# SECTION A: PROGRAM DESCRIPTION AND QUALITY OBJECTIVES
## A1. Title and Approval Sheet

## Quality Assurance Project Plan for

## Pine River/Van Etten Lake Watershed Volunteer-Based Stream Monitoring

Date: October 9, 2008

Version # 2

Organization: Huron Pines

QAPP Prepared by: Patrick Ertel

Title: Project Manager

Signature: _____

Other responsible individual: Gene Stagner

Title: Quality Assurance Manager

Signature: _____

(Other signatures may be added as necessary)

MiCorps Staff Use

Tracking Number:

MiCorps Reviewer: _____

☐ Approved ☐ Returned for modifications

# A2. Table of Contents

# A3. Distribution List

Gene Stagner
Pine River/Van Etten Lake Watershed Coalition
MiCorps Volunteer Project Manager

Joan Martin
MiCorps Project Administrator
Huron River Watershed Council

Paul Steen
Watershed Ecologist
Huron River Watershed Council

Steve Sendek
Fisheries Biologist
Michigan Department of Natural Resources

# A4. Program Organization

**Key Personnel** for the project are listed below:

Project Manager:

Patrick Ertel, Project Manager, Huron Pines – 501 Norway St, Grayling, MI 49738
989.344.0753 x19 or patrick@huronpines.org

Responsibilities:

- Grant administration and reporting between Huron Pines and Great Lakes Commission and MiCorps.
- Facilitate equipment acquisition, project design, implementation, and data reporting with the volunteer project manager.

Volunteer Project Manager:

Eugene Stagner, Volunteer Project Manager, Pine River/Van Etten Lake Watershed Coalition
989.739.5550 or gene.stagner@charter.net

Responsibilities:

- Perform as the overall project Quality Assurance Manager
- Coordinate and implement on-the-ground site selection, monitoring design, and event implementation.
- Coordinate and maintain volunteers and database to track participation. Oversee multiple sampling teams.
- Store equipment when not in use.

Scientific Advisor and Macro-Invertebrate Identification Expert:

Steve Sendek, Fisheries Biologist, Michigan Department of Natural Resources
989.348.6371 x7477 or sendeks@michigan.gov

Responsibilities:

- Provide guidance regarding future site selection.
- Answer questions surrounding habitat types and inclusion in sampling events.
- Identify macro-invertebrates that are otherwise unidentifiable by project managers.

**Roles filled by Key Personnel**

1. Management Responsibilities:
    - **Patrick Ertel** will manage all aspects of grant administration with MiCorps/Great Lakes Commission. In addition to grant related tasks, Patrick will also work with the volunteer project manager to ensure that all needs are met to facilitate the program implementation.
    - **Gene Stagner** is the Volunteer Project Manager. Tasks associated with that position will focus on organizing and managing the volunteers and each sampling event. Other tasks for Gene include organizing the identification events, data and sample management, and storing equipment.

2. Field Responsibilities:
    - **Gene Stagner** is the lead personnel in the field. Organizing, training, and managing the volunteers are Gene's primary roles. He will focus his energy on making sure the volunteers are properly trained and equipped to complete the sampling events. Gene will also be in charge of gathering the collections taken at each site.
    - **Patrick Ertel** will be available to assist Gene with any of the above tasks to better facilitate the field portion of the sampling events. Patrick will also be in the field participating in the sampling.
    - **Volunteers** will be participating in the collection, sorting, and bottling of samples during each sampling event.

3. Laboratory Responsibilities:
    - **Gene Stagner** will lead the laboratory sessions of this project. He is in charge of the identification events and storing of the samples. The equipment will also be stored at his home in between sampling events.
    - **Patrick Ertel** will participate in identification processes during the post sampling event ID session. Patrick will also be in charge of organizing any ID that needs to be made by Steve Sendek, the MDNR Fisheries Biologist for the Pine River system.
    - **Steve Sendek** is the Program Expert for identification of aquatic macro-invertebrates that may otherwise not be able to be identified by Gene, Patrick, or other volunteers.
    - **Volunteers** are going to participate in the sampling session using training provided by Gene and Patrick as well as the identification materials recommended and/or provided by MiCorps, such as the *Guide to Aquatic Invertebrates of the Upper Midwest*.

