FINAL PROJECT REPORT

Volunteer monitoring for water quality improvement in the Macatawa Watershed

VSM2012-02

Macatawa Area Coordinating Council
301 Douglas Ave
Holland MI 49424
616-395-2688
www.the-macc.org

Project Goals

1. Establish a long-term volunteer stream monitoring program to assess water quality trends over time in the Macatawa Watershed
2. Achieve a solid stream quality data set for the Macatawa Watershed

Project Objectives

1. Develop a Quality Assurance Project Plan (QAPP)
2. Host a meeting of the volunteer stream monitoring work group
3. Acquire the needed sampling supplies and equipment
4. Arrange and complete a "side-by-side" sampling session with MiCorps staff
5. Attend Annual MiCorps Conference
6. Prepare for and conduct monitoring events in Spring and Fall of each year
7. Conduct periodic surveys of team leaders and volunteers
8. Enter all habitat and macroinvertebrate data into MiCorps online database
9. Submit quarterly status reports and Financial Status Reports
10. Submit a final report, release of claims letter, a fact sheet, a final Financial Status Report

The first project goal has been successfully accomplished. The Macatawa Area Coordinating Council (MACC) and the Outdoor Discovery Center Macatawa Greenway (OCDMG) were able to effectively use grant resources to purchase equipment and train staff and volunteers. This will enable us to continue the program well into the future and develop a long-term water quality dataset for streams in the Macatawa Watershed, which is the first step toward achieving our second named goal.

All project objectives were completed successfully and on time as outlined in the project timetable in spite of a slightly delayed start due to a change in MACC staff responsible for implementing the grant. The QAPP was developed and approved by the end of the second quarter of the grant, as well as a meeting of the project work group and a side-by-side sampling session with MiCorps staff, which allowed for successful completion of our first volunteer sampling event in the fall of 2012. Four volunteer sampling events were successfully completed within the parameters of the QAPP in the spring and fall of each year of the grant. Periodic surveys were conducted of team leaders and volunteers, and results were included in the quarterly reports. All data was promptly entered into the MiCorps database after the completion of each sampling event. All quarterly reports were submitted on time.

Overall, no significant barriers to success were encountered and no challenges or obstacles were identified that could not be resolved. Community volunteer recruitment was marginally successful, though we did not establish goals for volunteer recruitment so it is difficult to measure. Despite the low number of community volunteers, we were able to successfully complete monitoring events due to existing staff, interns, existing volunteers, and school groups. Having a small number of monitoring sites (7) also reduced the need for a high level of volunteer recruitment. One potential barrier to a successful collection occurred in the fall of 2013 when river levels were low. At several sites, water was stagnant

and portions of the sampling reach were dry. However, volunteers were still able to collect a good number of macroinvertebrates at these locations, and results were similar to the previous fall. Anecdotally we can report that low water levels have minimal impact on sampling success.

A volunteer training event was not held independently of the sampling events. MACC and ODCMG staff was previously trained during the startup grant in 2011. These trained staff then trained additional team leaders from the MACC and ODCMG. Each team leader provided on-site volunteer training prior to each sampling event. Seven monitoring sites were each sampled four times throughout the course of the grant. One monitoring site was incorrectly sampled (confluence of 2 streams and the wrong one was sampled) at the first event in the fall of 2012, so there is only data for three events for that site (Site 6). Sampling events occurred in October 2012 (20 volunteers), June 2013 (15 volunteers), September 2013 (46 volunteers, higher due to high school participation), and May 2014 (8 volunteers). Overall, there were 10 volunteers that participated in multiple events.

One important benefit of this project was increased public awareness of water quality issues in the Macatawa Watershed and methods to assess water quality. This was especially apparent with the interest of school groups participating in the program. There were additional school groups that participated in mock events that were not recorded in the official monitoring database but provided them a hands-on learning experience. Public awareness was also increased through reporting of monitoring results in MACC newsletters and e-news.

As part of a school internship program, a high school senior from West Ottawa High School worked with the MACC for a semester. One project that he completed was the development of a tri-fold brochure that explains macroinvertebrates and our monitoring program. This will be a key educational handout that will be provided at numerous community events each year. The MACC often sets up a watershed display at community events, and when possible includes a tray of live macroinvertebrates. The live organisms are a great catalyst for conversation about water quality, and many individuals have requested information to take home, which up until now we have not been able to provide.

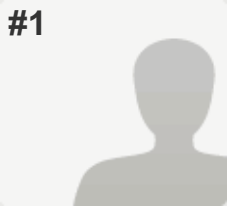
In order to evaluate the effectiveness of the monitoring program, the MACC periodically completed surveys of team leaders and volunteers. During the two year grant period, two surveys each were completed by volunteers and team leaders. Overall, the survey results were very positive, but we did learn ways to improve the program including better communication with volunteers. Results of the two leader surveys and the first volunteer survey were provided in previous quarterly reports. A copy of the volunteer survey results collected for the spring 2014 sampling events are found in Attachment 1.

The primary partner that participated in the grant was the Outdoor Discovery Center Macatawa Greenway (ODMCG). ODCMG did receive grant funds for staffing costs and equipment purchases, but also provided additional staff time and equipment as match. Additionally, they maintain and store the equipment and insect collections at their facility as well as host the insect identification portion of the sampling events. A secondary partner was DeGraaf Nature Center. Staff at DeGraaf adopted one of the locations and participated in collection and identification events.

As part of the grant, the following products were completed or developed: a Quality Assurance Project Plan (QAPP), newsletter articles, surveys of volunteers and leaders, an informational tri-fold brochure, and a binder for each sampling site that provides maps, directions and other references. The QAPP and surveys were previously submitted. Included in attachments are copies of newsletter articles (Attachment 2) and the tri-fold brochure (Attachment 3). The site binders include the following information: a map of all 7 sampling locations, a map and directions specific to that particular site, drawings of the site from the previous two sampling events, site access notes, cell phone numbers for program managers, an equipment list, the sampling protocol, macroinvertebrate keys, and a zipper pouch with pencils, pens and sharpies. An example from site 7, North Branch at Van Raalte Farm, is included in Attachment 4. Photographs representing each of the sampling events and some identification events are also attached (Attachment 5).

