Road-Stream Crossing Inventory Results and Action Plan For The Grass and Rapid River Systems

Antrim and Kalkaska Counties

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Background

In the winter of 2011, a meeting was convened at a home along the banks of the Rapid River to discuss sediment issues in the Rapid and Grass Rivers and develop a plan to evaluate and address excessive sedimentation in the watersheds of these river systems. In attendance, and involved throughout the project, were representatives from local and regional organizations in the Elk River Chain of Lakes Watershed (ERCOL), including: The Watershed Center Grand Traverse Bay, Three Lakes Association, Elk-Skegemog Lake Association, Friends of the Rapid River, Friends of Clam Lake, the Kalkaska County Conservation District, the Michigan Department of Natural Resources, the Grand Traverse Band of Ottawa and Chippewa Indians, and Tip of the Mitt Watershed Council. Other partners who became involved with this project at a later date include The College of Brockport: State University of New York and Michigan State University. This collaborative partnership was formed as a sub-committee of the ERCOL Watershed Protection Implementation Team (WPIT), which operates under the auspices of the MDEQ and USEPA-approved Grand Traverse Bay Watershed Management Plan (Plan) with the intent of carrying out implementation recommendations outlined in the Plan for reducing nonpoint source pollution in the Watershed.

Following lengthy discussion at multiple meetings, this group of concerned watershed stakeholders and water resource professionals developed a plan to assess sediment sources throughout both watersheds and identify specific action steps to reduce sediment inputs and address excessive sediment build-up in these river systems. The assessment consisted of: 1) biological, physical, and chemical water quality monitoring at multiple locations throughout both watersheds; 2) an inventory of all road-stream crossings in both watersheds to evaluate conditions and locations needing improvement; 3) a comprehensive stream channel inventory to identify streambank erosion and sources on all tributaries; 4) a stormwater inventory to determine sediment inputs in runoff from urban and residential areas; and 5) a hydrological study of both watersheds to better understand sediment inputs, transport, and deposition in both river systems. This document presents findings of the road-stream crossings inventory and provides recommendations in terms of specific actions that should be taken to reduce or prevent sediment inputs into the study streams from roads.

Methods

The Grass and Rapid Rivers Road/Stream Crossings Inventory was coordinated by The Watershed Center Grand Traverse Bay (TWC) and Tip of the Mitt Watershed Council (TOMWC). Volunteers carried out the inventory during the summer of 2011 following a training session in methodologies provided by TWC. The Grass River inventory was conducted by volunteers from Three Lakes Association and Friends of Clam Lake, whereas the Rapid River inventory was

performed by volunteers from the Elk-Skegemog Lake Association. Volunteers used methods outlined in the Great Lakes Road Stream Crossing Inventory Instructions booklet.

At each road-stream crossing, the following general information was collected: 1) site identification number (if existed); 2) stream name; 3) names of survey crew; 4) date or survey; 5) GPS information (if GPS was employed); 6) county name; 7) township/range/section (optional); 8) adjacent landowner information (if known); and 9) additional comments about the site. Each crossing was documented in terms of crossing type, whether a culvert, bridge, ford, or dam. Culverts, the most common type, were further documented in context of these parameters: 1) shape (e.g., round, ellipse, square); 2) inlet type (e.g., projecting, mitered, wingwall); 3) outlet type (e.g., cascade over riprap, freefall into pool); 4) structure material (e.g., concrete, metal, plastic); 5) structure interior whether smooth or corrugated; 6) structure length, width, and height; 7) general condition of culvert; 8) substrate material in the structure and depth of embeddedness; 9) whether structure was plugged or crushed; 10) water depth at inlet and outlet; 11) flow velocity at inlet and outlet; and 12) perch height at outlet (if perched). The stream at each site was documented with regards to: 1) flow, whether at bankfull, over, or below; 2) scour pools downstream of structure; 3) ponding upstream of structure; and 4) channel and flow characteristics associated with a reference riffle, which included bankfull width, wetted width, average stream depth, average flow velocity, and dominant substrate. The road was assessed in terms of: 1) type/ownership (e.g., county, private); 2) surface type (e.g., paved, gravel); 3) road surface condition; 4) width of road at culvert; 5) location of low point, whether at stream crossing or at other location; 6) runoff path, whether along road or into ditch; 7) embankment slope and fill depth at structure; 8) length and slope of approaches from both directions; and 8) ditch information regarding vegetation. Any erosion at the site was documented using the following: 1) location; 2) dimensions: length, width, and depth; 3) whether eroding material was reaching the stream; 4) the type of eroding material (e.g., sand, clay, gravel); 5) severity of erosion; and 6) whether corrective actions could be installed or not. Additional information collected includes photographs of the site, a site sketch, whether it is considered a priority site, whether a future visit is recommended, and if any invasive species were observed at the site.