4. Corrective Action:
    - **Gene Stagner** is in charge of bringing to light areas in which improvement can be made for facets of the on-the-ground portions of the project. If actions are discovered that are compromising the integrity of the sampling work and/or the data collection, Gene is responsible for bringing those to light and working with Patrick to correct them.
    - **Patrick Ertel** has the responsibility of ensuring the project deliverables and work plan are in accordance with the details set forth in the contract. Upon discoveries of inconsistencies, Patrick will work with Gene to correct the measures. Patrick will also work with MiCorps staff to ensure contract details are directly followed.

# A5. Problem Definition/Background

The overall goal of this project is to establish baseline benthic macro invertebrate data and to monitor the health of our watershed as we go forward in the future. It is desired to ensure that the river and associated feeder streams do not significantly degrade further in their ability to sustain a cold water fishery. This project will also help to show any changes in the stream condition, as told through the macro invertebrate populations. Both negative and positive impacts in the watershed will be portrayed in our

data, reflecting effects of continued development as well as installation of Best Management Practices at streambank and road/stream crossing erosion sites. The most effective means through which to monitor the watershed is with the use of volunteers. Involving volunteers helps foster a sense of ownership amongst the residents of the watershed. The more aware the residents become of the health of their own waters, the more likely they are to support projects that are aimed at bettering water quality. Educating the residents and volunteers leads to stronger support and more accepted designs for projects focused on installing BMPs.

There are 183 road/stream crossings in the PRVEL watershed. Michigan DEQ guideline state that 30% of the road/stream crossings should be monitored. However, much of the PRVEL watershed is contained within the Huron National Forest and there is a low population density throughout. Therefore, we have chosen to evaluate those sites that can best give watershed quality information with the least demand on available resources.

Our watershed is primarily composed of the East, West, and South Branches of the Pine River and several smaller connecting streams, of which, Van Etten Creek is the longest. The Pine River is generally thought to be in good condition throughout the National Forest. Downstream of National Forest land erosion has filled much of the river with sand. Certain reaches of the Pine River system do support resident trout. Van Etten Creek has been placed on the 1998 Clean Water Act Section 303(d) Non-Attainment list for not meeting State of Michigan water quality standards. There appears to be little if any trout population in Van Etten Creek. Through other work initiated by the PRVEL Coalition and Huron Pines, there are efforts to improve the water quality of Van Etten Creek and bring it back to a high-quality cold-water fishery, similar to the other branches and tributaries in the Pine River watershed.

## A6. Program Description

Huron Pines, partnering with the Pine River/Van Etten Lake Watershed Council, is beginning to implement a volunteer stream-monitoring program on the Pine River and Van Etten Creek, located in Alcona and northern Iosco Counties. Focusing on sampling the benthic macro invertebrate population and assessing stream habitat, sampling events will be held twice per year, once in spring, once in fall. There will also be periodic assessments of the habitat diversity in the stream reaches being sampled. With an understanding of what habitat types exist, changes in habitat diversity can be detected and certain composition of aquatic macro-invertebrates can be anticipated. Habitat assessment efforts will take place during the first full year of sampling and then be repeated as determined by the project manager, MiCorps recommendations, and details set forth in this QAPP. The initial sampling will consist of 5 sites, with a minimum of two teams sampling multiple sites during each one day event. It is intended that the sampling from year to year will take place on a consistent target date, or weekend, with the realization that the actual date will depend primarily on weather and stream conditions. Ideally, the sampling will take place from year to year within a two-week window surrounding the desired date. As experience with the program is gained and the number of well-trained volunteers increases, it is anticipated that we will identify additional sites to add to the sampling program to better represent the entire watershed.

## A7. Data Quality Objectives

The data quality objectives listed below are for the sampling parameter to be focused on during this project: aquatic macro-invertebrate collection and identification and periodic habitat assessment. The data resulting from collection of the aquatic macro-invertebrates will lead to an understanding of the overall biodiversity of the sampled stream reach. The diversity and quantity of species will be used to determine an overall stream quality index based on formulas set forth in the MiCorps protocol.

