

**Quality Assurance Project Plan for  
Grand Traverse Bay Adopt-A-Stream**

Date: December, 2016

Version # 8

Organization: Watershed Center Grand Traverse Bay

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Signature of reviewer	Date

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### **A3. Distribution List**

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## **A4. Project Organization**

### **Heather Smith, Project Manager**

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The Watershed Center Grand Traverse Bay  
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#### Project Manager :

Responsible for all aspects of project management, fieldwork, event preparation, quality control and assurance, corrective actions, records, and volunteer training, communication and recruitment. Reports to Executive Director.

#### **Volunteer Roles:**

Team Leader: Responsible for field assessment and collection oversight and attends all required trainings; reports to Project Manager. Team Leader responsibilities can be shared among team members; however, at least one team member needs to assume Team Leader responsibilities each sampling season and attend necessary training (see Section A8).

Bug Experts: Responsible for helping the Project Manager verify macroinvertebrate identifications from all volunteer teams each sampling season. Bug Expert volunteers will have advanced aquatic entomology experience and will be appointed by the Project Manager and Executive Director.

Collectors: Participates in field assessments/macroinvertebrate collections, may opt to participate in Team Leader trainings; reports to Team Leader.

*Note: The Watershed Center suggests volunteer teams be composed of 2-5 adults; however, teams are only required to have one member 18 years of age or older. At least one member needs to assume Team Leader responsibilities each sampling season.*

## **A5. Problem Definition/Background**

The Grand Traverse Bay watershed is one of the premier tourist and outdoor recreation regions in the State of Michigan. Its natural resource base and beauty contribute significantly to the quality of life enjoyed by year-round and seasonal residents, and the area's continued growth and relative prosperity. The same resource base that contributed to this region's desirability as a place to live and visit is under considerable pressure to support continued development.

The approved Grand Traverse Bay Watershed Protection Plan states that sediment and excessive nutrient loading are two of the highest priority pollutants that are threatening the cold water fishery, aquatic life, and other designated uses in the Grand Traverse Bay watershed. Other pollutants that threaten the watershed's designated uses include thermal pollution, toxins, changes in hydrologic flow, invasive species, pathogens, and loss of habitat. All of these pollutants and physical changes degrade water quality, destroy aquatic habitat, and reduce the number and diversity of aquatic organisms.

It is important to monitor the health of not only the larger streams in the watershed, like the Boardman River, but the small tributaries draining directly to the Bay. These small tributaries have the potential to negatively effect water quality. This is especially important because many of these smaller streams run through residential and commercial areas, which increases the risk of pollution from stormwater and other nonpoint sources. As part of our Adopt-A-Stream program, we are monitoring these small, wadable streams throughout our watershed by sampling macroinvertebrates, which are indicators of stream health because of their known tolerances to pollutants. In addition, our Adopt-A-Stream volunteers conduct habitat surveys to document changes in riparian areas and stream habitat.

Adopt-A-Stream data indicate which streams have degraded water quality, and habitat surveys may indicate sources of potential pollutants. Data gathered from our Adopt-A-Stream program enhances local land use planning efforts. Results provide residents and local planners with a quick baseline assessment of our area streams' condition. The Watershed Center uses results from our volunteer stream monitoring program to assist us with our ongoing protection efforts including stream restoration projects, BMP installation, and partnering with local governments, NGO's, and residents for outreach and education purposes. Results are distributed to local media and posted on The Watershed Center's website.

## **A6. Project Description**

The Watershed Center's Adopt-A-Stream program implements volunteer stream monitoring protocols developed by Michigan Clean Water Corps (MiCorps) and includes both benthic macroinvertebrate sampling and a stream/riparian habitat assessment. MiCorps was created to support the Michigan Department of Environmental Quality's (MDEQ) efforts in collecting and sharing water quality data.

