Muskegon River Streambank Erosion Inventory

Sponsored by:

NORTHWEST MICHIGAN RESOURCE CONSERVATION
AND DEVELOPMENT COUNCIL, INC.
3193 Logan Valley Road
Traverse City, Michigan 49684-4772

OSCEOLA-LAKE SOIL & WATER CONSERVATION DISTRICT
7700 South Patterson Road
Reed City, Michigan 49677-9634

MECOSTA SOIL CONSERVATION DISTRICT
18715 Chippewa Lake Road
Big Rapids, Michigan 49307-0001

Contact Person
James R. Haveman, Executive Director
Northwest Michigan RC&D Council, Inc.
(616) 946-6817

Dated: November 25, 1991
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# STEERING COMMITTEE

Muskegon River Streambank Erosion Inventory

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<td>Fay Wilson</td>
<td>Soil Conservation Service</td>
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<td>Rick Johnson</td>
<td>Osceola County Bd. of Commissioners</td>
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<tr>
<td>Randy Langworthy</td>
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<td>Leo Mrozinski</td>
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<td>Brian Myers</td>
<td>Michigan Department of Natural Resources</td>
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<td>Jerry Lindquist</td>
<td>Cooperative Extension Service</td>
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<td>Kurt Krug</td>
<td>Agricultural Stabilization &amp; Conservation Service</td>
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<tr>
<td>Lynn Gerould</td>
<td>Landowner</td>
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<td>George Rouman</td>
<td>Ferris State University</td>
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<tr>
<td>Ed Burch</td>
<td>Mecosta County Road Commission</td>
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<tr>
<td>Jack Robinson</td>
<td>Mecosta County Drain Commissioner</td>
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<td>Tom Rorabaugh</td>
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<td>Carol Baughman</td>
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<td>Ed Rivard</td>
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<td>Charles Hartman</td>
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<td>Donald Dahmer</td>
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<td>Sally Ann Sanford</td>
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*Add to list: D. Spratt 17-42 North Hill*
ACKNOWLEDGEMENTS

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Allen Anderson, Project Coordinator.
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I. INTRODUCTION:

A large area of Northwest and Central lower Michigan is covered by a deep mantle of sandy glacial drift. Because rivers and streams in this area generally have high gradients, streambank erosion is a serious problem threatening both public and private land. When left uncontrolled, erosion can be a threat to bridges, roads, culverts, utilities and buildings. This erosion and subsequent sedimentation is even more costly considering the damage done to fish and wildlife habitats, water quality, wetland communities and recreational opportunities offered in the area. In addition, communities spend considerable money each year to remove the sediment from their harbors, lakes, and impoundments. Some remediation has been completed in the recent past, especially under the guidance of groups such as the Northwest Michigan RC&D Council, and Soil Conservation Districts. There is still a great deal more that needs to be done.

The need for the Muskegon River Streambank Erosion Inventory began with the Northwest Michigan Streambank Erosion Inventory, which was completed in 1986 by the Northwest Michigan Resource Conservation and Development Council, Inc.. This inventory set the ground work for a study of this magnitude. First recognized, was the importance of the Muskegon river system on the areas tourism industry. Secondly, it was recognized that funding sources for locating and quantifying erosion problems were becoming more scarce. Once the need for this survey was recognized, the first step was to explore a possible funding source. A proposal was submitted for funding under (205 J) the Clean Water Incentives program. In June of 1990 the 205 J funds totaling $42,000.00 along with a match of $40,000.00 by the Soil Conservation Districts allowed the project to begin. A public meeting was held on August 14, 1990 and a steering committee was formed to help in the planning and guidance of the project.

The project was originally expected to last a total of three years. The work schedule was supposed to be:

Year 1. Inventory all tributaries, organize collected data.

Year 2. Inventory Muskegon River, organize collected data.

Year 3. Analyze all data, develop detailed maps showing location, number and severity of erosion sites, publish findings.

However, due to changes in funding this schedule is no longer in effect. Since a change in criteria in the Environmental Protection Agency’s priorities for natural resource/environmental programs, this project was not funded for the second and third years. This has forced the people and agencies involved to do as much of the project in one year as they possibly can.
This report is intended to:

1. Locate, identify, and quantify eroding sites on the Muskegon River and its tributaries.

2. Rank the streams and/or stream reaches by need so that as funds become available, various agencies or interest groups may direct their resources toward the areas most in need.

II. METHODS

The Muskegon River Streambank Erosion Inventory began by:

1. Organizing a photo base to either confirm or eliminate sites immediately.

2. Contact landowners to obtain permission to cross property lines.

3. Organize a steering committee to help in the management of the project.

4. Inform the public through news articles, radio and television interviews, and public meetings.

5. Actual field inventory.

6. Compilation and analyzing of data.

7. Entry onto computer generated resource inventory maps.

INVENTORY PHASE

Infra red Aerial photos (1" = 2000') were used as the photobase for the rivers and streams. These photos were crossed checked with the most recent (1989) fly over aerial slides from the involved counties. Some sites at this juncture were either confirmed or eliminated. Previous inventories, topographic maps, soils maps and citizen knowledge of the stream corridors were used in either adding or reducing the number of possible sites.

Actual field investigation was begun and consisted of the project's coordinator and/or trained technicians or volunteers physically walking the stream corridors or if possible, using canoes to monitor the streambank sites. A data sheet was borrowed from the Northwest Michigan Streambank Erosion Inventory and adapted for this project. The data sheet that was designed identifies site location and provides specific site detail so that an assessment of the sites severity can be made. Initial site investigations involved using a 50'
tape measure to establish reliable parameters. On subsequent inventories estimates were made on site dimensions.

PREPARATION OF INVENTORY MAPS

Final inventory maps were computer generated stream corridor strip maps (scale 1" - 2085') from the Northwest Michigan Council of Government's Geographic Information System, C-Map Program.

SEVERITY INDEX

A severity index was used to make an attempt to rate the erosion severity of some sites relative to the amount of sediment being deposited in the stream. The index was based on a total number of points added from the categories on the data sheet. Points were assigned dependent upon the category and the contribution to erosion to the stream. The higher the points, the more severe the problem. For example:

a. Toe is stable, upper bank eroding - 1 point
b. Toe is undercutting - 3 points
c. Toe and upper bank, both eroding - 5 points

The thinking here is that a bank with a stable toe erodes much less than a bank with the toe undercutting which could cause mass slumping of the bank. A bank that has both the toe, and upper bank eroding could create a situation in which sediment is delivered to the stream at a much greater rate than the previous two. An example of the erosion severity index can be found in the appendix.

TRIBUTARIES WITH NO APPARENT PROBLEMS

The following tributaries do not have field sheets because there was either no apparent nonpoint pollution problems or they were so minor it was not necessary to document them.

1. Appleby Creek 8. Kissiner Creek
2. Burt Creek 9. Lawrence Creek
3. E. Branch of Hersey Creek 10. McKinstry Creek
   and Hersey Creek 11. Norway Creek
4. Grindstone Creek 12. Palmer Creek
5. Indian/Lincoln Creek 13. Sandy Run Creek
6. Jewett Creek 14. Thompson Creek
7. Kenney Creek
OSCEOLA COUNTY

JOHNSON CREEK

Johnson creek is located in Richmond Township (T.17 N-R.10 W). It begins in section 18 and then flows northeastward into sections 7,8,5,4, and 9. It has two small tributaries that innervate with the Johnson; the Knuth and the Hewitt. The Knuth meets the Johnson near the section line of 18 and 7. The Hewitt meets the Johnson in Section 5 near the exit ramp of U.S. 131 south. These eventually flow into the Hersey River in section 9 near the city limits of Reed City.

Section 18 has two sites that were recorded and both were minor. The next section which is section 7 had a total of 11 sites with only one being more than minor. Two of these sites were however, possible non-point source pollution sites.

The next section, section 8 from 230th Ave to U.S.10 is one of the most degraded stretches found on any of the tributaries with a total of 42 sites. Sixteen of these sites are moderate to severe and there are six other sites that are borderline moderate. A total of eight of these are possible non-point source pollution spots.

Sections 5 and 4 from U.S.10 west of U.S.131 to the Hersey River totals nine areas of stream bank erosion of which one is considered moderate to severe in scope. Two of these sites are attributed to the Hewett Creek.

There is one thing very unusual about this river and that is the fact that pipelines cross the river in six different locations.

SHAW CREEK

The Shaw creek is a short tributary leading into the Hersey River. It can be found in Richmond Township (T.17 N-R.10 W), in section 3 where it begins and section 10 where it flows into the Hersey River. A total of twelve sites are eroded, all minor.

BIG STONE CREEK

Big Stone creek is located in two townships of Osceola County; Evart Township (T.17 N-R.8 W) and Hersey Township (T.17 N-R.9 W). It feeds into and out of many small lakes and finally flows into the Muskegon River.

The Big Stone has two arms which come together to form one in section 18 of Evart Township.
The northern most arm originates in Negaunee Lake in section 35 of Evart Township and flows northwest into section 26, 27, 22, and 21 where it runs into Saddle Bag Lake. The creek comes out of Saddle Bag Lake in section 20 and then turns north into section 17 where water emanating from Tiff Lake joins the flow. It is at this point where the creek turns and flows west into Pecks Lake and section 18.