**Precision**: 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), and [3] the transfer of collected macro-invertebrates from the net to the sample jars (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. 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.

In addition, the Program Manager will seek opportunities to compare results with those from an external sampling group, such as MDEQ. Every attempt will be made to collect duplicate samples in such a situation.

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

The Program Expert will make the final identifications for each sample. MiCorps staff will conduct a method validation review with the designated Program Expert to ensure his or her expertise, preferably prior to the first training session held by the Program Expert. This will be conducted with each new Program Expert added to a MiCorps monitoring program. This review will consist of a joint sampling event, with MiCorps staff jointly collecting, sorting and identifying the macroinvertebrates with the Program Expert. Any monitoring issues will be addressed on site. If no major concerns remain, the Program Expert will be considered "certified" by MiCorps.

**Bias**: Sites will be sampled by different team leaders at least once every three years in each season (two events among six sampling events) 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 subwatershed. Since not enough resources are available to allow the program to cover the entire watershed, some subwatersheds will not initially be represented. Additional subwatershed 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/Certifications

Both Gene Stagner, the Volunteer Project Manager, and Patrick Ertel, Project Manager, have had the hands-on MiCorps training to witness and learn first hand how a volunteer-based stream monitoring program is expected to work. In addition to the MiCorps training for new grantees, both Gene and Patrick have also had side-by-side training with MiCorps staff (Dr. Paul Steen).

Training will be provided to each volunteer participating in the project. Several volunteers have already accompanied Gene Stagner during "mock sampling events" to get a feel for what is being asked from the volunteers. During these sessions Gene instructs the volunteers about the protocol of how the sampling event is implemented, what types of habitat to look for, how to ensure each habitat has been sampled, and how to properly pick and sort the macro-invertebrates collected. One of these training sessions will be performed the night before each sampling event in the case that new volunteers have joined the program. The other way in which volunteers will receive training is through participation in an event with a group of well-experienced volunteers. The opportunity for the new volunteers to be able to "shadow" volunteers with more experience will allow them to ask real-time questions and learn hands-on, what is involved in the sampling events.

# SECTION B: PROGRAM DESIGN AND PROCEDURES

## B1. Study Design and Methods

As the project begins, the goal is to sample five sites, twice annually, that were selected to give the most parsimonious balance between number of sites and broad coverage of the watershed. The selection of the five sites was made to incorporate the effects of the several different land uses present in the Pine River System. Sites are located as to capture water quality data of individual branches of the Pine River as well as downstream from the confluence of all of the branches. Of particular importance is the water quality of Van Etten Creek and its effects on the water quality of Pine River after their confluence. Van Etten Creek is listed on the EPAs 303(d) list of non-attaining watersheds for its nutrient load. Two sites on Van Etten Creek will be sampled, along with three sites on the Pine River system.

**SITE DESCRIPTIONS (see attached map):**

1. Pine River
    a. Location – Alcona and Iosco Counties. N 44$^{o}$ 35' W 83$^{o}$ 32'.
    b. Proposed sampling sites –
        i. Pine River Campground, N 44$^{o}$ 33' 55" W 83$^{o}$ 35' 50"
            1. Site has been previously monitored by Oscoda High School monitoring team. Results have been posted on Michigan Lakes and Streams Web Site.
            2. Site has good, safe access.

3. Site is surrounded by Huron National Forest and is located at a campground.
4. The reason for monitoring this site is that the upper reaches of this site are feeder streams that are primarily located on private property that has mixed use, including farming. It is important to ensure that this part of the river is not degraded. It currently holds a trout population indicating it is in good health.

ii. Denolf Property, N 44° 32' 00" W 83° 24' 25"
1. Site has not been previously monitored.
2. Site has good, safe access. Previously site a Cruzen road has been monitored.
3. This site has private property on one side of the stream. The other side is owned by the State of Michigan.
4. This site was chosen because the North Branch, East Branch, and South Branch of the Pine River come together upstream of this site to form the main stream of the Pine River. Additionally, there are several feeder streams that feed into the Pine River branches and the Main Stream of the Pine River. The upper reaches of the North and East branches flow through both National Forest and mixed used private property, some of which is farmland. Monitoring this site will establish a baseline for the intermediate reaches of the Pine River system.

iii. Kings Corner Road, N 44° 30' 30" W 83° 24' 20"
1. Site has been previously monitored my Michigan DEQ
2. Site has reasonable access.
3. This site and all locations upstream to the confluence of Van Etten Creek and the Denolf Property are private property. Primarily the land is forested with limited available access.
4. This site was chosen because it will monitor after the confluence of Van Etten Creek, Roy Creek, Gray Creek and Duval Creek with the Main Branch of the Pine River.

