

A2. Table of Contents

Section	Description	Page
A3	Distribution List	3
A4	Program Organization	3
A5	Problem Definition/Background	4
A6	Data Quality Objectives	4
A7	Data Quality Objectives	5
A8	Special training/Certifications	6
B1	Study Designs and methods	7
B2	Instrument/Equipment Testing, Inspection and Maintenance	9
B3	Inspection/Acceptance for Supplies and Consumables	10
B4	Non-direct Measurements	10
B5	Data Management	10
C1	System Audits and Response Actions	11
C2	Data Review, Verification, and Validation	11
C3	Reconciliation with Data Quality Objectives	11
C4	Reporting	11
Appendix A	Map of Sampling Locations	
Appendix B	Stream Macroinvertebrate Datasheets-Order	
Appendix C	Stream Macroinvertebrate Datasheets-Family	
Appendix D	Stream Habitat Assessment	

A3. Distribution List

The following individuals will receive a copy of the QAPP:

- Carolyn Grace, St. Joseph County Conservation District
- Ann St. Amand, PhycoTech, Inc.
- Kam Truhn, PhycoTech, Inc.
- Dr. Paul Steen, Huron River Watershed Council
- Nancy Carpenter, Berrien County Conservation District (BCCD)

A4. Program Organization

1. Management Responsibilities:

Nancy Carpenter, Program and Quality Assurance Manager, Berrien County Conservation District, 3334 Edgewood Road, Berrien Springs, MI 49103 nancy.carpenter@macd.org

Nancy is the program and quality assurance manager for the volunteer stream monitoring program and the primary person responsible for field and reporting activities.

Responsibilities

- Develop, implement, and adhere to the Quality Assurance Project Plan
- Perform program promotion and volunteer recruitment
- Purchase necessary equipment for performing stream monitoring activities
- Coordinate and conduct volunteer stream monitoring training
- Coordinate and implement volunteer stream monitoring field data collection events
- Coordinate indoor macroinvertebrate identification sessions with Kam Truhn
- Catalogue and store collected specimens
- Perform data entry and data analysis under guidance from advisor Carolyn Grace.
- Write reports and update website on an annual basis to share information with volunteers and the general public
- Deliverables to MiCorps; all data collected will be sent electronically to the MiCorps database manager on an annual basis.
- Development and submission of status reports following MiCorps guidance on a quarterly basis.
- Administration and accounting of grant funds including budget oversight
- Project evaluation and submission of final report
- Update the QAPP every two years, and submit to MiCorps Quality Assurance Manager

2. Advisor Responsibilities:

Carolyn Grace, Administrator, St. Joseph County Conservation District 269-467-6336 ext 5,
carolyn.grace@mi.nacdnet.net

- Review and assist with QAPP
- Attend Side by Side training

- Advise the project manager on tasks
- Serve as a Team Leader for one of the volunteer teams
- Train Volunteers
- Provide guidance on data reporting

3. Field Responsibilities

Field sampling is performed by volunteers. Team Leaders and Collectors receiving training in field data collection methods by Program Manager, Advisor, and Expert Volunteer.

Team Leaders organize a stream monitoring strategy and delegate monitoring roles for each team. In the field, Team Leaders completely fill out data sheets, explain sampling of the site, time guidelines, collection directions and any other responsibilities. Pickers follow instructions from team leaders. Collectors sample all in-stream habitats and provide the pickers the samples to be identified. They will sort at the site picking out the macroinvertebrates from the sorting trays, putting them in a collection jar, and preserving them in 70% alcohol for later identification.

4. Laboratory Responsibilities:

Kam Truhn, Laboratory Manager for PhycoTech, Inc. and longtime macroinvertebrate identifier, has agreed to act as the Scientific Advisor for the Berrien County Conservation District Volunteer Stream Monitoring Program. He will help the program manager with identification. Kam will expertly confirm identification findings of macroinvertebrates and other aquatic life forms. Volunteers and BCCD staff will take part in collection and identification events. Any sample identification that cannot be completed during the scheduled time will be completed by Kam.

5. Corrective Action:

The Program Manager is the primary person responsible for initiating, developing, approving, implementing and reporting corrective actions concerning data quality.