The southern most arm eminates from Lake Miramichi in section 32 of Evart Township. The creek then flows northward into section 29 and Middle and Lower Big Stone Lake. From this point the creek runs north and west into sections 20, 19 and finally section 18.

From section 18 in Evart Township the river moves west into section 13 of Hersey Township where it greets the Proctor Creek. It then moves in a northwest direction into sections 12 and 11 of Hersey Township. The confluence of the Big Stone Creek and the Muskegon River can be found in Section 11.

The northern most arm of the Big Stone has no apparent problems until reaching section 17 and then there is only one eroded spot at a road stream crossing.

The southern most arm has no problems till reaching section 29, and then there are 7 minor sites. There are two minor sites in the next section, section 20. Six minor sites can be found in section 19. The confluence of the two arms can be found in section 18 and there are a total of 10 eroded sites in this section. Three of these spots are considered moderate to severe in their erosion and two are possible non-point source pollution sites.

The Creek flows next into Hersey Township’s section 11 where there can be found 21 sites of which two are moderate to severe. Sections 12 and 11 from 4 mile rd. to the Muskegon River have only 3 sites of minor erosion.

MCKINSTRY CREEK

This creek can be found in sections 7,8, and 17 of Hersey Township(T.17 N-R.9 W). It originates in section 7 just west of 175th Ave. and flows southeast to the Muskegon River. A total of seven locations in the quarter mile stretch of tributary were recorded, of which all were minor in erodability and one was a possible non-point source caused from road salt deposition into the creek.

PROCTOR CREEK

Proctor creek is located in Osceola County’s Hersey Township (T.17 N-R. 9 W). It is a sub tributary of the Muskegon River, first feeding into the Big Stone Creek which feeds directly into the Muskegon. It is approximately a third
of a mile long. It begins in section 36 and flows north into sections 25, 24, and section 13 where it intersects the Big Stone.

Sections 36 and 25 had no apparent problems. In Section 24 there were 6 recorded sites of which all were slight in erosion.

Section 13 to the mouth of the Big Stone creek found 14 stream bank erosion sites. Only one of these sites was considered moderately bad.

**UNNAMED CREEK H-1**

Found in sections 32 and 33 of Hersey Township (T.17 N-R.9 W) of Osceola County the quarter mile stretch of river from Schofield Rd. to the Muskegon River had a total of six eroded sites. Three of these are considered moderate to severely eroded and one spot is a possible non-point source pollution site caused from an old culvert deteriorating in the river. The creek above Schofield Rd was dry and unaffected.

**POLICK CREEK**

This creek is located in Osceola County’s Hersey Township (T.17N.-R.9W.), and spans two sections 27 and 22 before reaching the Muskegon River. Section 22 is where you first encounter any stream bank erosion with a total of 22 sites being recorded. Only one of these sites is more than minor in severity but, there are six sites that may be possible non-point sources due to cattle pasturing next to the creek.

**THESHER CREEK**

Thesher creek, located in sections 8 and 17 of Osceola County’s Herasey Township (T.17 N-R.9 W) had a total of five minor sites in section 17 before reaching the Muskegon River.

**TWIN CREEK**

Twin Creek can be found in Osceola county’s Osceola Township (T.18 N-R.8 W), and Evart Township (T.17 N-R.8 W). The origination point for Twin Creek is in section 18 of Osceola Township. From this point the creek flows southeast into sections 19,20,29,28, and 33 of Osceola and then out into section 3 of Evart Township where it flows through the city of Evart and encounters the Muskegon River.

There are no problems in sections 18 and 19. Sections 20 and 29 from 110th Ave. to 100th Ave. show only two minor sites. There are three sites in section 28 and two of these are possible non-point source pollution causes.
One of these was a possibility of fertilizer runoff, while the other was a possibility of road salt deposition.

THOMPSON CREEK

Thompson Creek can be found in Osceola County in sections 5 and 8 of Evart Township (T.17 N-R.8 W). There are no apparent erosion problems on Thompson Creek but, there are two sites that may be considered possible non-point pollution sources, caused from horses pasturing next to the creek.

HOFFMEYER CREEK

The Hoffmeyer Creek begins in section 10/15 of Osceola Township (T.18 N-R. 8 W) of Osceola County and flows southeastward through sections 14,23 and 24 where it greets the Muskegon River. An arm of the Hoffmeyer starts in section 13 and flows south where it meets the main branch and the two become one in section 24. The Hoffmeyer has just a few erosion problems and these are in section 24 only. There are three sites recorded in section 24. Of these, only one is considered moderate to severe in its erosion, plus this site is a possible non-point source pollution problem due to cattle using the stream.

There is another creek that parallels the Hoffmeyer in Osceola Township; it is the Hoffmeyer in Sylvan Township, (T.17 N-R.7 W), sections 18 and 19. This separate branch of the tributary actually begins in Osceola Township in section 12 and flows southeast through section 13 of Oceola Township and into section 18 of Sylvan. From the point it comes into Sylvan Township the river runs almost due south through section 19 and into the Muskegon River. There were no recorded sites on this stretch of the river.

THORN CREEK

Thorn creek is located in Osceola County in parts of four different Townships. It begins in Evart Township (T.17N-R.8W), and Orient Township (R.17N-R.7W), and continues into Sylvan Township (T.18N-R.7W) and finally it flows into Osceola Township (T.18N-R.8E).

The eastern most arm of the Thorn begins in section 18 of Orient Township in Big Lake and runs west into section 13 of Evart Township. Another arm of the Thorn originates from Wrights Lake, section 24 of Evart Township and flows north into section 13 of Evart Township where it meets the arm coming in from the east. The western most arm of the Thorn starts in section 23 of Evart Township and proceeds north into section 14 and the east into section 13 where it picks up flow from the other two arms. From this point the Thorn moves in a northerly direction into and out of sections 12 and 1 of Evart Township, section 6 of Orient Township, and section 31 of Sylvan Township. In
Osceola township the creek flows northwest through sections 36 and 25 where the confluence of the Muskegon River is found.

Evart Township's portion of the Thorn had the most problems. The middle arm of the Thorn saw four minor erosion site, and four possible non-point source pollution sites where cattle were being pastured by the river in section 24. Ten minor erosion sites, which were also possible non-point source pollution spots caused from cattle using the creek for watering were found in section 13. In section 12, 19 erosion sites were recorded of which two were moderate in severity. Two of these sites are possible non-point source pollution sites due to cattle pasturing next to river. Section one of Evart Township found 14 erosion sites with two eroding at a moderate rate.

From this point at 60th Ave to the Muskegon River there were a total of six recorded sites, five minor and one moderate in severity.

CHIPPEWA CREEK

In Osceola County’s Osceola Township can be found Chippewa Creek. It has two arms both beginning in section 21, and flowing south and southeast to meet in section 28, where the tributary continues to flow southeast into sections 27 and 26 where the confluence of the Chippewa and the Muskegon River can be found. Section 21 has one slight erosion site. Section 27 has two eroded banks with one of these severe in scope. Section 28 also has only one slight erosion site.

DOC AND TOM CREEK

The Doc and Tom Creek is located in Osceola county’s Sylvan Township (T.18N-R.7W). It has two arms that meet in section 22. The southern most arm originates from Mud Lake, section 34 and flows north through and into sections 27 and 22.

The other arm which is the main branch of the tributary begins in Clare County and comes into Osceola County in section 25. It then flows through sections 25, 24, 26, 23, 22, and 21 and into the Muskegon River.

Only two minor erosion sites were found in sections 24, 25, 26 and 23 combined. Section 22 had a total of 24 eroded sites with three being moderate to severe in erodability. In section 21 to the Muskegon River there were two minor sites.

SANDY RUN

Sandy Run creek originates in section 7 of Orient Township (T.17N-R.7W), and flows north through sections 6 and 5 and into Sylvan
Township's (T.18N-R.7W) sections 32,29,20, and 19 where it runs into the Muskegon River.

There were only two erosion sites before you reached section 19. Section 19 recorded 10 erosion sites and two possible non-point source pollution spots, one being possible fertilizer pollution and the other being a garbage pit next to the river.

**INDIAN/LINCOLN CREEK**

Indian creek originates from Indian Lake in section 9 of Cedar Township (T.18N-R.9W) and flows west through sections 8,7,and 18 of Cedar Township and into section 13 of Lincoln Township (T.18N-R.10W) where it feeds into Todd Lake. From this point the creek flows west into and out of Lincoln Lake in sections 24,23,and 14. The creeks name changes here to Lincoln creek and continues westward through sections 23,14,15,22,21,20, and 29 where it flows into the Hersey river.

Indian Creek had a total of three minor sites, all in Cedar township. Lincoln creek was fairly devoid of problems with a total of 5 minor erosion sites. Three of these were in section 21 and the other two were in section 29 of Lincoln Township.

**JEWTET CREEK**

Jewett creek can be found starting in Lincoln Township (T.18N-R.10W) section 31 and moving southeast through section 32, and then into sections 5 and 4 of Richmond Township (T.17N-R.10W) where it flows into the Hersey River.

In section 32 of Lincoln Township was where the major problems occurred, with 10 minor and one moderate erosion sites.