2. Van Etten Creek
   a. Location – Alcona County. N 44° 36' W 83° 24'.
   b. Proposed sample sites –
      i. King Road, N 44° 36' 00" W 83° 23' 30"
         1. Site has been previously monitored by Michigan DEQ.
         2. Site has good, safe access.
         3. Van Etten Creek above this site flows through private land. The private land upstream is primarily farmland, some tilled, some still used for cattle grazing.
         4. This site was chosen because there are two sites upstream of this location that typically show high levels of coliform (see Attachment 3), however, by the time the creek flows through this site, it has cleaned itself significantly. It is important to monitor and ensure this site does not degrade further.
      ii. State Land on Barlow Road, N 44° 33' 00" W 83° 24' 00"
         1. Site has been previously monitored by Michigan DEQ.
         2. Site has good, safe access.
         3. Van Etten Creek between this site and the King Road site primarily flows through mixed use private land and very near the village of Mikado.
         4. This site was chosen because it is the last easily accessible site on Van Etten Creek. It is important to monitor to ensure that the health of the stream is not adversely affected by this site and the site on King Road.

**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 and overhanging vegetation or roots, and depositional areas, while wading and using a D-frame kicknet. The trained Streamside Leader will record the number of locations sampled within the monitored reach in each habitat type and note the locations sampled on a site map. 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. The streamside leader will instruct and assist other team members in detecting and collecting macro-invertebrates 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. Any variations in procedure should be explained on the data sheet attached below.

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, which is placed inside the jar. The data sheet also states the number of jars containing the collection from this site. The team leader is responsible for labeling and securely closing the jars, and the team manager is responsible for returning all jars and all equipment. Upon return to the Program building, 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 stored in the central office until they are examined and counted on the day of identification (one or two weeks later). 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 at the Program office indefinitely. The alcohol is carefully changed (to avoid losing small specimens) in the jars every few years.

• **Macroinvertebrate community** will be monitored and identified to family level twice per year, once in the Spring and once in the Fall. Equipment to be used for this process includes: 12" D-frame kicknet, forceps, white plastic sorting trays, waterproof-sealable jars, ethanol, and a dissecting microscope. Literature references used for identification are materials recommended and/or provided by MiCorps, such as the *Guide to Aquatic Invertebrates of the Upper Midwest.*

• **Habitat** will be monitored at least every five years in the summer or fall. Monitoring procedures and methods will be performed based on measures set forth by MiCorps. Data sheet is attached.

**Quality Control Checklists**

**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
- Check the batteries of all equipment that requires them
- Make sure equipment is calibrated appropriately before conducting each test

**Field Procedures Quality Control**:

- Collect replicate samples
- Conduct repeat and/or side-by-side tests performed by separate field crews
- At least once every three years in each season: change the composition of the field crews to maintain objectivity and minimize individual bias
- Review field records before submitting for analysis to minimize errors

Since our evaluation is based on the diversity in the community, we attempt to include a complete sample of the different groups present, rather than a random sub-sample. We do not assume that a single collection represents all the diversity in the community, but rather we consider our results reliable only after repeated collections spanning at least three years. Our results are compared with other locations, in the same river system that have been sampled in the same way. All collectors attend an in-stream training session, and most sites are sampled by different collectors at different times to diminish the effects of bias in individual collecting styles. Samples where the diversity measures diverge substantially from past samples at the same site are resampled by a new team within two weeks. If a change is confirmed, the site becomes a high priority for the next scheduled collection. Field checks include checking all data sheets to make sure each habitat type available was sampled, and the team leader examines several picking trays to ensure that all present families have been collected. All lab sorting is rechecked by an expert before completing identification. Equipment used in the field will be rinsed between sampling sites to prevent contamination from one site to the next.