The MACC and ODCMG intend to continue the volunteer monitoring program biannually at the 7 sampling locations indefinitely. Expenses to maintain the program, including staff costs and equipment, will be worked into each organization's annual budget. If expenses to maintain the program and program equipment exceed budget capacities, then donations and sponsorships will be sought from the local community. Other local fund raising efforts, most recently Project Clarity, has demonstrated that the local community is generous and willing to support efforts related to monitoring and improving water quality. One outreach and education component that was not completed during the course of the grant is to post information about macroinvertebrates and the monitoring program on our website. The MACC's website will be updated to a new platform this summer and the macroinvertebrate information will be added. The website will serve as a tool to recruit volunteers and to share results of monitoring events to the public.

MiCorps Volunteer Survey



COMPLETE

Collector: Web Link (Web Link)
Started: Monday, June 02, 2014 5:53:10 AM
Last Modified: Monday, June 02, 2014 6:01:23 AM
Time Spent: 00:08:13
IP Address: 198.110.182.21

PAGE 1

Q1: Indicate the date and location where you have participated in the Macatawa Watershed's Volunteer Monitoring Program

5/27 Adams st landing & 46th street

Q2: How did you become aware of this event?

Organizational event. Became aware via the MACC and Outdoor Discovery Center

Q3: Was the sampling date, time and location clearly communicated to you in a timely fashion?	Yes
Q4: Did the team leader provide a training session prior to sampling?	Yes
Q5: Was the training documentation provided adequate to understand the sampling methods?	Yes
Q6: Was the training time (prior to sampling) adequate to understand the sampling methods?	Yes
Q7: Was the equipment provided adequate to conduct sampling?	Yes
Q8: Did you feel the training session properly prepared you to conduct the sampling?	Yes
Q9: Were there enough volunteers to adequately complete sampling?	Yes
Q10: Were there too many volunteers to manage efficiently?	No

Q11: What was the most difficult or challenging task or concept to understand during the sampling event?

Collecting enough samples in the given time frame

Q12: Were there any areas of the stream you felt were not adequately sampled?	No

Q13: What should be done differently during the next sampling event?

To have multiple netters to keep the sample size large

Q14: **Are you interested in participating in future sampling events?**	Yes
Q15: **Did you participate in the insect identification event?**	Yes (Answer questions 16 - 20)
Q16: **Did the instructor explain identification procedures adequately?**	Yes
Q17: **Did the instructor explain how to complete the survey forms?**	Yes
Q18: **Were the materials provided helpful in insect identification?**	Yes
Q19: **How do you feel about the identification work you did?**	Very confident
Q20: **Are you interested in participating in another insect identification event?**	Yes

#2

COMPLETE

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PAGE 1

Q1: Indicate the date and location where you have participated in the Macatawa Watershed's Volunteer Monitoring Program	*Respondent skipped this question*
Q2: How did you become aware of this event?	*Respondent skipped this question*
Q3: **Was the sampling date, time and location clearly communicated to you in a timely fashion?**	Yes
Q4: **Did the team leader provide a training session prior to sampling?**	Yes
Q5: **Was the training documentation provided adequate to understand the sampling methods?**	Yes
Q6: **Was the training time (prior to sampling) adequate to understand the sampling methods?**	Yes
Q7: **Was the equipment provided adequate to conduct sampling?**	Yes
Q8: **Did you feel the training session properly prepared you to conduct the sampling?**	Yes
Q9: **Were there enough volunteers to adequately complete sampling?**	Yes
Q10: **Were there too many volunteers to manage efficiently?**	No
Q11: What was the most difficult or challenging task or concept to understand during the sampling event?	*Respondent skipped this question*
Q12: **Were there any areas of the stream you felt were not adequately sampled?**	No
Q13: What should be done differently during the next sampling event?	*Respondent skipped this question*
Q14: **Are you interested in participating in future sampling events?**	Yes

Q15: Did you participate in the insect identification event?	Yes (Answer questions 16 - 20)
Q16: Did the instructor explain identification procedures adequately?	Yes
Q17: Did the instructor explain how to complete the survey forms?	Yes
Q18: Were the materials provided helpful in insect identification?	Yes
Q19: How do you feel about the identification work you did?	Somewhat confident
Q20: Are you interested in participating in another insect identification event?	Yes

#3

COMPLETE

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Time Spent: 00:02:21
IP Address: 198.110.182.15

PAGE 1

Q1: Indicate the date and location where you have participated in the Macatawa Watershed's Volunteer Monitoring Program

5-27-14 poppen woods, upper mac

Q2: How did you become aware of this event?

ODC

Q3: Was the sampling date, time and location clearly communicated to you in a timely fashion?	Yes
Q4: Did the team leader provide a training session prior to sampling?	Yes
Q5: Was the training documentation provided adequate to understand the sampling methods?	Yes
Q6: Was the training time (prior to sampling) adequate to understand the sampling methods?	Yes
Q7: Was the equipment provided adequate to conduct sampling?	Yes
Q8: Did you feel the training session properly prepared you to conduct the sampling?	Yes
Q9: Were there enough volunteers to adequately complete sampling?	Yes
Q10: Were there too many volunteers to manage efficiently?	No
Q11: What was the most difficult or challenging task or concept to understand during the sampling event?	*Respondent skipped this question*
Q12: Were there any areas of the stream you felt were not adequately sampled?	No
Q13: What should be done differently during the next sampling event?	*Respondent skipped this question*
Q14: Are you interested in participating in future sampling events?	Yes

Q15: Did you participate in the insect identification event?	Yes (Answer questions 16 - 20)
Q16: Did the instructor explain identification procedures adequately?	Yes
Q17: Did the instructor explain how to complete the survey forms?	Yes
Q18: Were the materials provided helpful in insect identification?	Yes
Q19: How do you feel about the identification work you did?	Somewhat confident
Q20: Are you interested in participating in another insect identification event?	Yes

#4

COMPLETE

Collector: Web Link (Web Link)
Started: Tuesday, June 03, 2014 8:21:37 AM
Last Modified: Tuesday, June 03, 2014 8:27:54 AM
Time Spent: 00:06:17
IP Address: 148.61.53.9

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Q1: Indicate the date and location where you have participated in the Macatawa Watershed's Volunteer Monitoring Program

Tuesday, June 27, 2014
Upper Mac and Poppen Woods

Q2: How did you become aware of this event?

