



KALAMAZOO RIVER GUARDIANS MONITORING PROJECT

Quality Assurance Project Plan

Jen Meilinger
jmeilinger@naturecenter.org

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Quality Assurance Project Plan

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A3. Distribution list

Project Officer:

Paul Steen, Ph.D. Watershed Ecologist
Huron River Watershed council
1100 N. Main Street
Ann Arbor, MI 48104

KNC administrative contact:

Jessica Simons
Kalamazoo Nature Center
VP Conservation Stewardship
7000 N. Westnedge ave
Kalamazoo, Mi 49009

Kalamazoo River Watershed Council Administrative contact:

Steve Hamilton
(I.D. expert)
Michigan State University/Kalamazoo River Watershed Council
Professor of Ecosystem Ecology and Biogeochemistry
Hamilton@kbs.msu.edu
(269)671-2231

Kalamazoo County Drain Commissioner:

Patricia Crowley
201 W. Kalamazoo ave.
pacrow@kalcounty.com

Jennifer Meilinger
Community Science Director
Kalamazoo Nature Center
jmeilinger@naturecenter.org

A4. Program Organization

1. Project Advisor – Jennifer Meilinger will advise the project manager tasks, oversee the budget, handle marketing strategies and assist with Volunteer recruitment.

2. Project Manager – Jennifer Meilinger will be the leader in the field for monitoring days, habitat assessments and behind the scenes organization for the Kalamazoo River Guardians Project. She will maintain the quality assurance project plan (QAPP), organize events, gather materials, keep track of samples and data, train monitoring team leaders, manage the budget and reporting, and handle all other responsibilities pertaining to the planning and implementation of the monitoring events.

3. Field responsibilities – Jennifer Meilinger will oversee field monitoring activities. We will have 5 monitoring leads whose responsibility will be to attend one training session prior to our event to learn sampling procedures. They will guide, assist and oversee the volunteers for one assigned site each monitoring event. We will have 10-20 volunteers, 3-4 at each site, who will monitor 4 sites following MiCorps outlined monitoring procedures. Many of our volunteers have prior monitoring experience and/or science backgrounds.

Laboratory Responsibilities

Steve Hamilton

(I.D. expert)

Michigan State University/Kalamazoo River Watershed Council

Professor of Ecosystem Ecology and Biogeochemistry

Hamilton@kbs.msu.edu

(269)671-2231

Steve Kohler

(I.D. Expert)

Western Michigan University

Professor of Community Ecology/Aquatic Ecology

Steve.kohler@wmich.edu

Jennifer Meilinger will be the lead for the laboratory i.d. event. Jennifer has experience in macroinvertebrate identification and has easier access to equipment at the KNC. Our project will include volunteers, with sampling and identification experience, who will serve as crew leaders and experts during the identification portion of our event. They will oversee the benthic macroinvertebrate identification to ensure accuracy. A laboratory will be set up at the Kalamazoo Nature Center in Kalamazoo, Michigan.

A5. Problem Definition/background

This project will address the guiding principles set forth in the Kalamazoo River Watershed Management Plan; specifically, this project will support the assessment of the nature and status of the watershed and ecosystem. After the Enbridge oil spill of 2010, the Kalamazoo River and its tributaries have undergone major remediation and clean-up efforts. However, within the Kalamazoo River Watershed, issues including a Superfund site, PCB contamination and numerous warnings against fish consumption indicate that much work is still necessary to return the river to a healthy ecological state.

In addition, three of our sites have been monitored for a number of years following the Michigan Department of Environmental Quality's procedure 51 by university classrooms. This data gives us a rich history for these sites that has yet to be recorded for public view. We will be able to compare our future results to this data.

A6. Program Description

The Kalamazoo River Monitoring project, Kalamazoo River Guardians (KRG) will focus water quality testing efforts in areas that are accessible by citizens of Kalamazoo County.

- We will target sampling on the Kalamazoo River and its tributaries within Kalamazoo County. We plan to initiate our program in Kalamazoo County and extend it throughout the watershed as resources permit.
- We will educate the public about water quality and familiarize them with their watershed.
- We will gather quality data that is accessible to the community and will be used by the DEQ to prioritize monitoring decisions and better focus their efforts on areas of higher need.
- If it should be discovered that one of our sites is of poor quality, is misused, mistreated or degrading, we will use this information to inspire and organize local action to help raise the quality of our watershed. Conversely, if we discover exceptional health of a site we will celebrate the good standing as an additional tool for raising awareness and passion for clean water in our community.

The primary goals of the project are...

- (1)...to establish a volunteer water quality monitoring program that will connect students and citizens of Kalamazoo with the Kalamazoo River Watershed.
- (2) ...help educate the public about local water issues and create a greater number of committed clean water stewards.
- (3) ... reach new community members each year and continue to grow the number of citizens interested in the health of the watershed.
- (4) ... improve and alleviate human impact on the watershed.