## B2. Instrument/Equipment Testing, Inspection, and Maintenance

As sampling begins in the Pine River/Van Etten Lake Watershed, all of the equipment to be used is new, therefore in working order. A “dry-run” will be performed with each piece of equipment to ensure that each is in working order. The equipment to be used, and the inspection/maintenance methods for each, for the macro-invertebrate sampling are as follows:

- **D-frame Kick nets**: will be inspected before and after each sampling session to look for any defects or tears in the nets that could compromise the sample collection.
- **Collection Jars** (with poly seal caps): each jar and lid will be inspected for cracks or defects before each use. After jars are in use they will be inspected for leaky tops or improper seals, as well as any cracks or chips.
- **Forceps**: will be cleaned and inspected to make sure the tips meet before and after each sampling event.
- **Waders**: will be cleaned of mud or debris and dried thoroughly between sampling events. At that time, any reported leaks will be patched.
- **Dissecting Scope**: will be monitored to ensure that it remains in working order at all times.

While the equipment is not in use for its intended purpose, it will be stored at the home of either the Volunteer Project Manager, or in the office of the Project Manager.

No equipment will be used that will ever need a true calibration, though there are methods by which we can judge the effectiveness of the equipment being used. For example, the microscope must always be able to zoom and focus, waders not leak, nets be free of holes, and forceps must meet at the tips when squeezed.

## B3. Inspection/Acceptance for Supplies and Consumables

- **D-frame Kick Nets** – purchased October 2007/2008, replaced when damaged beyond repair
- **Collection Jars** – purchased September 2007, replace when all are consumed
- **Forceps** – purchased October 2008, replace when damaged to the point when tips do not meet when squeezed
- **Waders** - not yet purchased, will be replaced when they are beyond typical patch repair
- **Dissecting Scope** – purchased October 2008, will be maintained to hopefully not need replacing. If replacement is needed that will occur when scope does not function at the level needed.

- **Ethanol** – purchased September 2007, replace when all is consumed or past expiration date
- **Sorting Trays** – purchased October 2007/2008, to be replaced when they no longer function to the capacity needed
- **Microscope slides** - purchased October 2008, will be replaced when broken

## B4. Non-direct Measurements

This section is not applicable to our project.

## B5. Data Management

Raw data will be entered and managed in Microsoft Excel workbooks. All data is backed up before and after each sampling event's data has been entered and a CD is kept off premises. Computer passwords provide data security.

Data will be entered from data sheets directly into the online MiCorps database by a single, trained volunteer for storage within the MiCorps data exchange system. Data sheets will be filed at the central 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. A Stream Quality Index (SQI) is also computed. The method for calculating that metric is set forth by the MiCorps program and is displayed on each sample collection form.

Other data analysis quality controls include:

- Checking all calculations twice
- Review of hard copies of all computer entered data for errors by comparing to field data sheets.
- Having our Scientific Advisor review data analysis methods and results periodically.

# SECTION C: System Assessment, Correction and Reporting

## C1. System Audits and Response Actions

The main facet of system auditing for this program will originate from a self-evaluation session after each sampling and identification event. During that meeting Gene Stagner and Patrick Ertel will discuss the overall success of the sampling/ID events. That is when we will bring up areas in which we can improve. Within the first two sampling sessions, the program will have the scientific advisor observe the process of sampling and ID events. After that observation, changes that need to be made based on maintaining scientific integrity will be made.

- Side-by-side sampling will take place during which a team of our volunteers and an outside expert will sample the same stream. Agreement in sample composition between the two should be 70% or greater.
- Data sheets will incorporate essential QAPP procedures, such as the number of net samples taken from each type of habitat.
- Volunteer team leaders trained by MiCorps will monitor that quality assurance protocols are followed and report any issues possibly affecting data quality.

The total diversity reported by each team must equal at least 70% of the diversity previously found at the site. Sites with results less than 70% will be re-sampled by experts to verify or discard such unusual results, which could be the result of less-than-thorough sampling.