**KINNEY CREEK**

Osceola county's Kinney creek spans two townships, Middle Branch (T.19N-R.7W) and Sylvan (T.18N-R.7W). In Middle Branch township, the creek originates in section 20 and flows southeastward through sections 21, 28, 33, and 34. From this point the creek runs through sections 3, 10, and 15 of Sylvan township where it meets up with the Muskegon River.

The stretch of river from 14 Mile Rd. to 13 Mile Rd. in Middle Branch Township contained 16 minor erosion sites. The next three and a half miles from 13 mile rd. and M66 in Middle Branch Township to the Muskegon River in section 15 in Sylvan Township contained only 6 minor eroded areas.
WHETSTONE/GRINDSTONE CREEK

The Whetstone creek runs through three townships; Hartwick (T.19N-R.8W), Middle Branch (T.19N-R.7W), and Sylvan (T.18N-R.7W). The Grindstone Creek can be found in Middle Branch and Sylvan Townships. These two creeks join together in section 32 of Middle Branch Township.

The Whetstone creek originates in section 14, and continues flowing through sections 13 and 24 of Hartwick Township, sections 19, 30, 29, and 32 of Middle Branch Township, and sections 4,9,10, and 15 of Sylvan township where it runs into the Muskegon River. The Grindstone creek starts in section 31 and flows southeastward through section 32 of Middle Branch Township, and then east through section 5 of sylvan Township where it finally turns north again to meet the Whetstone in section 32 of Middle Branch township.

In section 19 of the Whetstone creek there was only one minor erosion site. The Grindstone in section 31 had two minor sites. In section 32 of Middle Branch Township there was only one problem site and that was at the confluence of the two rivers. The rivers that have now become one showed one moderately and 13 minor eroded banks in section 4 of Sylvan Township. The remainder of the creek from M66 to the Muskegon River contained a total of 11 minor sites and one moderately eroded site.

MIDDLE BRANCH RIVER

The Middle Branch River begins in Hartwick township’s Hicks Lake and Lost Lake in sections 21 and 7, then flows northeast through Hartwick’s sections 16,17,18,7,9,10,3, and 2. The river continues in a northeast direction in Highland township through sections 35,34,26,25, and 24, and then into Marion Township’s section 19,20,17,16, and 21 where it comes into the village of Marion. From this point the river flows in a southerly direction through: Marion Township’s sections 28, 33, and 34, Middle Branch Township’s sections 3,10,11,14,23,24,25,26, and 35, and finally Sylvan Township’s sections 2 and 1 where the confluence of the Middle Branch and Muskegon River occur.

The approximately 6 mile stretch of river in Hartwick township contains a total of six minor eroded areas. In the next stretch of river from 18 mile Rd. to the Marion pond, four minor sites were recorded. From the Marion pond to M66 there were seven minor erosion sites. The area of the river from M66 in section 34 of Marion Township to 20th Ave including all of section 3 and the northeastern tip of section 10 of Middle Branch Township had only 4 sites that were of minor erosion and one of severe erosion. An approximately 3-4 mile stretch of river from 20th Ave. to 14 mile Rd. which includes sections 11, 14, and 23 contains a total of 17 minor and 5 moderate spots of erosion. The area from 14 Mile Rd. to the Muskegon River, about 4-5 miles is the worst stretch of
the river. This stretch which includes sections 25, 26, and 35 of Middle Branch Township, and sections 2 and 1 of Sylvan Township has a total of 41 minor, 12 moderate, and 3 severe erosion sites.

CAT CREEK

Cat creek is located in parts of two townships, Cedar (T.18N-R.9W), and Hersey (T.17N-R.9W). It begins in Cedar Township section 28, and flows south through sections 27, and 34, before entering sections 4, 3, 9, 10, and 15 of Hersey Township. It is in section 15 of Hersey Township where the Cat Creek enters the Muskegon River.

There were a total of 6 minor erosion sites along the four miles from 7 Mile Rd. to the Muskegon river.

KENNEY CREEK

Located in Lincoln Township (T.18N-R.10W), sections 30 and 29, Kenney creek is a tributary that feeds into the Hersey River. This creek is relatively free of problems, with only four minor erosion sites in section 29.

E. BRANCH of HERSEY CREEK and HERSEY CREEK

These two creeks which become one, eventually turn into the Hersey River. The E. Branch of the Hersey Creek begins in section 24 of Leroy Township (T.19N-R.10W) and moves southwest into and out of Leroy Township, sections 25, 26, 27, and 34. From this point the creek moves into Lincoln Township (T.18N-R.10W), and flows through township sections 3, 10, 9, 16, 17, and 20.

Hersey Creek originates in section 4 of Lincoln Township and runs south entering sections 9, 8, 17, and 20, where it joins the E. Branch of the Hersey. From this point the creek becomes the Hersey River.

The Hersey Creek was nearly free from problems, having only three minor sites. The E. Branch of the Hersey Creek had one minor site in section 24 and two minor sites in section 27 of Leroy Township. Lincoln Township had four minor sites total in sections 9, 16, 17, and 20.

HERSEY RIVER

Located in parts of three Townships, Lincoln (T.18N-R.10W), Richmond (T.17N-R.10W), and Hersey (T.17N-R.9W) is the Hersey River. In section 29 of Lincoln Township the Hersey Creek enlarges into the Hersey River. The River, from this point, flows south into; Lincoln Township sections 32, and 33,
Richmond Township sections 4, and 9, where the river makes an southeastward turn into sections 10,15,14,13, and 24, and finally into section 19 of Hersey Township.

In sections 29 and 32 from 8 mile Rd.220th Ave.there was a total of one severe erosion location. The next stretch from 220th Ave. to beyond Lake No-Sho-Mo had 12 erosion sites, of these, two were considered moderate in severity. As the river flows through the city of Reed City, sections 9,10, and 15 of Richmond Township, a total of 11 eroded sites are found. One of these sites is moderate, and another is a severe site. Sections 14,13, and 24 at 180th Ave recorded 12 sites, one which was a moderate site. In section 14 there were three sites that were possible non-point source pollution sites caused from cattle pasturing next to the river. The river in last stretch, section 19 of Hersey Township flows into the Muskegon River. There were 8 eroded sites in this section, only one, however, was more than minor in severity.

NORWAY CREEK

Norway creek is found flowing southwest from Clare County into sections 12 and 11 of Sylvan Township (T.18N-R.7W). This approximately 1 mile stretch of river which flows through some very wet soils had a total of 7 minor erosion sites.

LAWRENCE CREEK

Located in Lincoln Township (T.18N-R.10W) in sections 27 and 33 is the Lawrence creek. In section 33 the creek inerves with the Hersey River. There were a total of three minor erosion sites in this creek.

BURT CREEK

Burt Creek is found in Lincoln Township (T.18N-R.10W), sections 18 and 17 where it flows into the Hersey River. There was one minor erosion site in this creek.

APPLEBY CREEK

This tributary which flows into the Middle Branch river can be found in sections, 13 of Highland Township (T.30N-R.8W), and sections 7,18, and 17 of Marion Township (T.20N-R.7W). One minor erosion site was found on this creek.
KISSINGER CREEK

Located in sections 6, 7, and 8 of Lincoln Township (T.18N-R.10W), is the Kissinger creek. This creek which flows into the Hersey River had three minor erosion sites in its approximately 2 miles length.

MUSKEGON RIVER

The Muskegon river enters Osceola County from Clare County in section 1 of Sylvan Township (T.18N-R.7W). It then flows in a southwest direction through sections 12, 11, 14, 15, 16, 21, 20, and 19 before coming into Osceola Township (T.18N-R.8W), where it continues to flow southwesterly through sections 24, 25, 26, 27, and 34. It is at this point that the river runs through the City of Evart, and Evart Township (T.17N-R.8W) sections 3, 4, 5, 8, and 7. The final stretch of the Muskegon in Osceola county runs through the township of Hersey (T.17N-R.9W), sections 12, 11, 14, 15, 16, 17, 22, 20, 19, 30, 31, and 32 before entering Mecosta County.

It is in Hersey Township section 19 that the Muskegon travels next to and through part of the village of Hersey. There have been some environmental problems in this area, as two leaking underground storage tank spills have occurred within the village, and the Hersey river from Reed City to the Village has had problems with creosote contamination. This later problem has been remediated according to the Department of Natural Resources.

There were 5 minor, 26 moderate, and 2 severely eroded sites in all of Sylvan Township. In Osceola and Evart Townships there were a total of 6 minor, 1 moderate, and 1 severe erosion site along the rivers banks. Seven minor and five moderate erosion areas were all that were found in Hersey Township.

The streambanks of the Muskegon in Osceola County are the worst in the first half of the county. Before reaching the City of Evart, there is much worse erosion occurring than that following Evart. The river is more narrow in the counties upper reaches as well as having a faster current. There are also more, sharper, bends and turns in the upper reaches.