Adopt-A-Stream provides valuable water quality data to track and detect changes to stream systems within the Grand Traverse Bay watershed. Adopt-A-Stream also serves as an important educational tool. It will continue to be marketed as a community effort where volunteers can take ownership and pride in their local streams, while engaging in a fun, hands-on program. It provides an opportunity to educate citizens on land use and resulting effects on water quality as well as water quality monitoring parameters. Most importantly, Adopt-A-Stream increases interest and awareness of watershed issues and stewardship of freshwater resources among area residents and visitors. Recruitment of volunteers will be a year-round activity and will include advertising in local newspapers, on The Watershed Center's website, and on Facebook as well as face-to-face recruitment.

At least one volunteer from each sampling team (referred to as the "Team Leader") is trained prior to the sampling season on all MiCorps Volunteer Stream Monitoring protocols. Each team is assigned to a stream, with a specific 300ft of stream to be sampled. Sampling seasons begin on the first Saturdays of June and October and continue for the following two weeks, ending on a Saturday. Team Leader trainings occur each spring and fall before the onset of the sampling season.

Each team is outfitted with an Adopt-A-Stream sampling kit and waders or hip boots. A Stream Macroinvertebrate datasheet from MiCorps (attached) is used to record the number and diversity of macroinvertebrates found in streams as well as the types of aquatic habitat sampled; macroinvertebrate sampling is conducted every sampling season. A Stream Habitat datasheet from MiCorps (attached) is used to survey the riparian habitat at each site at a minimum of once every 5 years. After sampling is completed, teams return sampling kits, datasheets, and collected and preserved macroinvertebrates to The Watershed Center.

Tributaries sampled include both streams that flow into larger stream systems within the Grand Traverse Bay watershed and streams that flow directly into Grand Traverse Bay. Sample sites are located primarily at road-stream crossings or on publicly owned lands; some sites may be accessible only through private property. Sites are selected based on a number of criteria including size, accessibility, location within sub-watersheds, proximity to other sampled sites, location in the stream network, and data needs. Maps of current sampling site locations are available. Permission for access is gained prior to sampling for all sites accessed by private property.

## **A7. Data Quality Objectives – Macroinvertebrate Sampling**

Precision: Precision evaluates how consistently a program produces results. Along with bias, precision measures get as close to the accuracy (how close the measurements are to the true value) of results as is possible when conducting biological monitoring. Measures of precision and bias are critical to assuring that data are credible and reflect actual conditions.

The following techniques will be reviewed during the training/retraining of Team Leaders and during QA/QC checks: [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 macroinvertebrates 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. Bug Experts will verify all identifications made by the volunteer teams by re-identifying invertebrates in sample jars. The Bug Experts will adjust datasheets (if necessary) to ensure they reflect the verified biotic index numeric score before it is uploaded into the MiCorps database.

Bias: Bias is a measure of systematic error. Bias can be introduced by the methods used in all sampling events or by individual samplers or teams. Procedures must be in place to detect bias in sampling teams.

When a Team Leader brings back their sample jars, and there are significantly fewer, or significantly more macroinvertebrates than in previous samples, teams will be questioned as to the conditions of the stream, and possible changes in their team that may be attributed to the change. The Project Manager will then reinforce the importance of the techniques described above. Time permitting, Watershed Center Staff will re-sample the site within two weeks to ensure samples are complete and/or bias has not been introduced.

Team Leaders and their volunteers have adopted specific streams and will therefore sample the same stream each sampling season. However, at least once every third year, a different team or different team members, will sample each site for a single collection event in order to check for systematic bias. If there is a large discrepancy between biotic index scores among sampling teams, the Project Manager will consult with MiCorps staff about data bias and develop a course of action to improve integrity.

Completeness: Completeness is a measure of the proportion of data obtained that is judged to be valid. Completeness combines the results from all teams to give the Project Manager a measurement of how the program is functioning overall. Not all data generated in a study is automatically acceptable for use as data may fail QA/QC review.