I volunteer/intern with The Outdoor Discovery Center

Q3: Was the sampling date, time and location clearly communicated to you in a timely fashion?	No
Q4: Did the team leader provide a training session prior to sampling?	No
Q5: Was the training documentation provided adequate to understand the sampling methods?	No
Q6: Was the training time (prior to sampling) adequate to understand the sampling methods?	No
Q7: Was the equipment provided adequate to conduct sampling?	Yes
Q8: Did you feel the training session properly prepared you to conduct the sampling?	Yes
Q9: Were there enough volunteers to adequately complete sampling?	Yes
Q10: Were there too many volunteers to manage efficiently?	Yes

Q11: What was the most difficult or challenging task or concept to understand during the sampling event?

I did not know we were doing macro sampling until I showed up so I was surprised that the even was happening with the MACC. I have done it before in ecology class and volunteering with WMEAC so I didn't find it difficult, but I was not informed of the protocalls or expectations for this sampling day so I felt unsure about myself

Q12: Were there any areas of the stream you felt were not adequately sampled?	No

Q13: What should be done differently during the next sampling event?

I would have like to look over the forms and known the expectations before hand.

Q14: Are you interested in participating in future sampling events?	Yes
Q15: Did you participate in the insect identification event?	Yes (Answer questions 16 - 20)
Q16: Did the instructor explain identification procedures adequately?	Yes
Q17: Did the instructor explain how to complete the survey forms?	Yes
Q18: Were the materials provided helpful in insect identification?	Yes
Q19: How do you feel about the identification work you did?	Very confident
Q20: Are you interested in participating in another insect identification event?	Yes

#5

COMPLETE

Collector: Web Link (Web Link)
Started: Wednesday, June 04, 2014 7:07:56 PM
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Time Spent: 00:12:12
IP Address: 76.221.213.213

PAGE 1

Q1: Indicate the date and location where you have participated in the Macatawa Watershed's Volunteer Monitoring Program

Macro Sample at Greenspace Park and Stu Visser Park

Q2: How did you become aware of this event?

meeting announcement

Q3: Was the sampling date, time and location clearly communicated to you in a timely fashion?	Yes
Q4: Did the team leader provide a training session prior to sampling?	Yes
Q5: Was the training documentation provided adequate to understand the sampling methods?	Yes
Q6: Was the training time (prior to sampling) adequate to understand the sampling methods?	Yes
Q7: Was the equipment provided adequate to conduct sampling?	Yes
Q8: Did you feel the training session properly prepared you to conduct the sampling?	Yes
Q9: Were there enough volunteers to adequately complete sampling?	Yes
Q10: Were there too many volunteers to manage efficiently?	No

Q11: What was the most difficult or challenging task or concept to understand during the sampling event?

just difficulty in wading in deeper water with soft bottom

Q12: Were there any areas of the stream you felt were not adequately sampled?	No
Q13: What should be done differently during the next sampling event?	*Respondent skipped this question*

Q14: **Are you interested in participating in future sampling events?**	Yes
Q15: **Did you participate in the insect identification event?**	Yes (Answer questions 16 - 20)
Q16: **Did the instructor explain identification procedures adequately?**	Yes
Q17: **Did the instructor explain how to complete the survey forms?**	Yes
Q18: **Were the materials provided helpful in insect identification?**	Yes
Q19: **How do you feel about the identification work you did?**	Very confident
Q20: **Are you interested in participating in another insect identification event?**	Yes

#6

COMPLETE

Collector: Web Link (Web Link)
Started: Wednesday, June 11, 2014 7:20:33 AM
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Time Spent: 00:02:20
IP Address: 198.110.182.134

PAGE 1

Q1: Indicate the date and location where you have participated in the Macatawa Watershed's Volunteer Monitoring Program

May 27, 2014, Upper Mac and Poppen Woods

Q2: How did you become aware of this event?

training and co-sponsor of event

Q3: Was the sampling date, time and location clearly communicated to you in a timely fashion?	Yes
Q4: Did the team leader provide a training session prior to sampling?	No
Q5: Was the training documentation provided adequate to understand the sampling methods?	Yes
Q6: Was the training time (prior to sampling) adequate to understand the sampling methods?	Yes
Q7: Was the equipment provided adequate to conduct sampling?	Yes
Q8: Did you feel the training session properly prepared you to conduct the sampling?	Yes
Q9: Were there enough volunteers to adequately complete sampling?	Yes
Q10: Were there too many volunteers to manage efficiently?	No
Q11: What was the most difficult or challenging task or concept to understand during the sampling event?	*Respondent skipped this question*
Q12: Were there any areas of the stream you felt were not adequately sampled?	No

Q13: What should be done differently during the next sampling event?

nothing

Q14: **Are you interested in participating in future sampling events?**	Yes
Q15: **Did you participate in the insect identification event?**	Yes (Answer questions 16 - 20)
Q16: **Did the instructor explain identification procedures adequately?**	Yes
Q17: **Did the instructor explain how to complete the survey forms?**	Yes
Q18: **Were the materials provided helpful in insect identification?**	Yes
Q19: **How do you feel about the identification work you did?**	Very confident
Q20: **Are you interested in participating in another insect identification event?**	Yes

Cover Crop Plot (cont)

farmers. Nitrogen fertilizer is synthesized from natural gas and accounts for over 26% of the energy consumed by agriculture in the USA (CRS Report for Congress, Energy Use in Agriculture, 2004).

MACC and the Allegan Conservation District, in cooperation with the Michigan Cover Crop Initiative and the Great Lakes Restoration Initiative, have established a demonstration plot of 26 cover crops and blends north of Hamilton on 47th Street between 137th and 139th Avenues. It is open during daylight hours for self guided tours. Small signs identify each bed, and a list of the species present is available on site. It will remain open through October. This is private property, so please be a good guest if you visit. Would you like to incorporate cover crops into your operation? Please contact Mark Ludwig at 616-240-7135 for more information.