If deviation from the QAPP is noted at any point in the sampling or data management process, the affected samples may be deleted from the data set. Re-sampling will be conducted if warranted and feasible, given that the deviation is noted soon after occurrence and volunteers are available. Otherwise,

a gap may be left in the monitoring record. All corrective actions, such as above, will be documented and communicated to MiCorps.

## C2. Data Review, Verification, and Validation

After each sampling/ID event, a review and verification of the data will occur. During that time one or all of Gene Stagner, Steve Sendek, and Patrick Ertel 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. Spot checking of ID of the macro-invertebrates will be performed by the ID expert, Steve Sendek. If a sample is found to be outside of the accepted 70% similarity range to 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 based on the reporting frequency and requirements set forth in the contract.

## C3. Reconciliation with Data Quality Objectives

In order to best determine if the data meets the DQOs set forth in section A7, we will assess our data as soon after it was collected as possible. This will have to occur before or on the date of the identification session. If the DQOs are not fully met, corrective actions will begin immediately. Any limitations discovered in the data will be identified and reported to the project manager, MiCorps and data users.

## C4. Reporting

Reporting will be a key component to the success of this project. Both internal reporting from volunteers to project managers and from project managers to the scientific advisor will ensure continued success of the sampling/ID events. Many of these reports will be informal and completed over email or the telephone, if they are not done in person. More formal reporting will also take place regularly from the program managers to the MiCorps program administer (Joan Martin).

MiCorps Site ID#:_____

Michigan Clean Water Corps

# Stream Macroinvertebrate Datasheet

**Stream Name:** _____

Location:_____ (Circle one: *Upstream* or *Downstream* of road?)

Date:_____ Collection Start Time:_____ (AM/PM)

Major Watershed:_____ HUC Code (if known):_____

Latitude:_____ Longitude:_____

**Monitoring Team:**

Name of Person Completing Datasheet:_____

Collector:_____

Other Team Members:_____

**Stream Conditions:** Average Water Depth:_____ feet

Is the substrate covered with excessive silt? ____ No ____ Yes (describe:_____)

Substrate Embeddedness in Riffles: ____ 0-25% ____ 25-50% _____ > 50% ____ Unsure

Did you observe any fish or wildlife? ( ) Yes ( ) No If so, please describe:_____

**Macroinvertebrate Collection:** Check the habitats that were sampled. Include as many as possible.

____ Riffles
____ Cobbles
____ Aquatic Plants
____ Runs
____ Stream Margins
____ Leaf Packs
____ Pools
____ Undercut banks/Overhanging Vegetation
____ Submerged Wood
____ Other (describe:_____ _____ )

Did you see, but not collect, any **live crayfish**? (___ Yes ___ No), or **large clams**? (___ Yes ___ No)
**remember to include them in the assessment on the other side!**

**Collection Finish Time:** _____(AM/PM)

Datasheet checked for completeness by:_____ Datasheet version 10/08/05
Data entered into MiCorps database by:_____ Date:_____

MiCorps Site ID#:_____

Michigan Clean Water Corps

## IDENTIFICATION AND ASSESSMENT

Use letter codes [**R** (rare) = 1-10, **C** (common) = 11 or more] to record the approximate numbers of organisms in each taxa found in the stream reach.

*** Do NOT count empty shells, pupae, or terrestrial macroinvertebrates***

### Group 1: Sensitive

____ Caddisfly larvae (Trichoptera)
*EXCEPT Net-spinning caddis*
____ Hellgrammites (Megaloptera)
____ Mayfly nymphs (Ephemeroptera)
____ Gilled (right-handed) snails (Gastropoda)
____ Stonefly nymphs (Plecoptera)
____ Water penny (Coleoptera)
____ Water snipe fly (Diptera)

### Group 2: Somewhat-Sensitive

____ Alderfly larvae (Megaloptera)
____ Beetle adults (Coleoptera)
____ Beetle larvae (Coleoptera)
____ Black fly larvae (Diptera)
____ Clams (Pelecypoda)
____ Crane fly larvae (Diptera)
____ Crayfish (Decapoda)
____ Damselfly nymphs (Odonata)
____ Dragonfly nymphs (Odonata)
____ Net-spinning caddisfly larvae
(Hydropsychidae; Trichoptera)
____ Scuds (Amphipoda)
____ Sowbugs (Isopoda)