There is a great deal of residential development along the Muskegon in the county, with much of the way having houses next to the river.
OSCEOLA COUNTY

RICHMOND TOWNSHIP
JOHNSON CREEK, SECTIONS: 18, 7, 8, 5, 4, 9

<table>
<thead>
<tr>
<th>Stretch</th>
<th>Length in miles</th>
<th>Minor</th>
<th>Mod</th>
<th>Sev</th>
<th>Total sites</th>
<th>Sites/mile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knuth creek &amp; 3Mi.</td>
<td>1.5</td>
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<td>2</td>
<td>1.33</td>
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<tr>
<td>lakeola Rd.-4Mi.</td>
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<td>32</td>
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RICHMOND TOWNSHIP
SHAW CREEK, SECTIONS: 3, 10

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HERSEY TOWNSHIP
MCKINSTRY CREEK, SECTIONS: 7, 8, 17

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<td>HERSEY TOWNSHIP</td>
<td>THESHER CREEK, SECTIONS: 8,17</td>
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<tr>
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<td>Stretch</td>
<td>Length in miles</td>
<td>Minor</td>
<td>Mod</td>
<td>Sev</td>
<td>Total sites</td>
<td>Sites/mile</td>
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<td>U.S.10-Muskegon River</td>
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<th>POLLICK CREEK, SECTIONS: 22,27</th>
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<th>UNNAMED CREEK, SECTIONS: 32,33</th>
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<td>Stretch</td>
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<td>155th-Muskegon River</td>
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<th>HERSEY TOWNSHIP</th>
<th>PROCTOR CREEK, SECTIONS: 36,25,24,13</th>
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<tr>
<td>Stretch</td>
<td>Length in miles</td>
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<tr>
<td>2 Mi.-Big Stone Creek</td>
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</tr>
<tr>
<td>Stretch</td>
<td>Length in miles</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>Neguane Lake-Saddlebag Lake</td>
<td>2.5</td>
</tr>
<tr>
<td>Saddlebag Lake-Confluence of other arm</td>
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<tr>
<td>Lake Miramichi-Confluence of other arm</td>
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<tr>
<td>Confluence-Muskegon River</td>
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**OSCEOLA TOWNSHIP**

<table>
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<tr>
<th>Stretch</th>
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<th>Sites/mile</th>
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</thead>
<tbody>
<tr>
<td>8 Mi.-Muskegon River</td>
<td>2.5</td>
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16.
### OSCEOLA and EVART TOWNSHIPS
**TWIN CREEK, SECTIONS: 18,19,20,29,28,33,-3**

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<tr>
<th>Stretch</th>
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<th>Sites/mile</th>
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<tbody>
<tr>
<td>Border of Cedar and Osceola Townships-100th</td>
<td>3</td>
<td>2</td>
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<td>2</td>
<td>.67</td>
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<td>100th-Muskegon River</td>
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### OSCEOLA TOWNSHIP
**HOFFMEYER CREEK, SECTIONS: 15,14,23,24,13**

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<tbody>
<tr>
<td>80th-Muskegon River</td>
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### SYLVAN and ORIENT TOWNSHIPS
**SANDY RUN CREEK, SECTIONS: 7,6,5,-32,29,20,19**

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<th>Mod</th>
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<th>Sites/mile</th>
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</thead>
<tbody>
<tr>
<td>5 Mi.-U.S.10</td>
<td>2</td>
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<td>U.S.10-Muskegon River</td>
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### SYLVAN TOWNSHIP
**DOC and TOM CREEK, SECTIONS: 25,24,26,23,34,27,22,21**

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<thead>
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<th>Mod</th>
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</thead>
<tbody>
<tr>
<td>Clareola Rd.-20th</td>
<td>2.5</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
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<td>1.5</td>
<td>18</td>
<td>5</td>
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### SYLVAN TOWNSHIP
**NORWAY CREEK, SECTIONS: 12,11**

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<th>Total sites</th>
<th>Sites/mile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clare Co.-Muskegon River</td>
<td>1.25</td>
<td>7</td>
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<td>5.6</td>
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### EVART, ORIENT, SYLVAN, OSCEOLA, TOWNSHIPS
**THORN CREEK, SECTIONS: 23,24,14,13,12,1,-18,6,-31,-36,25**

<table>
<thead>
<tr>
<th>Stretch</th>
<th>Length in miles</th>
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<th>Mod</th>
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<th>Total sites</th>
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</thead>
<tbody>
<tr>
<td>2 Mi &amp; Wrights Lake &amp; 60th-60th &amp; 6 Mi.</td>
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<td>43</td>
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<tr>
<td>60th-muskegon River</td>
<td>2.25</td>
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### MIDDLE BRANCH and SYLVAN TOWNSHIPS
**KINNEY CREEK, SECTIONS: 20,21,28,33,34,-3,10,15**

<table>
<thead>
<tr>
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<th>Length in miles</th>
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<th>Sites/mile</th>
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</thead>
<tbody>
<tr>
<td>14 Mi.-M66</td>
<td>1.25</td>
<td>15</td>
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<td>15</td>
<td>12</td>
</tr>
<tr>
<td>M66-Muskegon River</td>
<td>3.5</td>
<td>5</td>
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<td>0</td>
<td>5</td>
<td>1.43</td>
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</table>
### HARTWICK, MIDDLE BRANCH, and SYLVAN TOWNSHIPS
**WHETSTONE/GRINDSTONE CREEK, SECTIONS:**
14,13,24,-19,30,29,32,31-5,4,9,10,15

<table>
<thead>
<tr>
<th>Stretch</th>
<th>Length in miles</th>
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</thead>
<tbody>
<tr>
<td>15 Mi.-50th</td>
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<td>1</td>
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<td>0</td>
<td>1</td>
<td>.33</td>
</tr>
<tr>
<td>50th-confluence of Whetstone/Grindstone</td>
<td>4.5</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>.66</td>
</tr>
<tr>
<td>Confluence-Muskegon River</td>
<td>3</td>
<td>28</td>
<td>2</td>
<td>1</td>
<td>31</td>
<td>10.33</td>
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### HARTWICK, HIGHLAND, MARION, MIDDLE BRANCH, and SYLVAN TOWNSHIPS
**MIDDLE BRANCH RIVER, SECTIONS:**
21,7,16,17,18,7,9,10,3,2,-35,34,26,25,24,-19,20,17,16,21,28,33,34,-3,10,11,14,23,24,25,26,35,-2,1

<table>
<thead>
<tr>
<th>Stretch</th>
<th>Length in miles</th>
<th>Minor</th>
<th>Mod</th>
<th>Sev</th>
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<th>Sites/mile</th>
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</thead>
<tbody>
<tr>
<td>Hicks Lake &amp; Lost Lake-18 Mi</td>
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<td>6</td>
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<tr>
<td>18 Mi.-Marion Pond</td>
<td>9</td>
<td>4</td>
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<tr>
<td>Marion Pond-M66</td>
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<td>3.5</td>
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<tr>
<td>M66-20th</td>
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<td>0</td>
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<td>2.28</td>
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<tr>
<td>20th-14 Mi.</td>
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<td>17</td>
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<td>41</td>
<td>12</td>
<td>3</td>
<td>56</td>
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### CEDAR and HERSEY TOWNSHIP
**CAT CREEK, SECTIONS:** 28,27,34,-4,3,9,10,15

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<tr>
<th>Stretch</th>
<th>Length in miles</th>
<th>Minor</th>
<th>Mod</th>
<th>Sev</th>
<th>Total sites</th>
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**LINCOLN TOWNSHIP**
KENNEY CREEK, SECTIONS: 30, 29

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**LEROY and LINCOLN TOWNSHIPS**
E.BRANCH OF HERSEY CREEK and HERSEY CREEK, SECTIONS: 24, 25, 26, 27, 34, -3, 10, 9, 16, 17, 20

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<td>14 Mi.-13 Mi.</td>
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<td>13 Mi.-8 Mi.</td>
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**LINCOLN, RICHMOND, and HERSEY TOWNSHIPS**
HERSEY RIVER, SECTIONS: 29, 32, 33, -4, 9, 10, 15, 14, 13, 24, -19

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**EVART TOWNSHIP**
THOMPSON CREEK, SECTIONS: 5

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LINCOLN and RICHMOND TOWNSHIPS
JEWETT CREEK, SECTIONS: 31,32,-5

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CEDAR and LINCOLN TOWNSHIP
INDIAN/LINCOLN CREEK, SECTIONS: 9,18,13,24,23,14,15,22,21,20,28,29

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OSCEOLA COUNTY, SYLVAN, OSCEOLA, EVART, HERSEY TOWNSHIPS
MUSKEGON RIVER

<table>
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<th>Stretch</th>
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<th>Mod</th>
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<td>80Th Ave. - Mecosta Co. Line</td>
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MUSKEGON RIVER WATERSHED OSCEOLA COUNTY
MAIN BRANCH MUSKEGON RIVER
Index Sheet #1 Maps 1-7
1-1 Muskegon River
12 Mile Road
11 Mile Road

Legend

- Minor Erosion
- Moderate Erosion
- Severe Erosion
- River
- Road
- Drains
- Lakes

MUSKEGON RIVER
STREAMBANK EROSION INVENTORY
June 1991
Sponsored by
Osceola/Lake Soil
Conservation District
Mecosta Soil Conservation
District
Northwest Michigan RC&D
Area Council