Buckwheat

Photos by: Mark Ludwig

Sudangrass

Volunteer Stream Monitoring is Underway!

The Macatawa Watershed Project and the Outdoor Discovery Center Macatawa Greenway (ODCMG) are partnering on a grant to establish a volunteer stream monitoring program in the Macatawa Watershed. The grant, from the Michigan Clean Water Corps (MiCorps), provides funding for the purchase of equipment and staff time to recruit volunteers and establish a long-term program for monitoring macroinvertebrate populations in the streams in the Macatawa Watershed. Monitoring will occur at seven sites in the watershed twice a year: in the spring and fall. Volunteers will spend time at each site collecting macroinvertebrates (aquatic insects), then samples are taken back to the ODCMG for later identification and sorting. The results are tallied into a stream quality score. In addition to monitoring the macroinvertebrate populations, stream habitat will also be assessed once a year. During early October, 2012, the first sample collections took place. Stream quality scores have not been tallied yet, but when they are, data will be posted on the MACC website. If you are interested in assisting with this volunteer effort, please contact Kelly at the MACC office: 616-395-2688 or kgoward@the-macc.org

Volunteers "picking" at Adams Street Landing
Photo by: Kelly Goward


Lake Macatawa sunrise, 11/27/2012

Hope College Students Present Water Quality Research Projects

Two groups of students from the Hope College Advanced Environmental Seminar, taught by Dr. Edward Hansen, presented the results of their semester-long research projects at the Watershed Advisory Committee meeting on December 6, 2012. Eric Greve, Nyun Hein and Laurie Stubenrauch presented results of research on the uptake of phosphorus and iron in duckweed, a small, green plant that grows in still water. In particular, they wondered if duckweed could be used to remove excess phosphorus from Lake Macatawa and help improve water quality. The results showed that duckweed absorbed iron rapidly, but a similar conclusion could not be reached about phosphorus without further study. Kyle Falk and Kelly Petrasky presented results of research on pharmaceutical concentrations in plants irrigated with brown water. They were interested in knowing if plants remove pharmaceuticals from wastewater and metabolize them, and could potentially be used in the wastewater treatment process. Most pharmaceuticals, including both prescription and over the counter products, are not removed during wastewater treatment. (Many products we ingest are not fully absorbed by our system and are excreted unchanged!) They can be a problem in the environment as certain products may negatively impact the development and reproductive capabilities of aquatic organisms, such as fish and frogs, and the animals that eat them. The research results indicated that plants did absorb certain pharmaceuticals, but further research is needed to determine if pharmaceuticals are metabolized by the plant or lost in runoff. Both research teams acknowledged the difficulties in working with plants and the need for further study. Contact Kelly Goward at the MACC for more information about the student research results.


Pictured left to right: Dr. Edward Hansen, Kyle Falk, Kelly Petrasky, Eric Greve, Laurie Stubenrauch, and Nyun Hein.

Volunteer Stream Monitoring Results

The first sampling event of the Macatawa Volunteer Stream Monitoring Program occurred in early October, 2012. Volunteers included representatives from the MACC, Outdoor Discovery Center Macatawa Greenway, DeGraff Nature Center, ERM, MDEQ, the Ottawa Conservation District, and other community partners. A smaller sub-group of volunteers met at the ODCMG in mid October to identify the macroinvertebrates that were collected and calculate water quality scores. Scores are summarized in the table at the right. The next monitoring event will occur in Spring 2013. If you are interested in assisting with this volunteer effort, please contact Kelly at the MACC office: 616-395-2688 or kgoward@the-macc.org

Site Name	Water Quality Score
Stu Visser Trails (Pine Cr)	29 (fair)
Macatawa Greenspace (Noordeloos Cr)	29 (fair)
Upper Macatawa Natural Area (Upper Macatawa)	20 (fair)
Poppen Woods (Peters Cr)	33 (fair)
Winding Creek Golf Course (South Branch)	10 (poor)
Adams Street Landing (North Branch)	35 (good)
Van Raalte Farm (North Branch)	32 (fair)


Gilligan Lake, Laketown Township

Macroinvertebrate Monitoring Report

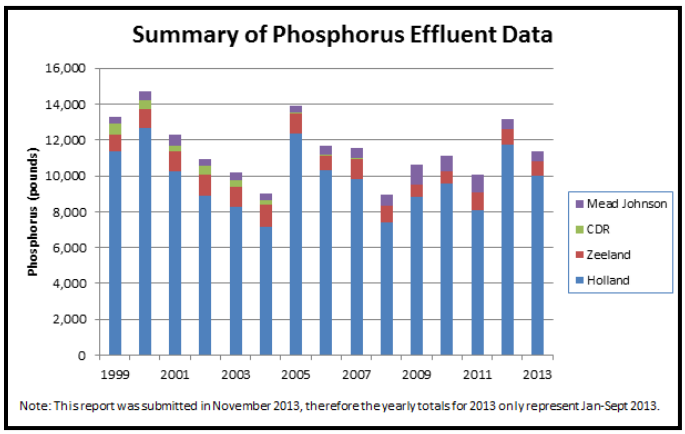
Twice a year in the spring and fall, the MACC and the Outdoor Discovery Center Macatawa Greenway organize a stream health monitoring program currently funded through MiCorps. The Macatawa Watershed began its program in October 2012 and just finished its third sampling this past September. Seven locations within the watershed are sampled including Pine Creek, Noordelos Creek, the Upper Macatawa, Peters Creek, the Macatawa River, South Branch, and North Branch of the Macatawa River. At each location, 30 minutes are spent searching for macroinvertebrates (aquatic insects) in the water with nets. These insects are important because they are good indicators of water quality. Once collection is complete, the insects are brought back to the office in jars and later sorted. The sites are given scores based on the abundance and the pollution tolerance of the macroinvertebrates that were collected. Insect are either sensitive, somewhat-sensitive or tolerant of pollution. If a given stream within the watershed has a very high number of *pollution sensative* insects such as the mayfly nymphs and caddisfly larva, it can generally be assumed that the stream is in good health. The seven stream locations in the Macatawa Watershed currently on average rate as being in *fair* health. For long-term averages, biannual monitoring in planned to continue long term. Contact the MACC if you are interested in volunteering for this event in the future!