A5. Problem Definition/Background

The BCCD seeks to continue its leading role in the critical job of improving and protecting our precious water resources. The Stream Team of Berrien Volunteer Stream Monitoring Project will be a tool to educate and engage people in watching over and protecting our streams, giving them a greater sense of stewardship. The goal is to protect and improve the water quality of the streams of the Hickory Creek Watershed.

The five specific objectives for the project are:

1. Educate Berrien County residents on monitoring, quality, and protection of our water resources.
2. Engage stakeholder groups and individuals in hands-on water monitoring and protection.
3. To monitor stream health in the Hickory Creek Watershed of Berrien County.
4. Identify or verify problem areas where degradation has occurred and where remediation or best management practices can be implemented.
5. Provide monitoring data available for years to come.

A6. Program Description

The primary objective of this program is to track long term changes in the stream health and water quality through a volunteer monitoring program in the Hickory Creek Watershed, which is one of many

sub watersheds of the St. Joseph River Watershed. Twice each year, macroinvertebrate samples will be collected at the six sampling locations within the watersheds. The sampling events will take place once in the fall and once in the spring. Collections will be stored at the BCCD office for identification within two weeks of the sample collection. Data will be entered and maintained in hard copy and electronic format at our office. Program reports will be completed and distributed to project partners. Sampling results will also be made available to the general public. It is the hope of the manager that the residents of Berrien County will get involved in this program and become long-term volunteers for not only this program, but also for other programs that the conservation district offers.

A7. Data Quality Objectives

Precision: The purpose of this project is to gauge stream health by measuring the total diversity of macroinvertebrate taxa. Streams monitored in this project are assessed by examining aquatic macroinvertebrate community diversity. Quality control during field data collection, to guarantee precision and accuracy, is accomplished by the Project Manager and Advisor who accompanies teams to observe their collection techniques and note any divergence from protocols. In addition, key team members such as leaders and collectors must have attended at least one training event prior to the field collection event. Techniques reviewed at training events and in the field will 1. Include a vigorous and thorough collecting style, 2. Will include all habitats and be thorough in each habitat diversity. 3. The picking style must be thoroughly picked through all materials collected and all sizes and types picked. 4. Must ensure a variety and or diverse and abundant samples of organisms. 5. The transfer of the collected macroinvertebrates from the net to the jars will be properly handled and labeled correctly.

Precision and accuracy will be maintained by following standardized MiCorps procedures. MiCorps staff will conduct a method validation review called the side-by-training with the Program Manager. MiCorps staff Dr. Paul Steen will be visiting and doing a side-by-side training on September 14th. The Program Manager, Advisor, Expert Volunteer, and Scientific Advisor (Identifier) will be in attendance as well as other key volunteers. Precision and accuracy will be maintained by conducting consistent volunteer team leader training and retrained at least every three years.

All field identifications and counts will be checked by an expert with access to a microscope, keys, and field guides. The Program Manager will check at least 10% of the specimens processed by experts to verify results. If more than 10% of the specimens checked were misidentified, the Program Manager will review all the specimens processed by that expert and reassess if that person should be considered an expert for future sampling events.

A given site’s stream quality index (SQI) score or total diversity (TD) measure across macroinvertebrate taxa will be noted as “preliminary” until three fall samplings and three spring samplings have been collected

Bias: Sites will be sampled by different teams at least once every three years to examine the effects of bias in individual collection styles. A relative percentage difference (RPD) calculation between the new measure and the mean of past measures should be less than 40% for both SQI and D. Sites meeting this data quality objective will be evaluated by the Project Manager using the proper formula. If the sample falls outside this range, then the Project Manager will conduct a more thorough investigation to determine which team or individual is likely at fault. The Project Manager will accompany teams to observe their collection techniques and note any divergence from protocols. The Program Manager

may also perform an independent collection or duplicate sample no less than a week after the team’s original collection.

It is also possible that the Program Coordinator can conclude that all sampling was valid and the discrepancy between samples is due to natural variations such as changing over time or unrepresentative sampling conditions.

Completeness: A measure of the amount of valid data actually obtained versus the amount expected to be obtained as a specified in the original sampling design. It is usually expressed as a percentage. For example, if 100 samples were scheduled but volunteers sampled only 90 times due to bad weather the completeness record would be 90%.