Before each sampling season, samples from the previous season will be checked by a Bug Expert and each team will receive their datasheet with the verified biotic index score and potential misidentified species descriptions as well as a commonly misidentified macroinvertebrate PDF

for the season. Teams will be able to recognize identification errors and will be encouraged to work with the Program Manager for further identification training and practice.

Representativeness: This refers to the degree to which the measured data reflect the true conditions in the environment being studied. Since this is difficult to measure directly, a qualitative discussion of site selection and sampling methodologies is presented here.

Sampling locations within sites are selected to represent the full variety of stream habitat types available, emphasizing the inclusion of riffle habitat. All available habitats within each site will be sampled and documented to ensure a thorough sampling of all of macroinvertebrates inhabiting the stream location. Additional sampling sites will be added as resources and volunteers allow.

Comparability: Comparability is a measure of the confidence with which one data set or method can be compared to another. At the core of this measure is the degree to which sampling methods are identical across all sampling events. The primary goal is for data comparability across space and time, despite being measured by different volunteers on different dates. MiCorps has established standard methods for all programs utilizing MiCorps protocols to increase the degree of comparability across the state.

To ensure data comparability, all volunteers will follow the same sampling protocols and use the same units of reporting. Program trainers will learn standard MiCorps monitoring protocols at annual MiCorps trainings and will train their volunteers to follow these protocols to ensure comparability across space and time. All sampling will be completed within the two-week sampling window each spring and fall.

If a site is inaccessible (due to unsafe conditions and/or volunteer time conflicts), the team will be encouraged to sample after the sampling window, but will be notified that this data will not be accepted by MiCorps. If a team knows beforehand that they will be unavailable to sample during the two-week sampling window, they will be asked to contact the Project Manager as soon as possible so that another monitoring team can sample the site.

If repeated issues with data quality and integrity occur, the Program Manager will consult with MiCorps staff to determine causes of compromised data and develop a course of action to improve quality and integrity.

## **A8. Special Training/Certifications**

Heather Smith, Project Manager, has been involved in The Watershed Center's Adopt-A-Stream Program since 2016 and has attended the MiCorps Conference and Training in fall 2016. Smith has three years experience coordinating volunteer stream monitoring programs, including order-level identification of macroinvertebrates. Smith has been involved in volunteer monitoring projects since 2006, including volunteer stream, lake, and beach monitoring.

A half-day, in-person training session will be offered once in the spring and once in the fall prior to the two-week sampling window. This training session will serve two purposes - to orientate and train new Team Leaders in Adopt-A-Stream protocols and to “refresh” current Team Leaders.

The half-day training session will include a classroom and in-field portion.

In the classroom, the following topics will be covered:

1. Overview of MiCorps and program goals
2. Safety procedures
3. Introduction to protocols
4. Data quality and QA/QC
5. AIS decontamination
6. Macroinvertebrate orientation, including opportunity for volunteers to identify a reference collection of macroinvertebrates for practice.

The second half of the session will be conducted in the field at an area stream where the following topics will be covered:

1. Description of equipment and sampling kit.
2. Explanation of field datasheets – Stream Macroinvertebrate datasheet; Stream Habitat datasheet.
3. Explanation/demonstration on how to use sampling equipment. Team leaders will collect macroinvertebrate samples to identify streamside.
4. Stream-side practice in identifying macroinvertebrates.

New Team Leaders are required to attend a half-day, in-person training prior to joining the program. In addition, new Team Leaders are required to shadow veteran monitors in the field prior to sampling on their own. Each new Team Leader will be given the choice to either:

- A) Join a team of seasoned volunteers as they sample. The new Team Leader will witness the seasoned team of volunteers sample and identify macroinvertebrates and fill out all necessary datasheets. Approved teams of seasoned volunteers will be at the Project Manager’s discretion.
- B) Sample their new site with the aid of the Project Manager. This will allow the new Team Leader to be coached through macroinvertebrate sampling and identification as well as completing datasheets.