Scale: 1" = 2085'
1-4 Muskegon River

Osceola County
T.18N-R.8W & T.17N-R.8W

Legend

MUSKEGON RIVER
STREAMBANK EROSION INVENTORY
June 1991
Sponsored by
Osceola/Lake Soil Conservation District
Mecosta Soil Conservation District
Northwest Michigan RC&D Area Council

Scale: 1" = 2085'

Legend:
- Minor Erosion
- Moderate Erosion
- Severe Erosion
- River
- Road
- Drains
- Lakes
1-6 Muskegon River  Osceola County
T.17N-R.9W

Legend

- Minor Erosion
- Moderate Erosion
- Severe Erosion
- River
- Road
- Drains
- Lakes

MUSKEGON RIVER
STREAMBANK EROSION INVENTORY
June 1991
Sponsored by
Osceola/Lake Soil
Conservation District
Mecosta Soil Conservation
District
Northwest Michigan RC&D
Area Council

Scale: 1' = 2085'
2-1 Middle Branch River  Osceola County
T.20N-R.8W & T.20N-R.7W

Legend

- Minor Erosion
- Moderate Erosion
- Severe Erosion
- River
- Road
- Drains
- Lakes

MUSKEGON RIVER
STREAMBANK EROSION INVENTORY
June 1991
Sponsored by
Osceola/Lake Soil
Conservation District
Mecosta Soil Conservation
District
Northwest Michigan RC&D
Area Council

Scale: 1" = 2085'
2-2 Middle Branch River  Osceola County
T.20N-R.7W & T.19N-R.7W

Legend

Minor Erosion
Moderate Erosion
Severe Erosion
River
Road
Drains
Lakes

MUSKEGON RIVER
STREAMBANK EROSION INVENTORY
June 1991
Sponsored by
Osceola/Lake Soil Conservation District
Mecosta Soil Conservation District
Northwest Michigan RC&D Area Council

Scale: 1" = 2085'
2-3 Middle Branch River  Osceola County
T.19N-R.7W

Legend

- Minor Erosion
- Moderate Erosion
- Severe Erosion
- River
- Road
- Drains
- Lakes

MUSKEGON RIVER
STREAMBANK EROSION INVENTORY
June 1991
Sponsored by
Osceola/Lake Soil Conservation District
Mecosta Soil Conservation District
Northwest Michigan RC&D Area Council

Scale: 1" = 2085'
2-4 Middle Branch River Osceola county
T.19N-R.7W & T.18N-R.7W

Legend

- Minor Erosion
- Moderate Erosion
- Severe Erosion
- River
- Road
- Drains
- Lakes

MUSKEGON RIVER
STREAMBANK EROSION INVENTORY
June 1991
Sponsored by
Osceola/Lake Soil
Conservation District
Mecosta Soil Conservation
District
Northwest Michigan RC&D
Area Council

Scale: 1" = 2085'
MUSKEGON RIVER WATERSHED OSCEOLA COUNTY
WHETSTONE, KINNEY, & DOC & TOM CREEK
Index Sheets #3 Maps 3-4
3-I  Whetstone Creek  Osceola County
T.19N-R.7W & T.18N-R.7W

Legend

MUSKEGON RIVER
STREAMBANK EROSION INVENTORY
June 1991
Sponsored by
Osceola/Lake Soil
Conservation District
Mecosta Soil Conservation
District
Northwest Michigan RC&D
Area Council

Scale: 1" = 2085'
Legend

- Minor Erosion
- Moderate Erosion
- Severe Erosion
- River
- Road
- Drains
- Lakes

MUSKEGON RIVER
STREAMBANK EROSION INVENTORY
June 1991
Sponsored by
Osceola/Lake Soil
Conservation District
Mecosta Soil Conservation
District
Northwest Michigan RC&D
Area Council

Scale: 1" = 2085'
4-4 Thorn Creek  Osceola County
T.17N-R.8W & T.17N-R.7W

Legend

- Minor Erosion
- Moderate Erosion
- Severe Erosion
- River
- Road
- Drains
- Lakes

MUSKEGON RIVER
STREAMBANK EROSION INVENTORY
June 1991
Sponsored by
Osceola/Lake Soil
Conservation District
Mecosta Soil Conservation
District
Northwest Michigan RC&D
Area Council

Scale: 1" = 2085'
MUSKEGON RIVER WATERSHED OSCEOLA COUNTY
CAT, THESHER, UNNAMED, BIG STONE & PROCTOR, POLLICK CREEK
Index Sheet #5, Maps 5-7
5-1 Cat Creek Osceola County

Legend

1. Minor Erosion
2. Moderate Erosion
3. Severe Erosion
4. River
5. Road
6. Drains
7. Lakes

MUSKEGON RIVER
STREAMBANK EROSION INVENTORY
June 1991
Sponsored by
Osceola/Lake Soil Conservation District
Mecosta Soil Conservation District
Northwest Michigan RC&D Area Council

Scale: 1" = 2085'
5-3 Big Stone Creek  Osceola County

T.17N-R.8W

Legend

- Minor Erosion
- Moderate Erosion
- Severe Erosion
- River
- Road
- Drains
- Lakes

MUSKEGON RIVER
STREAMBANK EROSION INVENTORY
June 1991
Sponsored by
Osceola/Lake Soil Conservation District
Mecosta soil Conservation District
Northwest Michigan RC&D Area Council

Scale: 1" = 2085'
MUSKEGON RIVER WATERSHED OSCEOLA COUNTY
HERSEY RIVER, JOHNSON & SHAW CREEK
Index Sheet 6, Maps 6-3
6-2 Hersey River, Johnson Creek, Shaw Creek Osceola County T.17N-R.10W

Legend

- Minor Erosion
- Moderate Erosion
- Severe Erosion
- River
- Road
- Drains
- Lakes

MUSKEGON RIVER STREAMBANK EROSION INVENTORY
June 1991
Sponsored by Osceola/Lake Soil Conservation District
Mecosta Soil Conservation District
Norhtwest Michigan RC&D Area Council

Scale: 1" = 2085'
6-3 Hersey River Osceola County

Legend

- Minor Erosion
- Moderate Erosion
- Severe Erosion
- River
- Road
- Drains
- Lakes

MUSKEGON RIVER STREAMBANK EROSION INVENTORY
June 1991
Sponsored by
Osceola/Lake Soil Conservation District
Mecosta Soil Conservation District
Northwest Michigan RC&D Area Council

Scale: 1" = 2085'
MECOSTA COUNTY

UNNAMED CREEK 1

This creek is located in section 29 of Mecosta Township (T.14N-R.10W). The creek is approximately 1 mile in length, 1-2 feet wide, and less than three inches deep.

There were no apparent problems.

UNNAMED CREEK 2

Located in Mecosta Township (T.14N-R.10W), in sections 30 and 31, this tributary averages 1-2 feet wide and less than a foot deep. The tributary originates in section 30, and the stretch from 7 mile Rd to the Muskegon River in section 31 is where the problems are occurring with 7 sites recorded. Three of these sites are moderate in severity. The damage done here seems to be the result of high water flow as the stream banks are high (50 feet), and steep (1:1 slope).

UNNAMED CREEK 3

This creek is located in Mecosta township (T.14 N-R.10 W), section 1. This creek averages approximately 4 feet wide and 1-2 feet deep. The substrata of the creek bed is sand. There were only 5 sites along the 1 mile stretch, but, the appearance of the creek was one of poor aesthetic quality, with a great deal of trash along the stream banks and debris floating in the creek.

UNNAMED CREEK 4

This creek is also located in Mecosta township (T.14 N-R.10 W), sections 12 and 13. It has two branches that begin near the west side of Northland Drive. These branches meet in the middle of the section and flow as one the rest of the way to the Muskegon. There is very little erosion occurring in this stretch. The amazing thing that was discovered was that a 4 foot waterfall was part of this creek.

UNNAMED CREEK 5

This creek is also found in Mecosta township (T.14 N-R.10 W), section 8 and 16. The stretch of river from 11 Mile Rd. to Elder Rd. was about 2 feet wide on average, and only about 6 inches deep. There were no apparent problems here. From Elder Rd. to the mouth of the Muskegon there were 11 sites, with 2 being considered severe.
COLD SPRING CREEK

Cold Spring creek encompasses two townships; Big Rapids (T.15 N-R.10 W) and Mecosta (T.14 N-R.10 W). It starts in section 29 of Big Rapids and flows southeast into sections 28, 33, and 34 in this township and then section 3, 2, and 11 of Mecosta township where it flows into the Muskegon.

Sections 28 and 33 have possible problems at the 220th and 212th Ave Rd. stream crossings due to sediment deposition from the road being graded. Section 34 in Big Rapids Township has 3 recorded sites, all slight. Cold Spring, in Mecosta township’s section 3 has a total of 7 sites which are all slight. The seventh site is also a possible non-point source site due to cattle grazing along the creek bank. Section 2 from Northland Drive to 11 mile Rd. totals 9 sites, all slight, with the first site being a possible non-point source site from farm animals having direct access to the river. Section 11 from 11 mile Rd. to the mouth of the Muskegon river has a total of three sites, with two being considered moderate.