All data collected during the inventory was entered into an Access database by volunteers and TOMWC staff. Due in part to volunteers' unfamiliarity with data collection and also because of lack of equipment (e.g., flow velocity meter), data were incomplete for numerous sites. Therefore, the severity of problems at each site could not be determined using the calculator built into the Great Lakes Road Stream Crossing Inventory database, but was instead assessed by TOMWC staff with a simplified alternate scoring system utilizing information in the database,

as well as accompanying photographs and staff familiarity with sites. The simplified scoring system was based on structure condition, fish passage problems, and sediment inputs.

Results

A total of 40 road-stream crossing sites were inventoried during the summer of 2011; 24 in the Grass River system and 16 in the Rapid River (Tables 1 and 2). Bridges were in place at 13 of the crossings and the other 27 were culverts. At two sites on Shanty Creek, dams were also present. The inventory data show moderate to severe problems at 17 sites, at nine locations in the Rapid River Watershed and eight in the Grass River Watershed.

Table 1. Road-stream crossing information and severity ratings for the Grass River tributaries.

ID#	Stream Name	Road Crossing Name	Type	Severity
01_SCRN	Shanty Creek	Road to nowhere	culvert	Minor
02_SCRR	Shanty Creek	Railroad Crossing	culvert	Minor
03_SCHP	Shanty Creek	Old hydropower site	bridge/dam	Severe
04_SCGRR	Shanty Creek	Grass River Road	culvert	Minor
05_SCM88	Shanty Creek	M-88	culvert	Minor
06_SCPBD	Shanty Creek	Pine Brook	bridge/dam	Severe
07_SCGC	Shanty Creek	Creekside drive bridge	bridge	Minor
08_SCUC	Shanty Creek	Dirt rd above Legend Golf Course	culvert	Minor
09_SCCDD	Shanty Creek	Creekside drive	bridge	Severe
10_SCCSD	Shanty Creek	Creekside drive	bridge	Severe
11_CCRR	Cold Creek	Railroad Crossing	bridge	Minor
12_CCPR	Cold Creek	No name	culvert	Moderate
13_CCCR	Cold Creek	Comfort Road	culvert	Severe
14_CCTR	Cold Creek	Tyler Road	culvert	Minor
15_CCFFR	Cold Creek	Fish-farm Road	culvert	Minor
16_CCAH	Cold Creek	Alden Highway	culvert	Minor
17_FCRR	Finch Creek	Railroad Crossing	bridge	Minor
18_FCAH	Finch Creek	Alden Highway	culvert	Moderate
19_FC9310	Finch Creek	9310 Finch Creek Road	bridge	Minor
20_FCFCR	Finch Creek	Finch Creek Road	culvert	Minor
21_FCERE	Finch Creek	Elder Road, East	culvert	Severe
22_FCERW	Finch Creek	Elder Road, West	culvert	Minor
23_FCBR	Finch Creek	Bebb Road	culvert	Minor
24_FCWR	Finch Creek	Way Road	culvert	Minor

Table 2. Road-stream crossing information and severity ratings for the Rapid River.

ID#	Stream Name	Road Crossing Name	Type	Severity
RR01	Little Rapid River	Old M72, upstream	culvert	Moderate
RR02	Little Rapid River	Old M72, downstream	culvert	Severe
RR03	Little Rapid River	Seeley Rd	culvert	Moderate
RR04	Little Rapid River	Hill Rd	culvert	Severe
RR05	Rapid River, North Branch	Priest Rd	culvert	Severe
RR06	Rapid River, North Branch	Day Rd	culvert	Minor
RR07	Rapid River, North Branch	Railroad	culvert	Moderate
RR08	Rapid River, North Branch	US131	culvert	Minor
RR09	Rapid River, North Branch	Wood Rd, upstream	culvert	Minor
RR10	Rapid River, Main	Wood Rd, downstream	culvert	Minor
RR11	Rapid River, Main	Dundas Rd	bridge	Moderate
RR12	Rapid River, Main	Underhill Rd	bridge	Moderate
RR13	Rapid River, Main	Kellogg Rd	culvert	Minor
RR14	Rapid River, Main	Glade Valley Rd	bridge	Moderate
RR15	Rapid River, Main	Rapid City Rd	bridge	Minor
RR16	Rapid River, Main	Aarwood Rd	bridge	Minor