Following a quality assurance review of all collected and analyzed data, data completeness is assessed by dividing the number of measurements judged valid by the number of the total measurements performed. The data quality objective for completeness for each parameter for each sampling 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.

Representativeness: Study sites are selected to represent the full variety of stream habitat types available locally. 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 watershed.

Comparability: Comparability represents how well data from one river or study site can be compared to data from another. To ensure data comparability, all volunteers participating in the monitoring program will follow the same sampling methods and use the same units of reporting. The methods for sampling and reporting are based on MiCorps standards that are taught at macroinvertebrate trainings. The Project Manager and Advisor will train volunteers to follow those same methods to ensure comparability of monitoring results among other MiCorps programs. To the extent possible, the monitoring of all study sites will be completed in a two-day period and certainly within a two-week time frame. If a Project Manager leaves the position and a new Project Manager is hired, the new hire will attend the next available training given by MiCorps.

A8. Special Training/Certifications

Nancy Carpenter, Program Manager, and Carolyn Grace, Advisor, have received MiCorps training. Carolyn has been involved with MiCorps macroinvertebrate identification events and is experienced with all facets under the grant. They will share coordinating training for macroinvertebrate and habitat assessment of team leaders. Kam Truhn, Scientific Advisor (species identifier), and Ann St. Amand, Expert Volunteer, are both very experienced in collecting and identifying and will be easily trained and comfortable with MiCorps standards. Team leaders and volunteers such as collectors and pickers will be taught. Team leaders will be trained prior to their initial sampling events. All team leaders will be required to attend program training at least once every other or every three years. Other volunteers including the pickers and collectors will be offered training prior to or the day of the sampling event.

Training of Team Leaders and Collectors:

- The training covers program goals and objectives
- Macroinvertebrate collection methods
- Filling out field data sheets

- Safety issues and waivers
- Quality assurance practices.

Training will be held at the Conservation District or other location prior to each field event if the volunteer group changes.

A spreadsheet will be utilized by the Project Manager that lists all volunteers that have received training as well as the date and a brief explanation of their ability.

After the training at the Conservation District the participants will visit a stream to practice assessing physical habitat characteristics, sampling of macroinvertebrates and familiarity with identification to the order level. The Program Manager will maintain the database for the trained volunteers.

B1. Study Design and Methods

Sight1: “Hickory Creek Preserve”. Latitude 42.07459, Longitude -86.48094. This site was chosen as it is the last available place to sample before it enters the St. Joseph River at Eagle Point Marina. There is ample parking for volunteers in the hardware store parking lot, and a trail leads down to and along the river. The surrounding environment is a combination of forested, wetland, and commercial

Site 2: “Hickory Creek Park at South Cleveland Avenue”. Latitude 42.06333, Longitude -86.49483. This road/stream crossing site was chosen as it is a “EPA Water Monitoring Site” and a “Clean Watersheds Needs Survey Site”. Interesting data could be compared. There is a parking area off of the road and access to the stream is unencumbered. The surrounding environment is rural forested.

Site 3: “Bort-Lambrecht Drain”. Latitude 42.04907, Longitude -86.47512. This site was discussed as an interesting choice as it is a tributary to the Hickory Creek. It is channelized and a section of it was double-staged ditched about a decade ago. Our project partner, Dr. St. Amand, has conducted stream sampling at this site near a school dating back to 2005, using a similar qualitative macroinvertebrate index, and those data are stored on the server at PhycoTech, as well as some samples that have been maintained for archival purposes at the lab. There is ample parking in the school lot for volunteers, and this may also be a site for future inclusion of school children for later projects. The surrounding environment is mostly residential homes, and it is forested along the creek.

Site 4: “Hickory Creek Park, Stevensville, at John Beers Road”. Latitude 42.01445, Longitude -86.51668. This site is in the Village of Stevensville and in a high traffic area. There is a small park where parking will be available for volunteers. The surrounding environment is residential and commercial.

Site 5: “Baroda Village Park”. Latitude 42.95669, Longitude -86.49036 This site is in the Village of Baroda which has the highest per capita number of tool and die businesses in the United States. This information was included in our decision to use this site. It is a public site with visitors to the park and pavilion. Parking is ample for volunteers. Our partner Dr. St. Amand conducted sampling for PhycoTech in 1986, 1987, 1988. The surrounding environment is a combination of residential, agriculture, and commercial.