WINTERS CREEK

This creek is located in Big Rapids township (T.15 N- R. 10 W). One arm originates in section 21, while the other originates in section 28. Section 22 showed the first sign of any erosion taking place. There were a total of 12 sites in the section. Only one of these sites, #12 was considered moderate. From this point the creek flows southeast into section 27 where it meets the other arm. The number of recorded sites in this section was 27, with 11 being moderately bad to severe and seven sites possible non-point source pollution problems. These seven sites include five that are related to farm animals grazing along the creek, and two that may be from residential fertilizer runoff.

The river became more degraded at this point from Northland drive to the Muskegon river. Section 26 had only 5 sites, but the presence of a golf course with the river running through it indicates a possible non-point source of pollution from fertilizer and pesticide use. Section 35 from 13 mile to 190th Ave is about 1/4 mile long and has two minor sites. There are 24 recorded sites in Section 25 and 13 are considered moderate to severe. Of the 16 sites in section 36, 8 are moderately bad or worse. In this section, cattle were observed in the creek.

BUCKHORN CREEK

This creek is located in the northwest part of Mecosta county. It originates in section 5 of Green township and flows southeast across sections 4, 9, and 10 of Green township where it flows into the Muskegon River.
There were no erosion problems other than two road stream crossings that were minor in section 5. This was due in part to the fact that the river bed was dry in section 5 and through part of 4. In the middle of section 4 the river received an influx of water that caused flow to occur again. As the river flowed through section 9 and the Pere Marquette State Forest there were 4 recorded sites, with one being moderate to severe. In section 10 from Northland Drive to the Muskegon River there were three recorded sites, all moderate in severity.

POGY CREEK

This stream begins in Grant township (T.16 N-R.9 W) in section 3 and flows west toward the Muskegon river through sections 3,4, and 5. There are many swamps and low areas. In section 3 and 4 from 140th Ave to Stones Corner Rd, there are a lot of steep slopes and wet areas. There were only 5 recorded sites and all were slight in this section. From Stones Corner Rd. to the Muskegon River, sections 4 and 5, the river basin is fairly flat with few erosion sites.

PALMER CREEK

The Palmer Creek is located in Green Township, sections 24, 23, and 22. The Palmer Creek was a very marshy area at its origin at House lake. Its flow was slow as it wandered toward the Muskegon. There were only two sites that needed to be listed. The only one that really needed to be looked at was at a place where access was not available at the time. The problem, here, was that cattle had access to the river, and this was a possible non-point source pollution problem. From this point to the Muskegon River there were no apparent problems.

PARIS CREEK

Paris creek is located in Green Township’s sections 7, 8, 16, 17, 18, 19, and 20 (T.16 N - R.10 W) and has three arms that come together in section 16.

The main branch of the Paris creek comes into Mecosta county from Newaygo county and flows southeast toward the Muskegon, while the two other arms flow northeastward toward the Paris where they meet in section 16. Section 7 from Newcosta Ave to 230th Ave had 11 recorded sites with 3 being moderate to severe.

Section 16 had a total of 19 erosion sites of which 4 were moderate to severe. One of these sites was a possible non-point source pollution site, caused from cattle using the river and breaking down the banks. The two arms that flow northeast were relatively free from erosion until sections 20 and 17.
The Southern most arm of the Paris creek had a total of 9 erosion sites in section 20, with two being considered possible non-point source pollution sites, due to farm animals using stream. Section 17 had a total of 6 erosion sites with one that was moderate in erosion and five being possible non-point source pollution sites. These were caused from cattle directly accessing the river while the other was from (ORV) traffic crossing the creek. The next arm to the north in section 17 had a total of 4 erosion sites. The main branch of the Paris Creek in section 17 had 4 erosion sites, with two being considered moderate.

**BLODGETT CREEK**

Blodgett creek is located in Grant Township (T.16 N-R.9 W), in sections 11, 10, 15, 9, 20, 17, 16, 8, and 7. It has two fingers. One begins in section 11 and proceeds west to the Muskegon River. The other originates in section 20 and flows north to meet the main branch in section 8. This section was almost entirely swampy with an abundance of mucky soils. No erosion sites were visible here.

Section 11 and 10 from 130th Ave. to 150th Ave. has 10 recorded sites, 7 in section 11, and 3 in section 10. Of these, two sites may be thought of as moderate in their erosion, and one is thought of as a possible non-point source pollution site from cattle grazing next to river. There are three more recorded sites from that point to the Muskegon River, and these are all road stream crossings.

**MITCHELL CREEK**

Mitchell creek is located in the township of Big Rapids (T.15 N-R.10 W). It has two fingers; one originates in the northwest corner of section six near 18 mile Rd. and proceeds southeast through sections 5, 4, 9, 10, 15, and 11, while the other begins in section 8 and flows east through sections 9, 16, 10 and then meets the other finger in section 15. Mitchell creek flows through the city of Big Rapids and into the Muskegon River in section 11.

There are no real problems on Mitchell creek other than some erosion at road stream crossings in sections 6, 5, and 4, until you reach section 9. In section 9 there are 16 eroded sites of which 5 are either moderate to severe in their erosion.

Of the eight sites in section 16 three are either moderate or severe. Sections 10, and 15 from Madison Rd. to Northland Drive has a total of 16 erosion sites, 4 which are either moderate or severe. Three of these sites are possible non-point source pollution sites. Section 11, from Northland drive to the mouth of the Muskegon River has seven minor erosion sites, but there are four possible non-point source pollution sites. These are caused from city
roads crossing the river, plus parking lots next to the river. These sites are examples of urban pollution, which is pollution caused from urban sources such as road salts, oils, greases, metals, and other pollutants that runoff from parking lots and roads.

HIGGONSON CREEK

Higgonson creek begins in Colfax township (T.15 N-R.9 W) and flows west through sections 20 and 19 and into section 24 of Big Rapids township (T.15 N-R.10 W) where it flows into the Muskegon.

Section 19 in Colfax township totals three minor sites. Section 24 in Big Rapids township has 10 recorded sites, three of which are moderate in severity. Four of these sites are possible non-point source pollution locations, with three being possibly caused from residential fertilizer runoff, and one being an (ORV) crossing.

DALZIEL CREEK

The Dalziel Creek is located in the southern 1/3 of Green Township (T.16 N-R. 10 W). The creek has one main branch that runs in an easterly direction toward the Muskegon River. The Dalziel crosses parts of sections 30, 29, 32, 33, 28, and 34 where it meets the Muskegon River.

Section 30 from the Newaygo county line to 230th Ave has four recorded sites, all minor. The problem in this section is that the tributary flows directly through a farm where cattle have direct access to the stream, thus causing a heavy nutrient load. Sections 29 and 32 had 14 sites of minor erosion.

Sections 33 and 28 from 220th ave to Northland Drive totaled 16 sites. Only one of these sites was a moderate erosion site, but there were four possible non-point source pollution places. Three of these were possibly caused from yards that were mowed to the river's edge, while one was a spot where a compost heap was located next to the river.

Section 10 which runs from Northland Drive to the Muskegon River has 10 sites that have been recorded, all of which are minor.

SANDBERG CREEK

Sandberg creek is located in Green Township in sections 2, 3, and 10, (T.16 N-R.10 W). There was no apparent erosion in sections 2 and 3, although the tributary ran through a Christmas tree farm in section 2 so there may be a possible non-point pollution problem. Section 10 has a total of four eroded banks with one being moderately severe.
LADNER CREEK

Ladner Creek is found in Mecosta Township (T.14N-R.10W). It originates in section 5 near 12 Mile Rd and flows southeast into sections 4, 9, 10, and 15 where it enters the Muskegon River.

The topography in these sections is one of gently rolling hills and low swampy areas at the creeks origin to high, steep, hills with many streambank erosion sites as you get closer to the Muskegon River.

The reach of the Ladner in section 5 from 12 mile Rd. to Elder Ave has only 1 site. Section 4 has a total of 16 recorded sites, 3 being moderate from Elder Rd. to 11 mile Rd. A total of 15 erosion sites, 4 moderate and one severe were recorded in section 9. Two moderate sites, and one severe erosion site, were part of the 26 total in section 10 from 210th Ave to 10 mile RD. Section 15 from 10 mile RD. to the Muskegon River contained 22 sites of which two were severe and one moderate in severity.

MACKS CREEK

Macks creek spans two townships, Austin (T.14N-R.9W), and Mecosta (T.14N-R.10W). It begins in sections 20 and 21, and flows through sections 29,30, and 31 of Austin Township, then meanders through sections 25,24,23, and 14 of Mecosta Township where it flows into the Muskegon River.

There appears to be little or no apparent erosion in those sections of Austin Township. There were 19 erosion sites in the stretch of river in section 25 of Mecosta Township, all of these were minor in severity. There was one site in this section where cattle were pastured next to the creek thereby causing a possible non-point source pollution problem.

Sections 24,23, and 14 from 8 mile Rd north to Lincoln Rd. had a total of 37 recorded stream bank erosion sites, sixteen of these are considered moderate and eight severe. This is by far a stretch of tributary that needs to be looked at closely due to the number of sites, the mostly sand banks, and the steepness of many of the slopes.

BENNETT CREEK

In Mecosta Township (T.14N-R.10W), sections 30, 31, and 29, can be found Bennett Creek.