In the Rapid River system, three road-stream crossing sites were rated as severe and six as moderate (Figure 1). Those rated as severe include two sites on the Little Rapid River at Old M72 near Valley Road (Site ID# RR02) and Hill Road (Site ID# RR04), as well as one site on the North Branch at Priest Road (Site ID# RR05). The six moderate sites include Old M72 near Kalkaska (Site ID# RR01) and Seeley Road (Site ID# RR03) on the Little Rapid River, the railroad crossing on the North Branch (Site ID# RR07), and Dundas Road (Site ID# RR11), Underhill Road (Site ID# RR12), and Glade Valley Road (Site ID# RR14) on the main stem.

In the Grass River system, problematic road-stream crossings were most prevalent in the Shanty Creek Watershed where four of the ten crossings were rated as severe in terms of negative impacts to the stream ecosystem (Figure 2). These include an old hydropower site with a dam (Site ID# 03_SCHP), another dam at Pine Brook (Site ID# 06_SCPB), and two sites on Creekside Drive (Site ID# 09_SCCSD and 10_SCCSD). Cold Creek had one site rated as severe on Comfort Road (Site ID# 13_CCCR) and a moderate site on an unnamed road (Site ID# 12_CCCR). Finch Creek also had one site rated as severe on Elder Road (Site ID# 21_FCERE) and a moderate site on Alden Highway (Site ID# 18_FCAH).