A7. Data Quality Objectives.

Precision/Accuracy

The following techniques will be reviewed during training and in retraining of team leaders every three years:

- 1) Collecting style (must be thorough and vigorous).
- 2) Habitat diversity (must include all habitats present and be thorough in each one).
- 3) The transfer of collected macro-invertebrates from the net to the sample jar (Thoroughness is critical).

Since there is inherent variability in accessing the less common taxa in any stream site and program resources do not allow program managers to perform independent (duplicate) collections of the sampling sites, our goal for quality assurance is conservative. A given site's Stream Quality Index (SQI) score or total diversity (D) measure across macro-invertebrate taxa will be noted as "preliminary" until three spring sampling events and three fall sampling events have been completed. At least two of these six measures will be collected by different volunteer teams to avoid consistent errors. The resulting measures of D and SQI for each site will be compared to the composite (median) results and each should be within two standard deviations of the median. Sample results that exceed these standards should be then noted as "outliers" and examined to determine if the results are likely due to sampling error or a true environmental variation.

If sampling error is determined the data point should be removed from the data record. The sample will be recollected if it is possible to do so in a two-week time frame from the other samples collected that season. If not, there will be gap in the data for that collection date.

Volunteer teams that generate more than one outlier should be observed by the program manager at the next sampling event and be considered for retraining.

The program experts will make the final identifications for each sample.

Bias/Systematic Error

Sites will be sampled by different team leaders at least once every three years in each season (two events among six sampling events, if conducted twice per year) to examine the effects of bias in individual collection styles. The new measure should be within two standard deviations of the median of past measures. Sites not meeting this DQO will be evaluated as above by the program expert.

Completeness

Following a QA review of all collected and analyzed data, data completeness will be assessed by dividing the number of measurements judged valid by the number of total measurements performed. The data quality objective for completeness for each parameter for each sampling event is 90%. If the program does not meet this standard, the program manager will consult with MiCorps staff to determine the main causes of data invalidation and develop a course of action to improve the completeness of future sampling events.

Representativeness

Study sites are selected to represent the full variety of stream habitat types available locally, emphasizing the inclusion of riffle habitat. All available habitats within the study site will be sampled and documented to ensure a thorough sampling of all of the organisms inhabiting the site. Resulting data from the monitoring program will be used to represent the ecological conditions of the contributing sub-watershed. Since limited resources are available to allow the program to cover the entire watershed, some subwatersheds will not initially be represented. Additional sub-watershed sites will be added as resources and volunteers allow.

Comparability

To ensure data comparability, all volunteers in the watershed will follow the same sampling and site selection methods and use the same units of reporting. Program directors and trainers will learn the standard MiCorps monitoring methods at annual trainings by MiCorps staff and will train their volunteers to follow those methods to ensure comparability of results among all MiCorps programs. To the extent possible, the monitoring of all study sites will be completed on a single day. For each sampling event that is not completed on a single day, monitoring by volunteers will be completed within the same two week period. If a site is temporarily inaccessible, such as due to prolonged high water, the monitoring time may be extended for two additional weeks. If the issue concerning inaccessibility is continued beyond the extended dates, then no monitoring data will be collected during that time and there will be a gap in the data. If a team is unable to monitor their site during the specified time, the team leader will contact the program manager as soon as possible and no later than the end of the first week in the sampling window in order for the manager to arrange for another team to complete the monitoring. If no team is available, the program manager will, if feasible, sample the site. Otherwise, the site will go unmonitored for that season.

A8. Special Training and certifications

Volunteers will be trained as crew leaders. The program manager, Jennifer Meilinger will function as the 5th site leader. When one of these volunteers decides to no longer participate in the program, another interested volunteer will be asked to assume this role. The other volunteers in the program will be asked if they would like to be trained collectors and identifiers. Trainings for the leader, collector, and identifiers will take place between 1-4 weeks before the collection event as needed. With the exception of the program's first collection event, first time volunteers will be assigned to sorting and picking the specimens and will be encouraged to take the leader/collector/identifier training before the next collection event.

B1. Study Design and Methods Sampling Equipment

Each site will be supplied with the following supplies:

- (1) 3 1/2 gal. buckets
- (2) D-Nets (handles will be marked as yard sticks)
- (2) sorting trays
- (4) forceps
- (4) 2 oz. jars with lids prefilled with ethanol for specimens
- (1) water bottles for rinsing specimens
- (1) 100' reel-style measuring tape
- (2) pencils

Pre-made labels with site number printed 12 pairs of lug-sole waders were purchased for volunteer. Many volunteers have their own. Map of site, clipboard with data sheets, and pencils will be provided.