Each new volunteer team will be mandated to send at least one designated Team Leader to a in-person training session once a year for three years to ensure they understand protocols (referred to as the “training period”).

After the volunteer team has successfully completed three in-person training sessions within the first three years of initiation into the program, they will graduate from the “training period”. The team will be able to send their Team Leader (or one member from each team if Team Leader duties are shared) to the in-person training session once every three years as a refresher.

In the years that Team Leaders do not attend in-person training, they will be asked to review protocols through online media (video, webinar, etc.) and take a corresponding quiz. Team Leader responsibilities can be shared among team members; however, to become a Team Leader and assume those responsibilities for a season, one must attend in-person/online training each year.

An electronic and hard copy list of all volunteers who have completed training is maintained by the Project Manager.

All volunteers are welcomed to the in-person training each spring and fall.

## **SECTION B: PROJECT DESIGN AND PROCEDURES**

### **B1. Study Design and Methods**

Adopt-A-Stream sites are sampled twice per year, once in the first two weeks of June and once in the first two weeks of October. Volunteers sample streams for macroinvertebrates, which are indicator organisms used to gauge the health of a stream, and record stream conditions such as average water depth and substrate information, each sampling season. Volunteers conduct a more thorough stream habitat assessment, which includes information on riparian habitat and potential sources of stream degradation, at a minimum of once every five years. Photo documentation, including one upstream and one downstream photo at each site, is encouraged each sampling season to help provide insight into changing conditions.

As more volunteers are recruited, additional sites will be chosen to further widen the scope of investigation or in response to specific issues or concerns. For example, if a new road is planned, then a site will be selected to measure potential impacts. This site selection process will ensure that volunteer monitoring provides both an overview of water quality in the Grand Traverse Bay watershed and information about suspected or known stressors.

Team Leaders will pick up equipment at The Watershed Center prior to sampling their stream. Each team will be outfitted with a sampling kit consisting of:

- Clipboard
- MiCorps Macroinvertebrate datasheet
- MiCorps Stream Habitat datasheet (only if doing habitat)
- Laminated identification sheets
- Laminated MiCorps Survey/Sampling Tips Sheets
- Adopt-A-Stream sign
- Laminated index card with 1” tick marks
- White trays
- Large and small magnifying glasses
- Thermometer
- Plastic cups
- Turkey baster
- Eye dropper

- Small plastic pipettes
- Collection jar(s) with ethanol (one for each site)
- Glass vials
- Forceps
- Plastic tweezers
- Ice cube trays
- Pencils
- Insect repellent
- D-nets
- Hip boots/waders
- Map of site location (if unfamiliar with site)

Sampling kits and all sampling equipment are stored at The Watershed Center's office.

Volunteer teams sample their assigned stream site on their own schedule, within the two-week sampling window each spring and fall.

Habitat Assessment: A MiCorps Stream Habitat datasheet will be used to complete a habitat assessment upon arrival at each site (if necessary). This sheet will record background information on the stream, as well as information regarding the physical appearance, substrate, in-stream cover, river morphology, stream corridor and potential sources of pollution. The datasheets also provide space for notes with regard to weather and/or flow conditions.

Macroinvertebrate Sampling: Multiple D-net samples (at least two) will be taken from each habitat present at the site, including riffles, cobble, aquatic plants, runs, stream margins, leaf packs, pools, undercut banks/overhanging vegetation, and submerged woody debris. A D-frame kick net will be used to collect samples; volunteers will place the net flush with the stream bottom with the net opening facing up-stream. One volunteer (termed "the Collector") will kick into the substrate in front of the net, dislodging any cobble, stones, etc., in order to release and capture macroinvertebrates. The nets will also be used under undercut banks to dislodge any invertebrates. Sampling will occur for 30-60 minutes at each stream site.