### Group 3: Tolerant

____ Aquatic worms (Oligochaeta)
____ Leeches (Hirudinea)
____ Midge larvae (Diptera)
____ Pouch snails (Gastropoda)
____ True bugs (Hemiptera)
____ Other true flies (Diptera)

STREAM QUALITY SCORE

Group 1:
____ # of R's * 5.0 = ____
____ # of C's * 5.3 = ____
Group 1 Total = _____

Group 2:
____ # of R's * 3.0 = ____
____ # of C's * 3.2 = ____
Group 2 Total = _____

Group 3:
____ # of R's * 1.1 = ____
____ # of C's * 1.0 = ____
Group 3 Total = _____

Total Stream Quality Score = _____
*(Sum of totals for groups 1-3; round to nearest whole number)*

Check one:
____ Excellent (>48)
____ Good (34-48)
____ Fair (19-33)
____ Poor (<19)

Identifications made by:_____

Rate your confidence in these identifications: Quite confident Not very confident
5 4 3 2 1

Datasheet checked for completeness by:_____ Datasheet version 10/08/05
Data entered into MiCorps database by:_____ Date:_____

MiCorps Site ID#:_____

Michigan Clean Water Corps

# Stream Habitat Assessment

**Stream Name:**_____

Location:_____ (Circle one: *Upstream* or *Downstream* of road?)

Date:_____ Start Time:_____ (AM/PM)

**Monitoring Team:**

Name of Person Completing Datasheet: _____

Other Team Members:_____

_____

_____

**Location Information:**

Major Watershed:_____ HUC Code (if known):_____

County:_____ Township: _____ Sec T R ¼ ¼

Latitude: _____ Longitude: _____

Lat./Long. Coordinate Determination Method (check one):
___ GPS ___ GPS w/ DBR ___ Digital mapping software ___ Topographic map

___ Other (describe _____) Map Scale (if known _____)

Did you assess 300 feet of stream? _____ If not, how much? _____ Why?_____

***Reminders:***

*Take photographs of the site as you work.*
*Left and right are determined as you are facing downstream.*

Datasheet Checked for Completeness by:_____ Datasheet Version 6/23/05
Data entered into MiCorps Database by:_____ Date:_____

MiCorps Site ID#:_____

# PHYSICAL HABITAT

## BACKGROUND INFORMATION

| | | | | | |
|---|---|---|---|---|---|
| Storm Event Conditions noted at site? | None | Light | Moderate | | Heavy |
| Days since Rain | ≤ 1 | 2 | ≥ 3 | | Unknown |
| Water Temp./D.O./pH * | | | | | |
| Water Color | Clear | Gray | Brown | Black | Green |
| Water body Type-upstream | Stream | Lake | Impound | | Wetland |
| Water body Type-downstream | Stream | Lake | Impound | | Wetland |
| Stream Width (ft.) | <10 | 10-25 | 25-50 | | >50 |
| Avg. Stream Depth (ft.) | <1 | 1-3 | >3 | | Unknown |
| Water Velocity (ft/s) * | | | | | |
| Stream Flow Type | Dry | Stagnant | L | M | H |

## PHYSICAL APPEARANCE
(Circle all that apply)

| | | | |
|---|---|---|---|
| Aquatic Plants | None | Present | Abundant |
| Floating Algae | None | Present | Abundant |
| Filamentous Algae | None | Present | Abundant |
| Bacterial Sheen/Slimes | None | Present | Abundant |
| Turbidity | None | Present | Abundant |
| Oil Sheen | None | Present | Abundant |
| Foam | None | Present | Abundant |
| Trash | None | Present | Abundant |
| | | | |
| | | | |

## SUBSTRATE (%)
(add to 100%)

| | |
|---|---|
| Boulder – 10" diameter | |
| Cobble/Gravel – 0.08" to 10" diameter | |
| Sand – coarse grain | |
| Silt/Detritus/Muck - fine grain/organic matter | |
| Hardpan/Bedrock – solid clay/rock surface | |
| Artificial – manmade | |
| Unknown | |