The stream meanders through mostly forested land, and the topography of the area is characterized by fairly steep slopes and moderately high banks. The river ranges from 5-12 feet wide, with an average depth of approximately 2 feet and an increasing flow as it reaches the Muskegon River. Streambank
eroded along the Bennett is slight, even though the slopes were steep and the banks fairly high.

Beginning at Pierce Rd. and flowing to the Muskegon River, a total of 15 erosion sites were recorded, of which 7 were of moderate severity.

MUSKEGON RIVER

The Muskegon River enters Mecosta County in section 5 of Grant Township (T.16N-R.9W) where it flows south then west into and out of sections 8 and 7. It then runs west and south through Green Township (T.16N-R.10W) sections 12, 11, 10, 15, 22, 27, 26, 35, and 34. From this point the river moves in a southerly direction through Big Rapids Township (T.15N-R.10W) sections 3, 10, 11, 14, 23, 24, 25, and 36. Here the Muskegon flows into section 31 of Colfax Township (T.15N-R.9W) before turning back into section 35 of Big Rapids Township. It is in this section that the river flows through the city of Big Rapids. As the river continues to move through the county it now flows along a southwesterly course. From Big Rapids Township the Muskegon now runs through Mecosta Township (T.14N-R.10W) sections 1, 2, 11, 14, 15, 9, 16, 21, 20, 29, 28, 32, and 31, before reaching section 6 of Aetna Township (T.13N-R.10W). It is at this point where the river now enters Newaygo County.

As the Muskegon flows through Mecosta County the character of the river changes from one of a 60 foot wide quickly flowing river with adjacent banks that are fairly flat to one of a slow, wide (200-600 feet) river with high, steep banks. There is a hydroelectric facility located in Mecosta Township at Rogers pond. This facility allows the river to become wide and slow above the dam. The river below the dam is fairly wide with a swift current but quickly becomes slow and very wide and remains this way throughout the rest of the county.

There is a great deal of residential development along the Muskegon, especially in the sections at and above Rogers pond north to Osceola County. This development could be a problem as a possible cause of non point source pollution with fertilizers as most of the lawns were well kept and cut close to the rivers edge.

The river downstream from Rogers pond to Newaygo county meanders through land owned for the most part by Consumers Power Company. There are some small parcels that are privately owned but, these are few.

The sections of the Muskegon in Grant Township (5,8,& 7) contain only two eroded sites, one minor and one moderate in severity. Sections 12,11,& 10 in Green Township have found three minor, two moderate, and one severely eroded sites. In the remainder of Green Township, which includes sections
15, 22, 27, 26, 35 and 34, there were eight eroded areas, four of these being minor and four being moderate in severity.

As the Muskegon moves into and through Big Rapids Township it contacts sections 3, 10, 11, 14, 23, 24, 25, 36, and 35. Section 31 of Colfax Township must be included with the sites in Big Rapids Township. This is because the river runs into this section before turning back to Big Rapids section 35 where it then flows into Mecosta Township. A total of eighteen erosion sites may be found in this stretch of river, 7 of these are minor, 8 moderate, and 3 severely eroded.

Once the Muskegon river leaves Big Rapids Township it flows through sections 1, 2, 11, 14, 15, 16, 9, 21, 20, 29, 28, 32, and 31 of Mecosta Township and section 6 of Aetna Township before it enters Newaygo County. In this stretch of river was found 14 minor, 22 moderate, and 7 severely eroded streambanks. This was by far the worst stretch of river found in either county.
### MECOSTA COUNTY

#### GRANT TOWNSHIP

**BLODGETT CREEK, SECTIONS: 11,10,15,9,8,20,17,16,7**

<table>
<thead>
<tr>
<th>Stretch</th>
<th>Length in miles</th>
<th>Minor</th>
<th>Mod</th>
<th>Sev</th>
<th>Total sites</th>
<th>Sites/mile</th>
</tr>
</thead>
<tbody>
<tr>
<td>130th-22 Mi.</td>
<td>1.25</td>
<td>7</td>
<td>0</td>
<td>0</td>
<td>7</td>
<td>5.6</td>
</tr>
<tr>
<td>22 Mi.-150th</td>
<td>.75</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
<td>5.3</td>
</tr>
<tr>
<td>Oak-165th</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>.3</td>
</tr>
<tr>
<td>150th-Muskegon</td>
<td>2.25</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>.9</td>
</tr>
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</table>

#### GRANT TOWNSHIP

**SANDBERG CREEK, SECTIONS: 2,3,10**

<table>
<thead>
<tr>
<th>Stretch</th>
<th>Length in miles</th>
<th>Minor</th>
<th>Mod</th>
<th>Sev</th>
<th>Total sites</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meceola Rd.-Muskegon River</td>
<td>2</td>
<td>11</td>
<td>1</td>
<td>0</td>
<td>13</td>
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#### MECOSTA TOWNSHIP

**UNNAMED CREEK #2, SECTIONS: 30,31**

<table>
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<tr>
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<th>Minor</th>
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<th>Sev</th>
<th>Total sites</th>
</tr>
</thead>
<tbody>
<tr>
<td>Newcosta Rd.-Muskegon River</td>
<td>1</td>
<td>5</td>
<td>2</td>
<td>0</td>
<td>7</td>
</tr>
</tbody>
</table>
### GREEN TOWNSHIP
PARIS CREEK, SECTIONS: 7,8,19,18,17,20,16,15

<table>
<thead>
<tr>
<th>Stretch</th>
<th>Length in miles</th>
<th>Minor</th>
<th>Mod</th>
<th>Sev</th>
<th>Total sites</th>
</tr>
</thead>
<tbody>
<tr>
<td>Newcosta-230th</td>
<td>1</td>
<td>10</td>
<td>1</td>
<td>0</td>
<td>11</td>
</tr>
<tr>
<td>230th-21 Mi</td>
<td>1</td>
<td>9</td>
<td>0</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>21 Mi-220th</td>
<td>0.33</td>
<td>4</td>
<td>1</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>230th-220th</td>
<td>1</td>
<td>8</td>
<td>1</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>220th-Muskegon River</td>
<td>1.75</td>
<td>11</td>
<td>2</td>
<td>2</td>
<td>15</td>
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### GREEN TOWNSHIP
PALMER CREEK, SECTIONS: 24,23,22

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<th>Mod</th>
<th>Sev</th>
<th>Total sites</th>
<th>Sites/mile</th>
</tr>
</thead>
<tbody>
<tr>
<td>House Lake-Muskegon River</td>
<td>1.5</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>1.3</td>
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### GRANT TOWNSHIP
POGY CREEK, SECTIONS: 3,4,5

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<th>Minor</th>
<th>Mod</th>
<th>Sev</th>
<th>Total sites</th>
</tr>
</thead>
<tbody>
<tr>
<td>140th-Muskegon River</td>
<td>2.5</td>
<td>8</td>
<td>0</td>
<td>0</td>
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### MECOSTA TOWNSHIP
UNNAMED CREEK #3, SECTION: 1

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<thead>
<tr>
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<th>Length in miles</th>
<th>Minor</th>
<th>Mod</th>
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<th>Total sites</th>
<th>Sites/mile</th>
</tr>
</thead>
<tbody>
<tr>
<td>180th-Muskegon River</td>
<td>1.5</td>
<td>4</td>
<td>1</td>
<td>0</td>
<td>5</td>
<td>3.33</td>
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### Mecosta Township
**Unnamed Creek #1, Section: 28**

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<th>Total Sites</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pierce Rd.-Muskegon River</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>6</td>
</tr>
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</table>

### Big Rapids Township
**Winters Creek, Sections: 21, 22, 28, 27, 26, 35, 25, 36**

<table>
<thead>
<tr>
<th>Stretch</th>
<th>Length in miles</th>
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<th>Mod</th>
<th>Sev</th>
<th>Total Sites</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S. 131-14Mi.</td>
<td>2</td>
<td>11</td>
<td>1</td>
<td>0</td>
<td>12</td>
</tr>
<tr>
<td>14Mi.-Northland &amp; 250th-Northland</td>
<td>2</td>
<td>24</td>
<td>4</td>
<td>0</td>
<td>27</td>
</tr>
<tr>
<td>Northland-190th</td>
<td>1</td>
<td>7</td>
<td>4</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>190th-Muskegon River</td>
<td>1.25</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>10</td>
</tr>
</tbody>
</table>

### Green Township
**Dalziel Creek, Sections: 30, 29, 32, 33, 28, 34, 35**

<table>
<thead>
<tr>
<th>Stretch</th>
<th>Length in miles</th>
<th>Minor</th>
<th>Mod</th>
<th>Sev</th>
<th>Total Sites</th>
</tr>
</thead>
<tbody>
<tr>
<td>Newcosta-230th</td>
<td>1</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>230th-220th</td>
<td>1</td>
<td>15</td>
<td>0</td>
<td>0</td>
<td>15</td>
</tr>
<tr>
<td>220th-Northland</td>
<td>1</td>
<td>15</td>
<td>1</td>
<td>0</td>
<td>16</td>
</tr>
<tr>
<td>Northland-Muskegon River</td>
<td>1.25</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>10</td>
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69.
<table>
<thead>
<tr>
<th>Stretch</th>
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<th>Total sites</th>
<th>Sites/mile</th>
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</thead>
<tbody>
<tr>
<td>175th-Muskegon River</td>
<td>1</td>
<td>7</td>
<td>6</td>
<td>1</td>
<td>14</td>
<td>14</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Stretch</th>
<th>Length in miles</th>
<th>Minor</th>
<th>Mod</th>
<th>Sev</th>
<th>Total sites</th>
<th>Sites/mile</th>
</tr>
</thead>
<tbody>
<tr>
<td>RYAN CREEK, SECTIONS: 12,11,10,14,15,9,3,4,5,6,7—12,13,24</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>180th-New Mill Pond Rd.</td>
<td>1.5</td>
<td>13</td>
<td>1</td>
<td>0</td>
<td>14</td>
<td>9.33</td>
</tr>
<tr>
<td>New Mill Pond-Muskegon River</td>
<td>.5</td>
<td>10</td>
<td>2</td>
<td>0</td>
<td>12</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
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</table>