Matt Plomp and Dyon Dubero collecting macroinvertebrates

2013 Phosphorus TMDL Annual Report Summary

In 1999, the Michigan Department of Environmental Quality submitted a Total Maximum Daily Load (TMDL) for phosphorus in Lake Michigan to the U.S. Environmental Protection Agency. The Lake Macatawa Phosphorus TMDL was approved by the United States EPA in April 2000. The TMDL mandates a reduction in the amount of phosphorus entering Lake Macatawa from 138,500 lbs. per year (1997 level) to 55,000 lbs. per year.

To further understand how these numbers are monitored, it is important to note that there are two ways in which phosphorus enters the lake: point source and non-point source pollution. Point sources are pollutants that can be measured and calculated since the origin is known and from a single location, typically a discharge pipe from a factory or similar facility. Nonpoint sources are not as easily measured since they are spread over the land and carried by stormwater. Nonpoint source data is based on statistical likelihoods that are generated from computer modeling.



In the Macatawa Watershed, there are three point sources that contribute to lake phosphorus: the Holland Board of Public Works, Zeeland's Clean Water Plant, and Mead Johnson. The three entities combined are regulated through permits to discharge no more than 20,000 lbs. of phosphorus out of the yearly 55,000 lbs.; they have never reached their allotted yearly maximum (see graph). While point sources are important to monitor within watershed, most of the phosphorus pollution problems come from nonpoint sources in the form of stormwater runoff from urban and agricultural areas. Models estimated that 1,579 lbs. of phosphorus were reduced in 2013 from nonpoint sources in the Macatawa Watershed. These reductions were attributed to agricultural best management practices including cover crops and reduced tillage.


Noordeloos Creek at the Macatawa Greenspace

Volunteer Stream Monitoring


Volunteer Paul Lilly (left) and MACC Program Assistant, Carolyn Ulstad (right), sorting through the collection adjacent to Noordeloos Creek

The Macatawa Area Coordinating Council, in partnership with the Outdoor Discovery Center Macatawa Greenway, has been operating a volunteer stream monitoring program since summer 2012. Volunteers have assisted in collecting and identifying aquatic macroinvertebrates as a way to approximate stream health. We began this program with the assistance of a grant from the Great Lakes Commission Volunteer Stream Monitoring Program, a program of the Michigan Clean Water Corps (MiCorps). MiCorps is a network of volunteer monitoring programs in Michigan that assists the Michigan Department of Environmental Quality in collecting and sharing water quality data. All data collected through their programs is publically available online at www.micorps.net (View Data under "Data Exchange"). The grant funding allowed us to purchase equipment needed to maintain a volunteer monitoring program, such as waders, nets, trays, forceps, and microscopes. The MACC and ODCMG intend to continue this program well into the future. Seven locations are monitored each spring and fall. Aquatic macroinvertebrates are collected in jars and brought back to the ODCMG for identification and preservation. Once the critters have been identified and sorted, a score is calculated to determine relative stream health (see table at right). Since we have only collected 2 years of data, very little conclusions can be made about trends in stream health. Overall, most sites in the Macatawa Watershed rate poor to fair, but we have had a couple that rate good as well. Our next collection day is scheduled for September 29. Contact the MACC (395-2688) or ODCMG (393-9453) offices for more information or to sign up to volunteer.

Value	Stream health
>48	Excellent
34-48	Good
19-33	Fair
<19	Poor

Spring River Cleanup

On April 26, a cool yet sunny spring day, the MACC and ODCMG organized groups of volunteers to pick up trash along the shore of Lake Macatawa at Kollen Park and Dunton Park. About 30 volunteers assisted with the clean-up, including a group of Boy Scouts and other local youth.

The fall River Cleanup is scheduled for Saturday, September 6, 1-4pm, at Kollen Park, so mark your calendars and plan to attend! Registration is required with the ODCMG: 616-393-9453.

Some of the volunteers that picked up trash along the shore at Kollen Park. Not pictured are additional volunteers that picked up more trash along the shore of Dunton Park.

ATTACHMENT 3

What are macro-invertebrates?

Macroinvertebrates are small animals that mainly consist of insects but also include:

- Crustaceans
- Mollusks
- Arachnids
- Annelids

All are big enough to be seen with the naked eye and do not have a backbone. These animals vary in size and shape, but they all live in the water for some or all of their lives so their survival is related the water quality of their habitat. Macro-invertebrates are a vital part of the aquatic food chain so their survival is crucial to a healthy ecosystem.

Stonefly nymph

Dragonfly Nymph

Midge Larva

Water Penny

Group 1; Sensitive to pollution:

- Stonefly Nymph
- Caddisfly Nymph
- Mayfly Nymph
- Water Penny

Group 2; Moderately tolerant of pollution:

- Dragonfly Nymph
- Scud
- Cranefly Nymph

Group 3; Tolerant to pollution:

- Leeches
- Midge Larva
- Blackfly Larva

Blackfly Larva

Scud

Caddisfly Larva

Leech

Macatawa Area Coordinating Council

301 Douglas Avenue,
Holland, MI 49424

Phone: 616-395-2688
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http://www.the-macc.org/

Macro-invertebrates: What they mean to water quality

MACATAWA WATERSHED PROJECT

Why care about macroinvertebrates?

