the evaluation is approximately every 5 years, with ongoing evaluation efforts completed as necessary. The first aspect of the evaluation strategy measures how well we are doing at actually *implementing* the watershed protection plan and assesses if project milestones are being met. The second aspect is to evaluate how well we are doing at *improving water quality* in the watershed. The following sections address each of these issues.

Evaluation Strategy for Plan Implementation

This aspect of the evaluation strategy was developed to measure progress during the implementation phase of the watershed protection plan and to provide feedback during implementation. The evaluation will be ongoing and will be conducted through the existing Steering Committee. The Steering Committee will meet once a year to assess progress on plan implementation and to learn and share information about existing projects throughout the watershed. In addition, plan tasks, priorities, and milestones will be assessed every 5 years to ensure that the plan remains current and relevant to the region and that implementation is proceeding as scheduled and is moving in the right direction.

The evaluation will be conducted by analyzing the existing watershed management plan goals and objectives, as well as the implementation tasks and 'milestones' in Sections 7.3 and 7.4 to determine progress. Key milestones include completing streambank erosion restoration projects, repairing road stream crossings, developing stormwater management plans and starting stormwater remediation efforts in urban areas, and updating zoning ordinances. The proposed timeline for each task (i.e. 3 years, 10 years, ongoing) will also be reviewed to determine if it is on schedule. Other anecdotal evidence (not attached to specific plan milestones) also will be noted that indicates the protection plan is being successfully implemented, such as an increase in the amount of updated or new zoning ordinances that deal with water quality and natural resource protections in watershed townships and municipalities.

Additionally, a number of other evaluation tasks will be completed due to the variety of tasks involved in the watershed plan. They will include but are not limited to the following:

- Document the effectiveness of BMP implementation by taking photographs, completing site data sheets and gathering physical, chemical and/or biological site data. Work with partners to develop a standardized methodology implementation (see Monitoring in Section 7.3).
- Utilize focus groups to evaluate specific projects throughout plan implementation as needed.
- Conduct targeted surveys of project partners by direct mail, phone or by website to assist in information gathering.
- Maintain a current list of future target projects, the status of ongoing projects, and completed projects, along with their accomplishments. Keep track of the number of grants received and the dollars committed in the watershed region to implement aspects of the plan.

The purpose of the evaluation strategy is to provide a mechanism to the Steering Committee to learn track how well the plan is being implemented and what can be done to improve the implementation process. Additional development of the strategy will occur as the implementation phase unwinds.

Measuring and Evaluating Social Milestones

Section 7.4 outlines an Information and Education Strategy that addresses the communication needs associated with implementing the Protection Plan. The strategy is important because developing and carrying out a regional vision for stewardship of the region's water resources will require the public and community leaders to become more knowledgeable about the issues and solutions, more engaged and active in implementing solutions and committed to both individual and societal behavior changes. Residents, local officials, homeowners, and the like must be educated and motivated to adopt behaviors and implement practices that result in water quality improvements.

In this respect, it is important to measure and keep track of the social impacts of the Grand Traverse Bay Protection Plan. Project managers must find out what types of outreach are working in their communities and what types aren't, along with how people's attitudes and behaviors are impacted. Just how much is social behavior changing because of the plan implementation? To answer this question, social impacts must be included when evaluating the progress of plan implementation.

Key social evaluation techniques that will be used to assess the implementation of the IE Strategy, as well as other watershed BMPs, include:

- Continued cooperation between area organizations submitting proposals to implement aspects of protection plan
- Social surveys (and follow up surveys) for homeowners, local officials, students, farmers, etc. to determine watershed and water quality awareness
- Determining any increases in 'watershed friendly' design and construction (anecdotal evidence will be used)
- Increased awareness (from both the general public and local government officials) regarding the necessity of stormwater improvement
- Increase in the number of communities implementing stormwater ordinances
- Continued requests to do Freshwater Focus (increases in positive feedback after printing)
- Incorporating feedback forms into educational and public events and posting them on The Watershed Center website www.gtbay.org.
- Determine number of environmental efforts/projects in the watershed and how many organizations are currently working to protect water quality in the area. Maintain a list of ongoing projects and completed projects, along with their accomplishments. (This task is also found in next section relating to evaluating the water quality improvements.)

In a social survey conducted in summer 2002, the most significant finding was the identification of a major gap in knowledge amongst watershed residents in that 60% of the respondents answered "don't know" when asked which watershed they lived in. This basic fact indicates that watershed partner organizations have a long way to go in informing and engaging the public in watershed issues. A major social milestone to achieve by 2010 is to increase awareness of Grand

Traverse Bay watershed residents knowing which watershed they live in from 40% up to 75%. (We feel this is a realistic goal, considering the average American moves once every 5 years; so in any given year approximately 20% of the residents are new to the area.)

Evaluation Strategy for Determining Water Quality Improvement

The EPA dictates that watershed management plans must outline a set of criteria to determine whether proposed load reductions in the watershed are being achieved over time and that substantial progress is being made towards attaining water quality standards. In the case of the Grand Traverse Bay watershed, overall water quality is good (Section 3.11) with some pollutant threats; therefore no specific watershed goals were made regarding load reductions. Instead, the project Steering Committee made a broad goal to maintain current levels of phosphorus and nitrogen in Grand Traverse Bay (Chapter 6: Goal #2, Objective #2). However, since the Grand Traverse Bay watershed is threatened and has problem areas, it is stressed that improvements must be made now in order to maintain the current water quality and protect it into the future. Most watershed goals outlined in Chapter 6 seek to maintain or improve the current state of water quality and habitat, as well as increase awareness of this valuable resource.

In addition to conducting an evaluation every 5 years regarding protection plan implementation, the Steering Committee will evaluate whether or not water quality in Grand Traverse Bay and its watershed is declining, improving, or staying the same. Criteria or milestones to be used to evaluate changes in water quality will include:

- No statistically significant increases in bay-wide averages of Phosphorus or Nitrogen concentrations in Grand Traverse Bay.
- Monitoring results that indicate no harmful changes to water quality or biological indicators measured throughout the watershed.
- Documented decrease (or no statistically significant change) in the areal extent or number of macrophyte weed beds in Grand Traverse Bay. (*See Monitoring Task #4 in Section 7.3*)
- No *E. Coli* levels exceeding Michigan and USEPA water quality standards for both single day measurement (>300 *E. coli* per 100mL of water) and 30-day geometric mean measurement (> 130 *E. coli* per 100mL of water in 5 samples over 30 days). (*See Monitoring Task #3 in Section 7.3*)
- Stream macroinvertebrates surveys throughout the watershed indicating excellent water quality. (*See Monitoring Task #2 and #7 in Section 7.3*)
- Determine number of environmental efforts/projects in the watershed and how many organizations are currently working to protect water quality in the area. Maintain a list of ongoing projects and completed projects, along with their accomplishments. (This task is also found in previous section relating to evaluating the plan implementation.)