<table>
<thead>
<tr>
<th>Stretch</th>
<th>Length in miles</th>
<th>Minor</th>
<th>Mod</th>
<th>Sev</th>
<th>Total sites</th>
<th>Sites/mile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Osceola/ Mecosta Co. line - Paris Park</td>
<td>5</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>7</td>
<td>1.4</td>
</tr>
<tr>
<td>22 Mile Rd - 17 Mile Rd. &amp; Sawmill Point</td>
<td>4</td>
<td>7</td>
<td>4</td>
<td>0</td>
<td>11</td>
<td>2.75</td>
</tr>
<tr>
<td>17 Mile Rd. &amp; Sawmill Point - Rogers Dam</td>
<td>10</td>
<td>6</td>
<td>10</td>
<td>4</td>
<td>20</td>
<td>2.0</td>
</tr>
<tr>
<td>Rogers Dam - Newaygo Co. Line</td>
<td>10</td>
<td>12</td>
<td>20</td>
<td>6</td>
<td>38</td>
<td>3.8</td>
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</tbody>
</table>
### MECOSTA TOWNSHIP
#### LADNER CREEK, SECTIONS: 5,4,9,10,15

<table>
<thead>
<tr>
<th>Stretch</th>
<th>Length in miles</th>
<th>Minor</th>
<th>Mod</th>
<th>Sev</th>
<th>Total sites</th>
<th>Sites/mile</th>
</tr>
</thead>
<tbody>
<tr>
<td>225th-11 Mi.</td>
<td>1</td>
<td>13</td>
<td>2</td>
<td>1</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>11 Mi.- Muskegon River</td>
<td>1.5</td>
<td>51</td>
<td>6</td>
<td>6</td>
<td>63</td>
<td>42</td>
</tr>
</tbody>
</table>

### MECOSTA TOWNSHIP
#### BENNETT CREEK, SECTIONS: 29,30,31

<table>
<thead>
<tr>
<th>Stretch</th>
<th>Length in miles</th>
<th>Minor</th>
<th>Mod</th>
<th>Sev</th>
<th>Total sites</th>
<th>Sites/mile</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 mi.-Muskegon River</td>
<td>1.25</td>
<td>8</td>
<td>7</td>
<td>0</td>
<td>15</td>
<td>13.04</td>
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</table>

### MECOSTA TOWNSHIP
#### MACKS CREEK, SECTIONS: 36,25,24,23,14

<table>
<thead>
<tr>
<th>Stretch</th>
<th>Length in miles</th>
<th>Minor</th>
<th>Mod</th>
<th>Sev</th>
<th>Total sites</th>
</tr>
</thead>
<tbody>
<tr>
<td>7 Mi.-8 Mi.&amp; Fillmore-8 Mi.</td>
<td>2</td>
<td>19</td>
<td>0</td>
<td>0</td>
<td>19</td>
</tr>
<tr>
<td>8 Mi.- Muskegon River</td>
<td>2.25</td>
<td>15</td>
<td>16</td>
<td>8</td>
<td>38</td>
</tr>
</tbody>
</table>

### BIG RAPIDS TOWNSHIP
#### MITCHELL CREEK, SECTIONS: 6,5,4,9,8,16,10,15,11

<table>
<thead>
<tr>
<th>Stretch</th>
<th>Length in miles</th>
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<th>Mod</th>
<th>Sev</th>
<th>Total sites</th>
<th>Sites/mile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Newcosta-Madison</td>
<td>3</td>
<td>15</td>
<td>2</td>
<td>1</td>
<td>18</td>
<td>6</td>
</tr>
<tr>
<td>Madison-Muskegon River</td>
<td>1.25</td>
<td>23</td>
<td>6</td>
<td>3</td>
<td>32</td>
<td>25.6</td>
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</table>
### Mecosta Township

**Unnamed Creek #4, Sections: 12, 13**

<table>
<thead>
<tr>
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<th>Minor</th>
<th>Mod</th>
<th>Sev</th>
<th>Total sites</th>
<th>Sites/mile</th>
</tr>
</thead>
<tbody>
<tr>
<td>180th-Muskegon River</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
<td>4</td>
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</table>

**Unnamed Creek #5, Sections: 8, 16**

<table>
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<tr>
<th>Stretch</th>
<th>Length in miles</th>
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<th>Mod</th>
<th>Sev</th>
<th>Total sites</th>
<th>Sites/mile</th>
</tr>
</thead>
<tbody>
<tr>
<td>11Mi-Muskegon River</td>
<td>1.5</td>
<td>2</td>
<td>6</td>
<td>3</td>
<td>11</td>
<td>7.33</td>
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</table>

### Big Rapids and Mecosta Township

**Cold Spring Creek, Sections: 29, 28, 33, 34, 2, 11**

<table>
<thead>
<tr>
<th>Stretch</th>
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<th>Minor</th>
<th>Mod</th>
<th>Sev</th>
<th>Total sites</th>
<th>Sites/mile</th>
</tr>
</thead>
<tbody>
<tr>
<td>220th-Northland</td>
<td>3</td>
<td>12</td>
<td>0</td>
<td>0</td>
<td>12</td>
<td>4</td>
</tr>
<tr>
<td>Northland-Muskegon River</td>
<td>1</td>
<td>15</td>
<td>0</td>
<td>0</td>
<td>15</td>
<td>15</td>
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</tbody>
</table>

### Green Township

**Buckhorn Creek, Sections: 5, 4, 9, 10**

<table>
<thead>
<tr>
<th>Stretch</th>
<th>Length in miles</th>
<th>Minor</th>
<th>Mod</th>
<th>Sev</th>
<th>Total sites</th>
<th>Sites/mile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meceola Rd-Muskegon River</td>
<td>2.75</td>
<td>5</td>
<td>3</td>
<td>0</td>
<td>9</td>
<td>3.27</td>
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</tbody>
</table>
1-3 Paris Creek  
Mecosta County  
T.16N-R.10W

LEGEND

Muskegon River  
Streambank Erosion Inventory  
June 1991  
Sponsored by  
Osceola/Lake Soil Conservation District  
Mecosta Soil Conservation District  
Norwest Michigan RC&D Area Council

Scale: 1" = 2085'

76.
1-4 Dalziel Creek  Mecosta County

Legend

- Minor Erosion
- Moderate Erosion
- Severe Erosion
- River
- Road
- Drains
- Lakes

Muskegon River
Streambank Erosion Inventory
June 1991
Sponsored by
Osceola/Lake Soil Conservation District
Mecosta Soil Conservation District
Northwest Michigan RC&D Area Council

Scale: 1" = 2085'
2-1 Winters Creek

Legend

- Minor Erosion
- Moderate Erosion
- Severe Erosion
- River
- Road
- Drains
- Lakes

Mecosta County
T.15N-R.10W

MUSKEGON RIVER

STREAMBANK EROSION INVENTORY
June 1991
Sponsored by
Osceola/Lake Soil Conservation District
Mecosta Soil Conservation District
Northwest Michigan RC&D Area Council

Scale: 1" = 2085'
3-2 Macks Creek
Mecosta County

Legend

- Minor Erosion
- Moderate Erosion
- Severe Erosion
- River
- Road
- Drains
- Lakes

MUSKEGON RIVER
STREAMBANK EROSION INVENTORY
June 1991
Sponsored by
Osceola/Lake Soil
Conservation District
Mecosta Soil Conservation
District
Northwest Michigan RC&D
Area Council

Scale: 1" = 2085'
4-1 Muskegon River

Legend

- Minor Erosion
- Moderate Erosion
- Severe Erosion
- River
- Road
- Drains
- Lakes

MUSKEGON RIVER
STREAMBANK EROSION INVENTORY
June 1991
Sponsored by
Osceola/Lake Soil Conservation District
Mecosta Soil Conservation District
Northwest Michigan RC&D Area Council

Scale: 1" = 2085'
4-3  Muskegon River  Mecosta County
T.16N-R.10W & T.15N-R.10W

Legend

- Minor Erosion
- Moderate Erosion
- Severe Erosion
- River
- Road
- Drains
- Lakes

MUSKEGON RIVER
STREAMBANK EROSION INVENTORY
June 1991
Sponsored by
Osceola/Lake Soil Conservation District
Mecosta Soil Conservation District
Northwest Michigan RC&D Area Council

Scale: 1" = 2085'