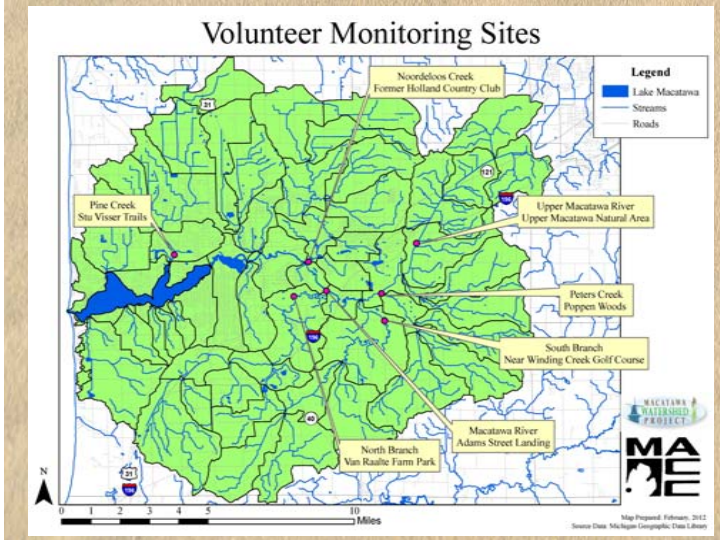
Since macroinvertebrates are sensitive to water quality, we can collect a sample of the macroinvertebrates that are present and look at which types are common and uncommon. They are grouped into three categories:

- Sensitive to pollution
- Somewhat-sensitive to pollution
- Tolerant to pollution

If there are many 'sensitive to pollution' macroinvertebrates present in a sample, then the water they came from is likely clean. If only macroinvertebrates from the 'tolerant' group are present, then there is some kind of pollution present, making the water less suitable for the more sensitive ones. This simple process of collecting and identifying provides very valuable data about the ecosystem that they came from.

What are we doing?

Twice a year, in the spring and fall, the Macatawa Area Coordinating Council (MACC), the Outdoor Discovery Center Macatawa Greenway, and the DeGraaf Nature Center organize a volunteer stream monitoring program that was funded by a MiCorps grant from June 2012-May 2014. Monitoring sites are located in Pine Creek, Noordeloos Creek, Upper Macatawa River, Peters Creek, the North, South and main branches of the Macatawa River (see map). At each location 30 minutes are spent gathering the macroinvertebrates with nets. They are later sorted out by family and the sites are given scores based on the abundance and pollution tolerance of the macroinvertebrates that were collected. The data collected is posted to the MACC website.



Volunteers collecting and sorting macroinvertebrates on the South Branch of the Macatawa River.

ATTACHMENT 4

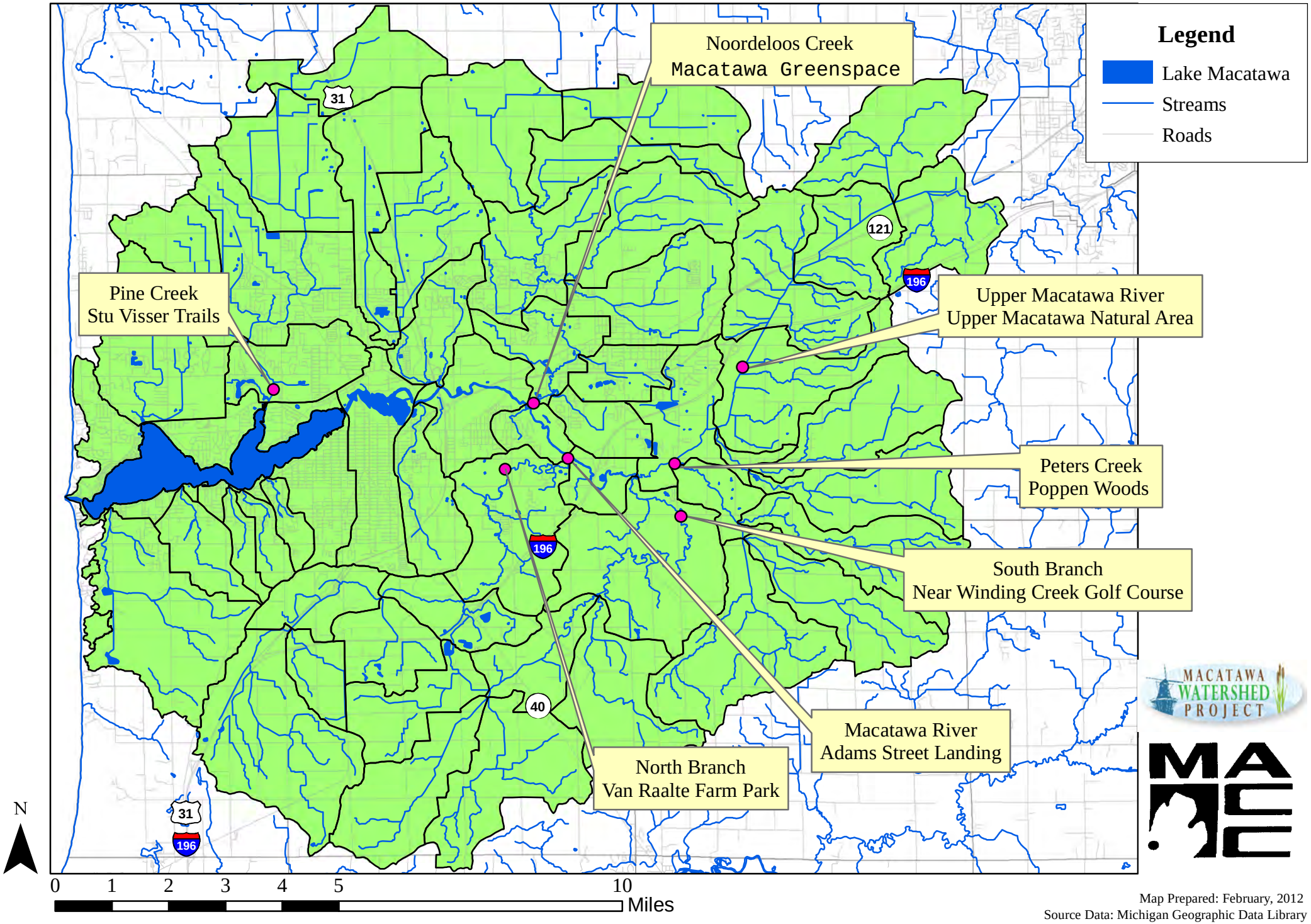
Macatawa Watershed Project

Macroinvertebrate Monitoring Program

Site 7

North Branch at Van Raalte Farm

Volunteer Monitoring Sites



Map Prepared: February, 2012
Source Data: Michigan Geographic Data Library

Imagery ©2014 Google, Map data ©2014 Google 1000 ft

Van Raalte Farm Park
1076 E 16th St
Use parking lot off Country Club Rd (red arrow)

SITE ACCESS NOTES:

Van Raalte Farm Park
1076 E 16th St, Holland

Enter at parking lot on Country Club Road south of 16th St. Follow trail map to footbridge over river. Sample upstream of bridge.