Site Description

Site 1: Kalamazoo River @ Merrill Park

42.28567727249582, -85.51537836499872

County: Kalamazoo County

Past monitoring efforts: Annual since 2012.

Surrounding Environment: This site is moderately urban to rural. It is within a park boundary but borders a small highway. The section we will monitor moves through an area bordered by lawn and a township park into a more wooded area. There is two lane highway (hwy 96) on the opposite bank with a natural buffer which ranges from 20 -100 feet in width.

Site 2: Kalamazoo River @ D Avenue

42.37722326920304, -85.57871918866385

County: Kalamazoo County

Past monitoring efforts: Annual since 2012.

Surrounding environment description: Rural. The river at this site has a riffled bottom, with a fork in the river as it moves around a small island. The bank is natural wooded area on all sides. A house sits on each side but quite far back from the river bank.

Site 3: Davis Creek

42.27225361669652, -85.54135300015767

County: Kalamazoo County

Past monitoring efforts: DEQ monitored in 2009 very close to this site. It was rated acceptable with a score of -1 for taxa. It was given a habitat rating of acceptable with a rating of 133. It had recently undergone some habitat restoration as part of a clean-up at the Lakeside Refinery site. Monitoring at this site has been annual since 2012.

Surrounding environment description: Residential/Commercial. This site includes nearby storm drains and has had quite a few human impacts. It runs through an industrial area and is routed through concrete in a few areas. It has an old gas line running through it and an old railroad bridge. The stream

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bank has erosion issues all along the creek. The creek ends in an EPA restoration site. The site has undergone shoreline restoration in recent years. It is our hope that our monitoring efforts can track the impact of the restoration and the pace of recovery. Our data at this site is expected to vary over time.

Site 4: Arcadia Creek

42.290262665903356, -85.59672168236658

County: Kalamazoo County

Past monitoring efforts: Annual since 2012.

Surrounding environment description: Commercial. This site includes nearby storm drainage. This site runs through the busy Kalamazoo business district between WMU and Kalamazoo College. It borders Stadium Drive and a small university neighborhood and business district. It runs through culverts and has been altered many times to make way for development.

Site 5: Trout Run Stream

42.359667385518, -85.58113582224719

County: Kalamazoo County

Past monitoring efforts: This stream has been monitored since the 1970's by Kalamazoo Nature Center staff and local universities. Surrounding environment description: Forest. This stream runs through a very natural area. It has basically remained untouched form many years. It runs along one of the Kalamazoo Nature Center trail systems. The Project manager will provide site maps for volunteers and will flag sampling areas prior to the sampling events.

Sampling the benthic community: Multiple collections will be taken from each habitat type present at the site, including riffle, rocks or other large objects, leaf packs, submerged vegetation or roots, and depositional areas, while wading and using a D-frame kick net. If more than one site is sampled per team the team will inspect nets to ensure they are clean before proceeding to the next site. The trained collector will transfer the material from the net into white pans. The remaining volunteers (pickers) will pick out samples of all different types of macro-invertebrates from the pans and place them into jars of 70% ethyl alcohol for later identification. During the collection, the collector will provide information to the team streamside leader in response to questions on the data sheet that review all habitats to be sampled, the state of the creek, and any changes in methodology or unusual observations. Data is summarized using the MiCorps Stream Quality Index (SQI) located on the macroinvertebrate data sheet. The streamside leader will instruct and assist other team members in detecting and collecting macroinvertebrates in the sorting pans, including looking under bark and inside of constructions made of sticks or other substrates. Potential sources of variability such as weather/stream flow differences, season, and site characteristic differences will be noted for each event and discussed in study results. There are places on the data sheet to record unusual procedures or accidents, such as losing part of the collection by spilling. Any variations in procedure should be explained on the data sheet.

Potential resource/time constraints: The timing of the event (taking unpredictable weather into consideration) can affect the availability of volunteers. It may be difficult to find an "ideal" sampling date in our two-week window.

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At the collecting site, all invertebrate sample jars receive a label written in pencil, stating date, location, name of collector, and number of jars containing the collection from this site. The data sheet also states the number of jars containing the collection from this site. The collection jars will be pre-labeled. The team leader is responsible for returning all jars and all equipment to Jennifer Meilinger at the Kalamazoo Nature Center Upon return from the collection site. The collections are checked for labels, the data sheets are checked for completeness and for correct information on the number of jars containing the collection from the site, and the jars are secured together with a rubber band and site label and placed together in one box. They are to be examined, sorted on the afternoon of the sampling day. Counting and identification will occur as the designated ID experts have time. The data sheets are used on the identification day, after which they remain on file indefinitely.