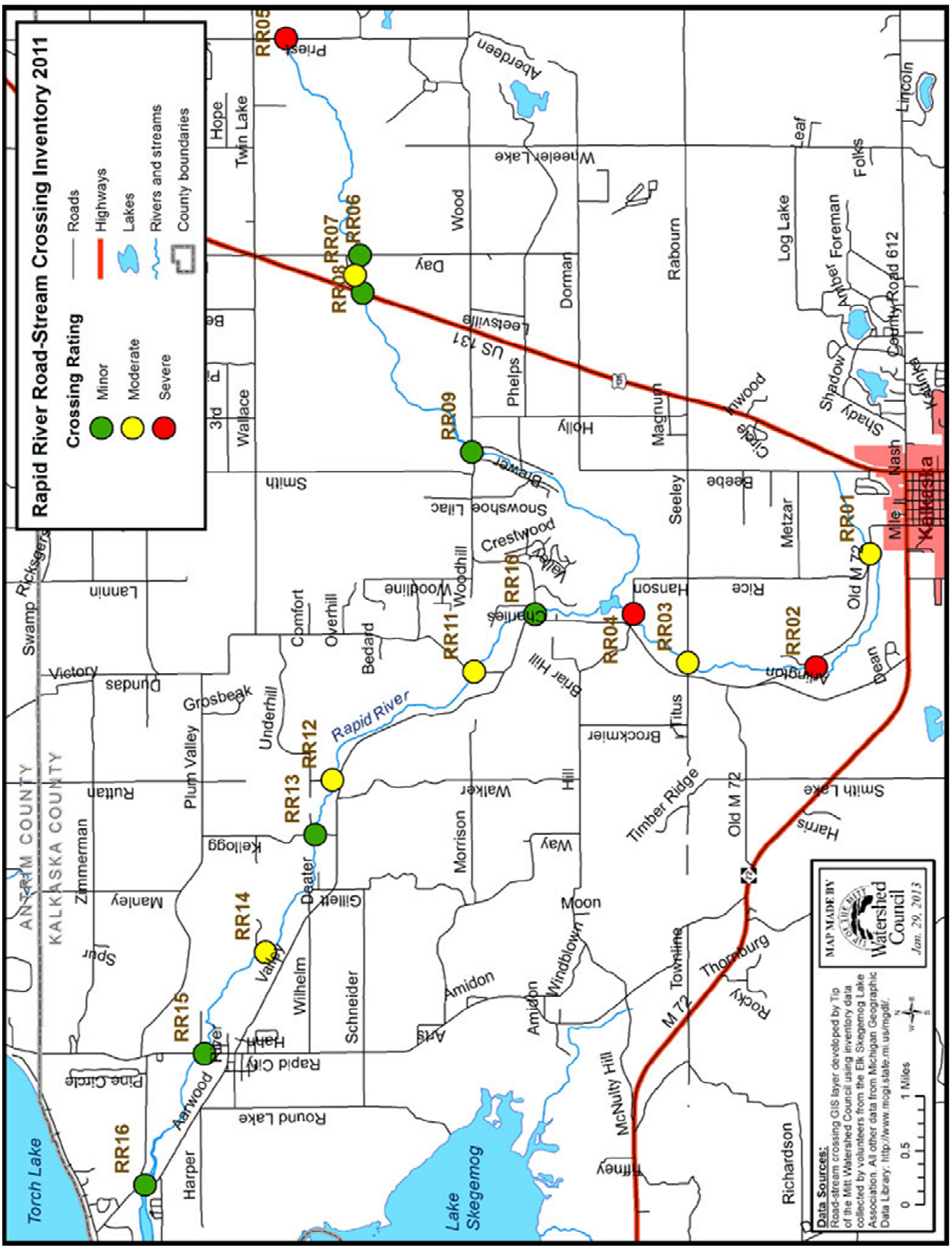

Figure 1. Results of the 2011 Rapid River Road-Stream Crossing Inventory.