PROGRAM CONTACTS:

Kelly Goward
Macatawa Area Coordinating Council
Cell: 616-446-4397

Jamie Krupka
Outdoor Discovery Center Macatawa Greenway
Cell: 616-886-5568

EQUIPMENT LIST

REQUIRED	OPTIONAL
2-3 D-nets	Eye droppers
2-3 Sorting Trays	Waders
3-4 Forceps	Camera
2 Glass Jars with Lids	

MACROINVERTEBRATE SAMPLING PROTOCOL

1. Designate a note taker and **make sure that the data sheet is filled out completely**. A second person in the group should check the data sheet for completeness and sign at the bottom.
2. Designate one or two people to be collectors. The note taker must record the collection start time on the data sheet. Collection should occur for about 30 minutes and the end time is recorded on the data sheet. Collect from no more than a 300 foot reach. It is not necessary to collect from the entire stream bank to bank; instead, make sure to collect from all habitat types that are present in the stream reach. Start at the downstream end of the reach and work your way upstream.
3. The note taker must sketch the 300 foot stream reach that is sampled on the data sheet. Include as much detail as possible.
4. Designate one or two people to be pickers. Collectors will empty their nets into sorting trays and the pickers will transfer macroinvertebrates into the glass jars (filled with stream water). **BE SURE TO LABEL THE LID OF THE JAR WITH THE LOCATION AND DATE.** Picking can continue beyond the 30 minutes of collection time.
5. It is not necessary to collect more than 15 individuals of a single species. Excess should be returned to the stream.

MiCorps Site ID#: 7

Michigan Clean Water Corps

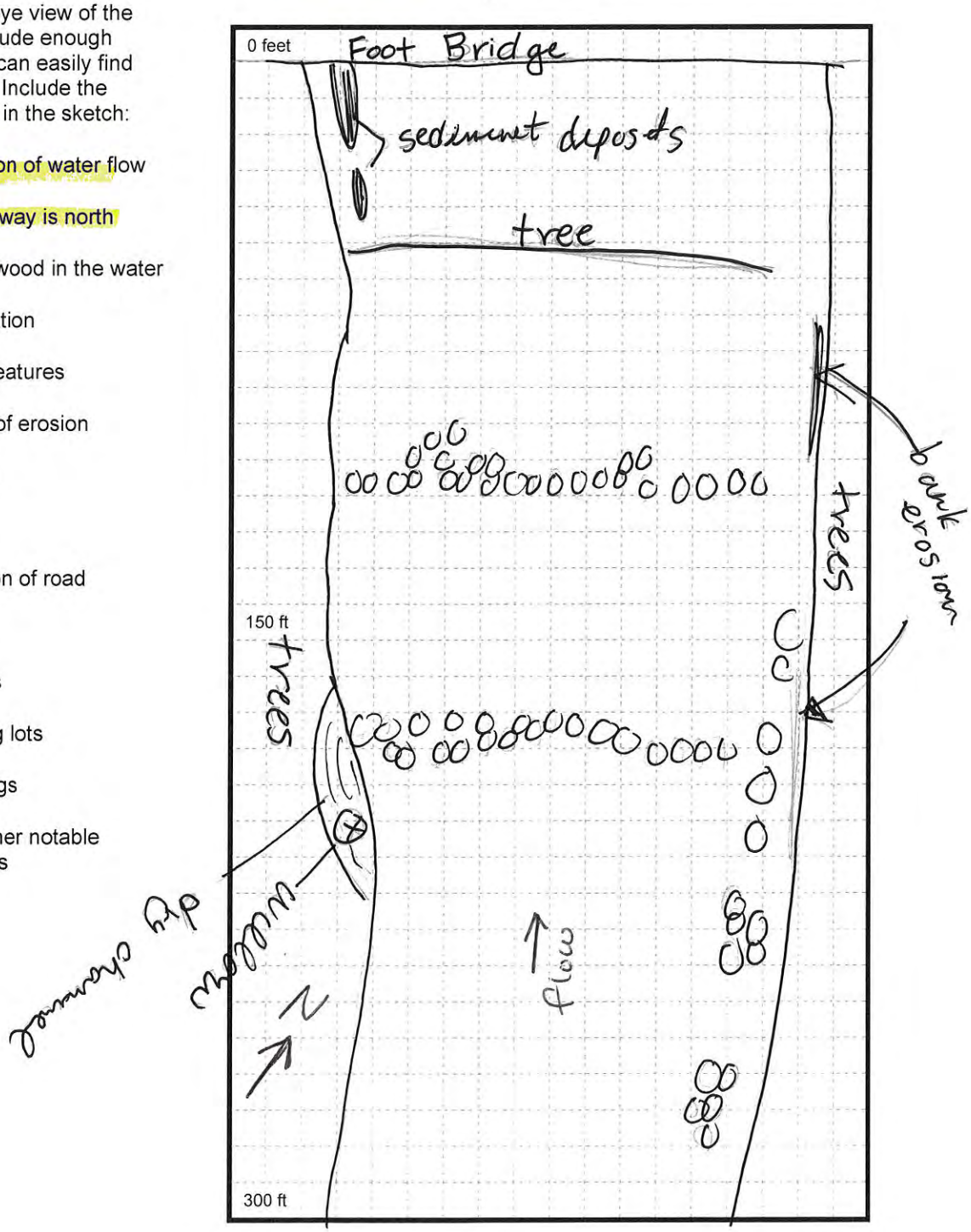
Site Sketch

Stream Name: North Branch Location: VanRaalte Farm

Date: 5-27-14 Drawn by: Kelly Goward

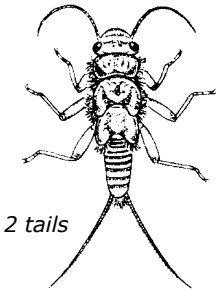
Draw a bird's-eye view of the study site. Include enough detail that you can easily find the site again! Include the following items in the sketch:

- Direction of water flow
- Which way is north
- Large wood in the water
- Vegetation
- Bank features
- Areas of erosion
- Riffles
- Pools
- Location of road
- Trees
- Fences
- Parking lots
- Buildings
- Any other notable features



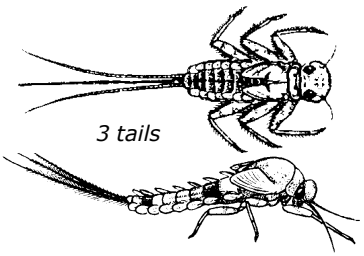
Macroinvertebrate Identification Key

GROUP 1 – Very Intolerant of Pollution



2 tails

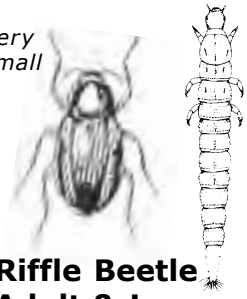
Stonefly Nymph



3 tails

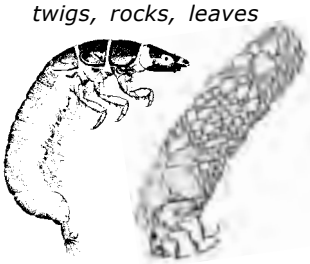
Mayfly Nymph

very small

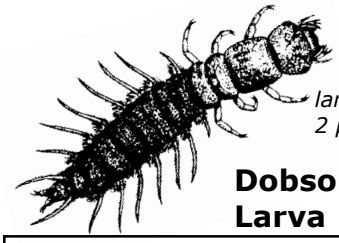


Riffle Beetle Adult & Larva

makes a case from twigs, rocks, leaves



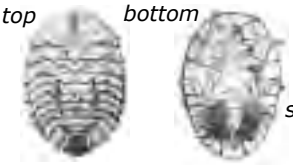
Caddisfly Larva



large head & 2 pinchers

Dobsonfly Larva

top *bottom*



looks like a suction cup

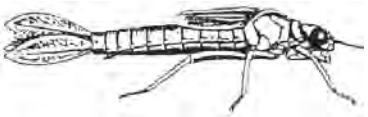
Water Penny Larva

must be alive

Right-Handed Snail

GROUP 2 – Moderately Intolerant of Pollution

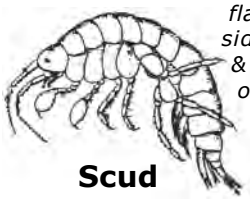
3paddle-like tails



Damselfly Nymph

Dragonfly Nymph

no tails

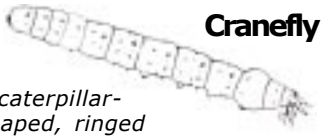


flattened side-ways & swims on side

Scud

Sowbug

flattened top to bottom (looks like a pill bug)



Cranefly

caterpillar-shaped, ringed

must be alive

Clam/Mussel

GROUP 3 – Fairly Tolerant of Pollution

Midge Larva

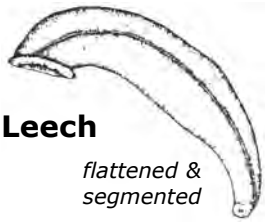
visible head & prolegs

Planaria

2 eye spots & very small

one end is swollen

Black Fly Larva

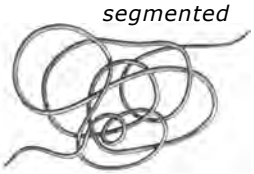


Leech

flattened & segmented

GROUP 4 – Very Tolerant of Pollution

segmented



Aquatic Worms

must be alive

Left-Handed Snail

Rat-tailed Maggot

bright red

Blood Worm Midge Larva

ATTACHMENT 5

Fall 2012 sample collection event at the Upper Macatawa Natural Area. Michelle Hohn (off camera) and Larry Fegel (right).

Fall 2012 sample collection event in the Upper Macatawa River at the Upper Macatawa Natural Area.

Fall 2012 sample collection event in Noordeloos Creek at the Macatawa Greenspace. Jamie Krupka, ODCMG (left), and Jennifer Laforest, ODCMG (right).

Fall 2012 sample identification event at Outdoor Discovery Center Macatawa Greenway office. Clockwise from upper left: Mark Ludwig, Katie Lampen, Jennifer Laforest, Jamie Krupka, Dan Callam, Dylana Eisaman, Kelly Goward, Erin Wildt.

Spring 2013 sample collection event in Pine Creek at Stu Visser Trails. Matthew Plomp (top left), Dyon Dubero (lower left) and Carolyn Ulstad (right).

Spring 2013 sample collection event in Pine Creek at Stu Visser Trails. Carolyn Ulstad (foreground) and Dyon Dubero (background).

Spring 2013 sample collection event in the South Branch of the Macatawa River at the Winding Creek Golf Course. Matthew Plomp (left) and Dyon Dubero (right).

Fall 2013. Students from Hudsonville High School collecting and sorting macroinvertebrates from the Upper Macatawa River at the Macatawa Greenspace.

Fall 2013. Students from Holland Christian High School collecting and sorting macroinvertebrates from the North Branch of the Macatawa River at Van Raalte Farm Park. Note low water levels in the river did not negatively impact the collection efforts..

Spring 2014 sample collection event in Peters Creek at Poppen Woods. Jessica Siemen.

Spring 2014 sample collection event in Noordeloos Creek at the Macatawa Greensapce. Paul Lilly (left) and Carolyn Ulstad (right).

Spring 2014 sample identification event at the Outdoor Discovery Center. Clockwise from upper left: Joy Funk, Dan Callam, Max Boose, Jessica Siemen, Jamie Krupka.

Spring 2014 sample identification event at the Outdoor Discovery Center. Clockwise from lower left: Dylan Eisaman, Carolyn Ulstad, Paul Lilly, Dyon Dubero.