At the time of identifying the sample, the sample identifier checks the data sheet and jars to ensure that all the jars, and only the jars, from that collection are present prior to emptying them into a white pan for sorting. If any specimens are separated from the pan during identification, a site label accompanies them. For identification, volunteers sort all individuals from a single jar into look-alike groups, and then are joined by an identification expert who confirms the sorting and provides identification of the taxa present. These identifications are then verified by the program expert. When identification of a sample is complete, the entire collection is placed in a single jar of fresh alcohol with a poly-seal cap and a printed label inside the jar and stored in a designated KNC storage area. The alcohol is carefully changed (to avoid losing small specimens) in the jars every few years. Samples will be stored in a cool, dry, closed cabinet at room temperature.

Parameters

Macro-invertebrate community will be monitored and identified to order level at least annually, preferably in both April and October.

Timing

The benthic population is sampled within a two-week period in mid-April and mid-October. Most sites are sampled on a single day, although additional population samples may be collected within a two-week period. The physical characteristics of the sites are measured once every three to five years during the summer or fall.

Equipment Quality Control

- Check to make sure equipment is in working order and not damaged
- Clean equipment before and after taking it into the field
- Label equipment with their dates of purchase and dates of last usage
- Check the expiration date of chemical reagents prior to each use

B2. Instrument/Equipment Testing, Inspection, and Maintenance

All supplies and equipment were purchased in September 2012. Jennifer Meilinger will be responsible for their upkeep, storage, and replacement.

Waders – If any waders are reported damaged after use they will be replaced. Wader hangers were also purchased so that they can be hung upside down. Waders will be hung in a Kalamazoo River Guardian’s store room, an area where temperature and humidity are regulated.

Nets – Nets will be inspected after each use. Nets will be stored in a KRG designated storage room where temperature and humidity are regulated.

Small equipment – Forceps, droppers, etc. will be stored in this same storeroom.

Large equipment – Buckets, sorting trays, tarps, etc. will be stored in a Kalamazoo Nature Center Maintenance barn

B3. Inspection/Acceptance for Supplies and Consumables

Supplies such as Ethanol (from Carolina Biological Supply), glass jars with poly seal lids (from M Jacob & Sons), etc. will be inspected after each sampling date. Low supplies will be replenished immediately after sampling date to insure they will be ready for next event. All supplies will be stored in the KRG store space.

B4. Non-direct Measurements

Not applicable.

B5. Data Management

Raw data will be entered and managed in Microsoft Excel workbooks. Data will be stored on the Kalamazoo Nature Center’s computer system and backed up externally. Computer passwords provide data security. Recorded data will be entered directly into the online MiCorps database by Jennifer Meilinger or other Kalamazoo Nature Center staff for storage within the MiCorps data exchange system. Data sheets will be filed in Jennifer’s office for a period of at least five years. Macroinvertebrates Data are summarized for reporting into four metrics: All taxa, insects, EPT (Ephemeroptera + Plecoptera + Trichoptera), and sensitive taxa. Units of measure are families counted in each metric. The MiCorps Stream Quality Index (SQI) is also computed.

C1. System Assessments and Response Actions

Not applicable.

C2. Data Review, Verification, and Validation

After each sampling/ID event, a review and verification of the data will occur. During that time Jennifer Meilinger will review the hard copies of the sampling forms to make sure each is filled out correctly. Following that, the corresponding data entered into the database will be checked against its respective hard copy of the form. Upon that review the SQI will be evaluated to determine its similarity to previous samples from the same site and/or same water body. A spot check of ID of the macroinvertebrates will be performed by Jennifer and another of our I.D. experts. If a sample is found to be outside of the accepted two standard deviations around the median from previous samples, the site will be re-sampled by experts to verify or discard such unusual results, which could be the result of less-than-thorough sampling. Any abnormalities to the process set forth in this QAPP will be immediately communicated to MiCorps staff. In addition to that notification, all processes and events surrounding the volunteer monitoring efforts of this project will be reported regularly to MiCorps by Jennifer based on the reporting frequency and requirements set forth in the MiCorps contract.

C3. Reconciliation with Data Quality Objectives

Data will be reviewed either on identification day or soon thereafter. If the DQOs are not fully met, corrective actions will begin immediately. Any limitations discovered in the data will be identified and reported by to MiCorps and data users.

C4. Reporting

Informal reports from volunteers will be highly encouraged after the sampling event. Time will be given to speak to volunteers on the day of the event after volunteers return. We also encourage input via E-mail. Quarterly reports will be written and submitted to MiCorps (see distribution list). Any issues in quality control will be included in these reports. Reports will also be submitted to the county drain commissioner to help guide future decisions.

MiCorps Volunteer Stream Monitoring
Procedures
August 2006
Prepared by:
Jo Latimore, Huron River Watershed Council
Adapted from:
"Stream Crossing Watershed Survey Procedure,