The Collector(s) will periodically transfer the material from the net into white trays. Other volunteers will sort macroinvertebrates by type and place them into an ice cube tray for identification. Identification of macroinvertebrates will be done with the assistance of the Team Leader (or other volunteers who've attended training) and identification guides and keys included in the collection kits. Macroinvertebrate identification will occur for roughly 60 minutes at each site to ensure complete identification. Macroinvertebrates will be preserved in a collection jar with 70% isopropyl alcohol and each jar will be labeled on the cap and jar with stream name, location, and date.

Streams receive a macroinvertebrate score based off of a biotic index; this index is based on the diversity and abundance of macroinvertebrates present. All macroinvertebrates found will be preserved with the exception of the presence of more than 15 of one type. After 11, a specimen is considered common. However, keeping a few extra in case of misidentification will be encouraged. A MiCorps Macroinvertebrate datasheet will be used to record the number and

diversity of macroinvertebrates found in the streams, as well as types of habitats sampled. This sheet breaks down macroinvertebrates into sensitive, somewhat sensitive, and tolerant groups (classified down to Order). Stream sites with greater numbers and types of ‘sensitive’ insects will score higher on the ranking system than sites with lower numbers or more ‘tolerant’ insects.

Prior to leaving a site, volunteers will be instructed to wash/rinse equipment. Each team will be provided with information on aquatic invasive species decontamination and will be encouraged to take decontamination steps to lessen the likely hood of unintended invasive introductions if using equipment at multiple sites. After sampling is complete, teams will return sampling kits, datasheets, and preserved macroinvertebrates to The Watershed Center.

Volunteer teams will be encouraged to error on the side of caution if conditions are risky or dangerous (ex: high water levels or fast-moving streams). Teams will be asked to alert the Project Manager as soon as possible if they anticipate being unable to sample during the two-week sampling window.

## **B2. Sample Handling and Custody**

Macroinvertebrate collection jars will be clearly labeled before distribution to volunteer teams each season. After sampling, collection jars will be returned directly to The Watershed Center office for storage and verification by the Bug Experts. Upon return from the field, each team’s jar and datasheets will be reviewed for completeness and legibility and jars will be checked for labels and a tightly fitting lid. Samples will be stored at The Watershed Center for a period of three years.

## **B3. Analytical Methods**

The habitat and benthic macroinvertebrate assessment methods used have been developed by the MiCorps and MDEQ for volunteer monitoring programs and are attached to this QAPP (“Volunteer Monitoring Procedures”). These methods are consistently used by volunteer organizations throughout Michigan.

See Section B2 for monitoring procedures.

## **B4. Quality Assurance and Quality Control (QA/QC)**

To ensure the quality and integrity of the program, a series of quality assurance (processes-oriented) and quality control (product-oriented) measures will be employed.

### Equipment QA/QC:

Equipment will be checked prior to usage to make sure it is in acceptable working order (nets inspected for tears/holes, specimen jars inspected for proper seal, etc.). All equipment will be cleaned before and after field sampling.

### Field Procedures QA/QC:

All Team Leaders will attend an in-person, half-day training session and will “shadow” or be “coached” by a vetted volunteer team and/or the Project Manager prior to joining the program (see Section A8). New Team Leaders, who’ve been involved in the program for three years or less, will attend an in-person training each year. Veteran Team Leaders will attend an in-person training every three years and web-based trainings in off years. All macroinvertebrate samples will be verified by the Bug Experts before final biotic indices are recorded for each site.

Volunteer teams will be contacted by the Project Manager at the end of each sampling season to pinpoint potential macroinvertebrate identification errors. If biotic indices diverge substantially from past biotic indices at the same site, the Project Manager will examine the discrepancy and take appropriate actions including withholding data from the MiCorps database and speaking with the sampling team to determine the next course of action (re-training, shadowing an expert, sampling with the Project Manager, etc.). All datasheets will be reviewed by the Project Manager to check for transcribing errors.

Each season, the Project Manager will perform a QA/QC check with 10% of volunteer teams, which will entail observing volunteers sampling streams for macroinvertebrates, filling out datasheets, identifying macroinvertebrates and preserving samples. This will allow the Project Manager to observe if monitoring protocols are followed; this will also provide an opportunity for the Project Manager to discuss any deviations from protocol. See Sections A7, A8, B1, and B2 for more information.