## INSTREAM COVER
(circle one)

| | | |
|---|---|---|
| Undercut Banks | Yes | No |
| Overhanging Vegetation | Yes | No |
| Deep Pools | Yes | No |
| Boulders | Yes | No |
| Aquatic Plants | Yes | No |
| Logs or Woody Debris | Yes | No |

## RIVER MORPHOLOGY

| | | | | | | |
|---|---|---|---|---|---|---|
| Riffle | Present | | | Abundant | | |
| Pool | Present | | | Abundant | | |
| Channel | Natural | Recovering | | | Maintained | |
| Designated Drain | ? | Y | | | N | |
| Highest Water Mark (ft) | ? | <1 | 1-3 | 3-5 | 5-10 | >10 |

## STREAM CORRIDOR

| | | | | |
|---|---|---|---|---|
| Riparian Veg Width (feet - Left Bank) | <10 | 10-30 | 30-100 | >100 |
| Riparian Veg Width (feet - Right Bank) | <10 | 10-30 | 30-100 | >100 |
| Bank Erosion | 0 | L | M | H |
| Streamside Land Cover | Bare | Grass | Shrub | Trees |
| Stream Canopy % | <25 | 25-50 | | >50 |

## Typical Stream Cross Section Sketch

## Adjacent Land Uses Seen
(circle all that apply)

| | Left | Right |
|---|---|---|
| Wetlands | L | R |
| Shrub or Old Field | L | R |
| Forest | L | R |
| Pasture | L | R |
| Crop Residue | L | R |
| Row Crop | L | R |
| Residential Lawns, Parks | L | R |
| Impervious Surface | L | R |
| Disturbed Ground | L | R |
| No Vegetation | L | R |

*** Optional Data Item**

Michigan Clean Water Corps

Datasheet Checked for Completeness by:_____ Datasheet Version 6/23/05
Data entered into MiCorps Database by:_____ Date:_____

MiCorps Site ID#:_____

Stream Name:_____ Location:_____

| POTENTIAL SOURCES OF STREAM DEGRADATION (Severity: S – slight; M – moderate; H – high) (Indicate all that apply) | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Crop Related Sources** | **S** | **M** | **H** | **Land Disposal** | **S** | **M** | **H** |
| **Grazing Related Sources** | **S** | **M** | **H** | **On-site Wastewater Systems** | **S** | **M** | **H** |
| **Intensive Animal Feeding Operations** | **S** | **M** | **H** | **Silviculture (Forestry NPS)** | **S** | **M** | **H** |
| **Highway/Road/Bridge Maintenance and Runoff (Transportation NPS)** | **S** | **M** | **H** | **Resource Extraction (Mining NPS)** | **S** | **M** | **H** |
| **Channelization** | **S** | **M** | **H** | **Recreational/Tourism Activities (general)** | **S** | **M** | **H** |
| **Dredging** | **S** | **M** | **H** | • **Golf Courses** | **S** | **M** | **H** |
| **Removal of Riparian Vegetation** | **S** | **M** | **H** | • **Marinas/Recreational Boating (water releases)** | **S** | **M** | **H** |
| **Bank and Shoreline Erosion/ Modification/Destruction** | **S** | **M** | **H** | • **Marinas/Recreational Boating (bank or shoreline erosion)** | **S** | **M** | **H** |
| **Flow Regulation/ Modification (Hydrology)** | **S** | **M** | **H** | **Debris in Water** | **S** | **M** | **H** |
| **Upstream Impoundment** | **S** | **M** | **H** | **Industrial Point Source** | **S** | **M** | **H** |
| **Construction: Highway, Road, Bridge, Culvert** | **S** | **M** | **H** | **Municipal Point Source** | **S** | **M** | **H** |
| **Construction: Land Development** | **S** | **M** | **H** | **Natural Sources** | **S** | **M** | **H** |
| **Urban Runoff (Residential/ Urban NPS)** | **S** | **M** | **H** | **Source(s) Unknown** | **S** | **M** | **H** |

Additional Comments:

Please use this space to make any additional comments about site conditions or this assessment process…

Finish Time: _____ (AM/PM)