Site 6: “Brown Town Road”. Latitude 41.90005, Longitude -86.47464 The partners chose this road/stream crossing as it is near the southern end of the watershed nearly as far away from where it enters the St. Joseph River as it can get. This should provide a good representative sample as the creek begins its journey north to the outlet. Parking will be along the road on wide shoulders for volunteers. The surrounding environment is agriculture.

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% 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. Before leaving the site, the Team Leader will ensure the equipment is inspected, cleaned, and sanitized with a dilute bleach prior to reusing. The site will be inspected to make sure that no equipment or refuse is left behind.

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 to remain consistent each year. For each sampling site event that is not completed in a single day, monitoring by volunteers will be completed within the two-week period. If a site is temporarily inaccessible, for example by high water the Program Manager will consult with Paul Steen.

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 Nancy Carpenter at the BCCD 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 expert has 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. 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 BCCD 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.

Frequency and time frame of monitoring: The benthic population is sampled within a two-week period in late early May 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.

Taxonomic level of macroinvertebrate identification: Macro-invertebrate community will be monitored and identified to order level.

Literature and equipment used for identifying macroinvertebrates and analyzing samples: The identification events for general volunteers will be held at the BCCD or other location. Equipment used during ID events include: microscopes, hand magnifying lenses, plastic and metal forceps, eye droppers, plastic sorting trays, and macroinvertebrate references. Order-level and family-level data sheets for each sampling site will be on hand as well as the labeled sample bottles.

Chain of custody: All collections will be handed to the Project Manager and then to the Scientific Advisor (expert identifier) and returned to the Project Manager.

Equipment Quality Control:

- The Project Manager with an assistant will check to make sure equipment is in working order and not damaged.
- All equipment will be cleaned after taking it into the field using recommended decontamination procedures.
- Dates of purchase and last usage will be on all equipment.
- Expiration dates of chemical reagents will be checked before use. Any equipment batteries will be checked.
- Any equipment requiring calibrated will be tested before each use.

B2. Instrument/Equipment Testing, inspection and Maintenance

At least one week prior to the monitoring event, the Project Manager and Assistant will check all equipment carefully. Supplies for each team will be put in a 5-gallon pail to include smaller buckets, nets, plastic sorting trays, tweezers, eye droppers, one or two squirt bottles, an ice cube tray, clip board with pencil attached, datasheets for each site, a map, and pre-labeled jars with 70% alcohol. A first aid kit will be given to the Team leader. All equipment will be stored at the Berrien County Conservation District in the storage room.

- **D-frame nets:** inspected before and after sampling to look for any defects or tears. Nets are to be firmly attached to poles and free of holes. All nets hosed down after each use and allowed to dry and before storing.
- **Collection jars:** All jars will be opened and closed to ensure tight fit. Fresh ethanol will be provided for each sampling team prior to collection event. Damaged jars will be disposed of and new purchased.
- **Forceps/tweezers:** will be cleaned and inspected to make sure the tips still meet and are able to be used to pick bugs.
- **Sorting Trays:** inspected and washed to ensure ready to be used.
- **Buckets, ice cube trays and squirt bottles:** inspected for cracks and leaks.

- **Magnifiers/Scopes:** Will be cleaned and inspected to make sure they function properly
- **Waders:** Waders will be available to volunteers for collection events. They will be inspected for leaks and washed before storing.
- **First aid kit:** Each will contain a bandages, gauze tape and supplies for low risk injury.

B3. Inspection/Acceptance for Supplies and Consumables

- **D-frame nets:** Nets to be replaced when damaged or program grows, and more are needed. They will be labeled with purchase date.
- **Collection jars:** 24 4oz jars with poly seal tops will be purchased and resupplied when needed.
- **Forceps/tweezers:** 12 will be purchased. Replacements will be ordered when no longer functioning or the tips don't meet
- **70% alcohol:** Will purchase before first event and replace when all consumed
- **Sorting Trays:** 12 trays will be purchased and replaced as needed
- **Buckets, ice cube trays and squirt bottles:** will be purchased and replaced as needed
- **Waders:** Will be kept in the storage room next to the BCCD office and repurchased when needed; they will be leaked checked for each collection event.
- **First aid kit:** will be checked after each event to be restocked if needed.