### **B5. Instrument/Equipment Testing, Inspection, and Maintenance**

All sampling kits will be inspected for completeness and to ensure equipment is functional before distributing to volunteers. Kick nets, sample jars, and waders will be inspected by the Project Manager prior to each sampling season.

### **B6. Instrument/Equipment Calibration and Frequency**

N/A – for Water Chemistry Projects Only

### **B7. Inspection/Acceptance for Supplies and Consumables**

The Project Manager is responsible for inspecting all supplies, consumables, and equipment including waders, hip boots, nets, specimen jars, and other Adopt-A-Stream kit contents. Supplies will be replaced when deemed dangerous or too damaged to use.

## **B8. Non-direct Measurements**

N/A

## **B9. Data Management**

The Project Manager will be responsible for maintaining all records. Data will be entered from datasheets into the online MiCorps database after biotic indices are verified by the Bug Experts. In addition, data will be entered into The Watershed Center's online stream health database ([www.gtbay.org/streamsummary.asp](http://www.gtbay.org/streamsummary.asp)). Biotic index scores will be entered into a Microsoft Excel workbook by the Project Manager. Datasheets will be filed at The Watershed Center office for a minimum of five years; specimen jars will be stored for three years.

## **SECTION C: SYSTEM ASSESSMENT, CORRECTION AND REPORTING**

### **C1. System Audits and Response Actions**

All Team Leaders will be provided a copy of the QA/QC Plan (Section B4) and will be asked to monitor for adherence to quality assurance methods and report concerns with data quality to the Project Manager. Trainings for new and veteran Team Leaders helps to ensure proper procedures in sample collection, macroinvertebrate identification and preservation, and datasheet completion. Identifications of macroinvertebrate specimens will be checked for accuracy and volunteers that appear to be having difficulty will receive additional instruction from the Project Manager.

If the Project Manager suspects compromised data quality, datum in question will be withheld from the MiCorps database. Any problems affecting data quality will be reported to MiCorps by the Project Manager.

### **C2. Data Review, Verification and Validation**

All data collected during this project will be reviewed by the Project Manager to determine whether QA/QC objectives are met. See Section A7 for a description of criteria that should be used for accepting, rejecting, or qualifying project data. The Project Manager will decide whether data are accepted, rejected, or qualified.

The Project Manager, along with the Watershed Center's Executive Director, will determine which volunteers can graduate to the "Bug Experts" team used to verify macroinvertebrate field identifications.

Data will be entered into the MiCorps and Watershed Center databases by the Project Manager or trained Watershed Center volunteer within three months following the sampling window. Entries will be spot checked by Watershed Center staff or volunteers who did NOT do the initial

entry. Transcription errors will be review if present; the Project Manager will evaluate the need for double checking all data entry based on spot checks.

### **C3. Reconciliation with Data Quality Objectives**

Bi-annual QA/QC checks will provide an opportunity for the Project Manager to determine if training and instruction are adequate. It is expected that variability will decrease as volunteers gain more experience and confidence in the methods. The Project Manager will record all data discrepancies (ex: incomplete datasheets, misidentification of macroinvertebrates, failure to fully comply with monitoring protocols, etc.) and will perform an annual evaluation of the program. Problem areas will be flagged and training concerns will be voiced to MiCorps staff.

### **C4. Reporting**

The Project Manager will produce an annual report summarizing the Grand Traverse Bay watershed monitoring results from the previous field season (spring and fall sampling). This report, to be completed each winter, will be distributed to all volunteers, project participants, and any others by request. In addition to the monitoring results, the report will describe any notable achievements, how data were used by agencies, a list of monitored sites, and the names of volunteers and project sponsors. Data also will be compared to those collected in previous years to establish water quality trends in the Grand Traverse Bay watershed.