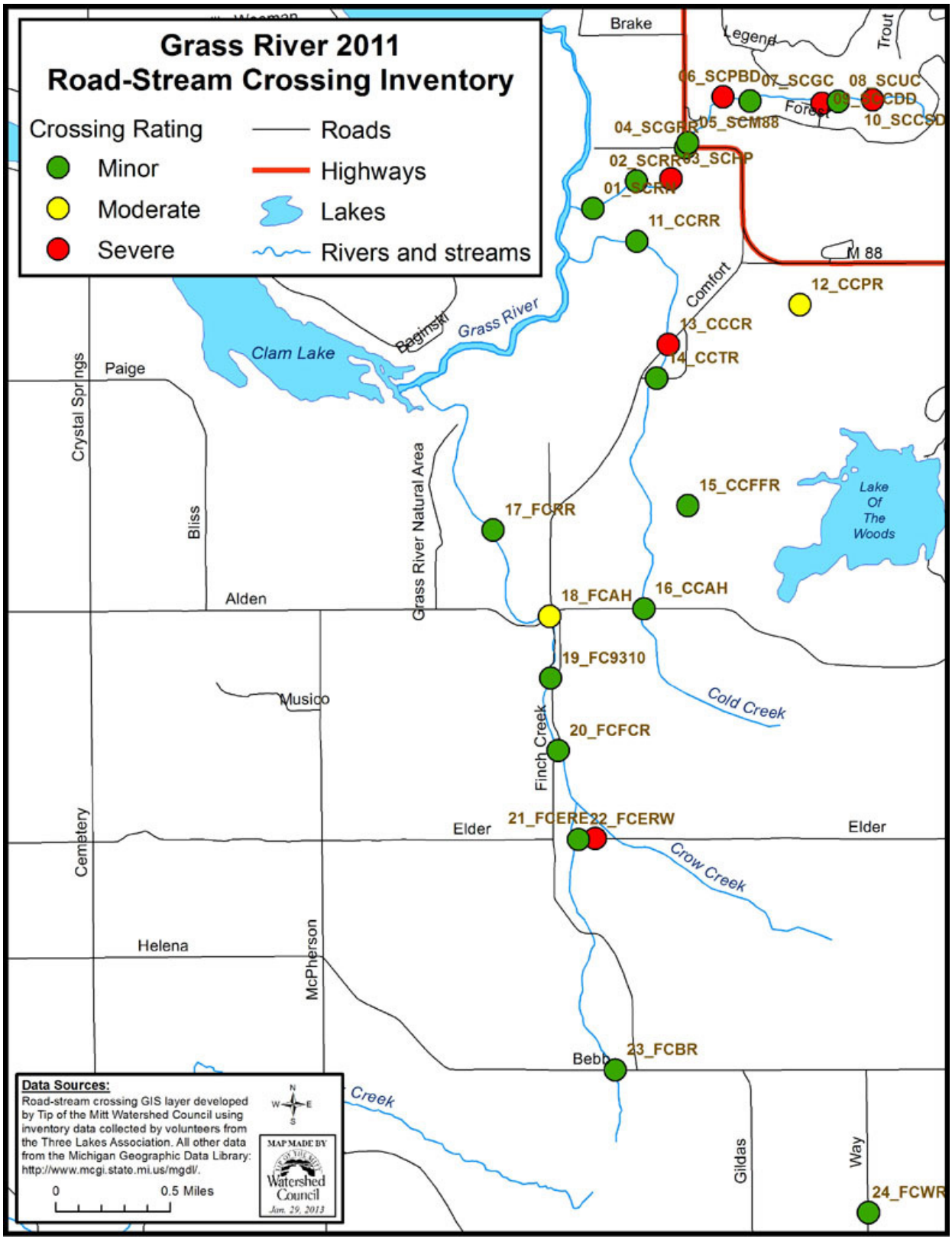

Figure 2. Results of the 2011 Grass River Tributary Road-Stream Crossing Inventory.

Discussion and Recommendations

Road-stream crossings are among the greatest sources of nonpoint source pollution to Northern Michigan's rivers and streams. Although sediments are the most prevalent pollutant associated with road-stream crossings, other pollutants include heavy metals, nutrients, debris and litter. In addition, road-stream crossings can create barriers to aquatic organism passage, increase water temperatures, disrupt sediment transport and hydrologic connectivity. The results of the 2011 inventories provide a framework for systematically addressing the worst road-stream crossings, which will improve water quality and protect the stream ecosystems in the Rapid and Grass River Watersheds.

Based on the assessment of the inventory results, the following action steps are recommended.

1. Disseminate inventory information. Share results of the road-stream crossing inventory with the ERCOL WPIT committee, local governments, road commissions, and other relevant stakeholders.
2. Plan corrective actions for severe and moderate sites. Meet with watershed partners and road commissions to discuss inventory results; incorporate a tour of severe and moderate sites to view the crossings as a group and discuss possible corrective measures to address problems.
3. Identify three top priority road-stream crossings based on severity, as well as other factors including capacity of road commission to perform necessary work, cost, potential for grant funding, etc.
4. Acquire funding for developing engineering plans for the three priority sites identified above. Engineering costs will vary by site. Solicit engineering firms for bids and estimates for more complicated sites. It is anticipated that the severe road-stream crossing sites will require on the order of $10,000 or more for engineering alone.
5. Pursue funding to implement projects. Grant programs oftentimes support road-stream crossing projects when the applicant can demonstrate the existing conditions pose a serious threat to water quality and stream habitat. Necessary funds to complete projects will also vary. Basic culvert crossings can cost approximately $40,000, while timber bridge projects can be $300,000.
6. Implement priority projects at severe and moderate sites. Additional corrective actions at sites, particularly moderate sites, may be simple, cost-effective solutions, such as plantings along the streambank or diveriting road-runoff to allow for greater infiltration of pollutants.
7. Assess dams. Two road-stream crossings over Shanty Creek include dams. Assess condition of dams and perform feasibility studies for repair or removal. Environmental impacts, particularly sediment releases, must be considered before taking any actions.

8. Assess the “Road to Nowhere” crossing in the lower section of Shanty Creek. If the culvert is found to be a hazard, aquatic organism passage barrier, or significant threat to water quality, then pursue means (engineering, if applicable, and funding) for its removal. Although survey results did not reveal any serious problems at this site, volunteers conducting the inventory commented that the culvert serves no purpose.
9. Repeat the road-stream crossing inventory on a regular basis, ideally every 5-10 years.
10. Work with Land Information Access Association (LIAA) to upload inventory data to www.northernmichiganstreams.org, the central respository for road/stream crossing information in Northern Michigan.

The following photos are examples from the Grass River RSX Inventory:

Culvert inlet and scouring pool on private road on Cold Creek.

Culvert inlet with eroding upper bank at Elder Road East on Finch Creek.

Aging concrete bridge over Shanty Creek on Creekside Drive.

Volunteers measuring culvert dimensions at Tyler Road on Cold Creek.

Cascade over riprap at Finch Creek Road creates aquatic species passage barrier.

Volunteers assessing road-stream crossing at Comfort Road on Cold Creek.

The following photos are examples from the Rapid River RSX Inventory:

Sediments fall on to the culvert and into the Little Rapid River at Hill Road.

Volunteers help assess stream conditions at the Wood Road crossing.

Sediments pour into the Rapid River from the bridge at Dundas Road.

Sediments wash into the Little Rapid River at access point on Old M72.

Water ponds upstream of undersized culvert at Priest Road in the headwaters.

Dilapidated bridge over the Rapid River at Glade Valley Road.