Prior to event all data sheets will be printed and put onto the clip board for sampling event. All labels and any other material needed will be put into buckets for easy transportation. A list of supplies and consumables will be kept by the project manager and updated as new items are purchased with purchase dates.

B4. Non-direct Measurements

This section is not applicable to our project

B5. Data Management

All data are recorded on original field (order-level) and laboratory (family-level) paper data sheets. These data sheets are stored in hard copy and electronically at the BCD office. Raw data will be entered and managed in a Microsoft Excel spreadsheet. All data is backed up before and after each sampling event's data has been entered. Data will be entered by the Program Manager into the program's MS Excel database for long-term storage. Once a year, all new data will be entered into the MiCorps data exchange system. Data sheets will be filed with the BCCD indefinitely. Information will also be stored away from the office on a password protected flash drive. Field data sheets are checked by the Project Manager upon return to the BCCD office. Any omissions or confusions are clarified as soon as possible. The Program Manager will enter data into the spreadsheet which is then used for both analysis and reporting. The final data tables are checked against the field and laboratory data sheets. The results of monitoring will then be posted on the BCCD website and in their newsletter, as well as distributed directly to other key participants. Aquatic macroinvertebrates collected by volunteers during sampling events are identified to the family level or lowest taxonomic level possible.

Macroinvertebrate: Data will be 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) will also be computed.

Habitat: specific measures are used from habitat surveys to investigate problem areas at each site. The percentage of stream-bed composed of fines (sand and smaller particles) is calculated and changes are tracked over time as an indicator of sediment deposition.

Section C: System Assessment, Correction and Reporting

C1. System Audits and Response Actions

Volunteer Team Leaders trained by the Program Manager ensures that quality assurance protocols are followed and report any issues possibly affecting data quality. When significant issues are reported, the Program Manager may accompany groups in the field to perform side-by-side sampling and verify the quality of work by the volunteer team. In the event that a group is determined to have done a poor job sampling, a performance audit to evaluate how people are doing their jobs of collecting and analyzing the data is accomplished through side-by-side sampling and identification. During side-by-side sampling a team of volunteers and an outside expert sample the same stream. The statistic for checking this side-by-side sample is given in the Bias section (A7). A system audit is conducted following each spring and fall monitoring event to evaluate the process of the project. The system audit consists of the Program Manager, any other program leader, and one or two active volunteers, and is a start to end review of the monitoring process and how things could be improved for the next event. If deviation from the QAPP is noted at any point in the sampling or data management process, the affected samples will be flagged and brought to the attention of the Program Manager and the team that collected the sample. Re-sampling is conducted as long as the deviation is noted soon after occurrence and volunteers are available (two-week window). Otherwise, a gap must be left in the monitoring record and the cause noted. All corrective actions are documented and communicated to MiCorps staff. Details of the process for assessing data quality are outlined in section A7. Response to quality control problems is also included in section A7.

C2. Data Review, Verification, and Validation

A standardized data-collection form is used to facilitate spot-checking to ensure that forms are completely and correctly filled out. The Program Manager or a single trained volunteer reviews the data forms before they are stored in a computer or file cabinet. After data has been compiled and entered into a computer file, it is verified with raw data from field survey forms.

C3. Reconciliation with Data Quality Objectives

Data quality objectives are reviewed annually to ensure that objectives are being met. Deviations from the data quality objectives are reported by the Program Manager to MiCorps staff for assessment and corrective action. Also, data quality issues are recorded as a separate item in the database and are provided to data users. Response to and reconciliation of problems that occur in data quality are outlined in Section A7.

C4. Reporting

Throughout the duration of this program, quality control reports are included with quarterly project reports that are submitted to MiCorps. Quality control reports provide information regarding problems or issues arising in quality control of the project. These could include but are not limited to: deviation from quality control methods outlined in this document relating to field data collection procedures, indoor identification, data input, diversity calculations and statistical analyses. The Program Manager generates annual reports sharing results of the program with volunteers, special interest groups, local municipalities, and relevant state agencies. Data and reports will be made available via the BCCD’s web page.

Site Map

Hickory Creek Watershed

- Site #1 ●
- Site #2 ●
- Site #3 ●
- Site #4 ●
- Site #5 ●
- Site #6 ●

