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### **A3. Distribution List**

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## **A4. Project Organization**

### **Heather Smith, Program Manager**

Grand Traverse BAYKEEPER  
The Watershed Center Grand Traverse Bay  
13170 S. West Bay Shore Dr.  
Traverse City, MI 49684  
(231) 935-1514

#### Program 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 Program 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).

Macroinvertebrate Experts: Responsible for helping the Program Manager verify macroinvertebrate identifications from all volunteer teams each sampling season. Macroinvertebrate Expert volunteers will have advanced aquatic entomology experience and will be appointed by the Program 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(TWC)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 contributes to this region's desirability as a place to live and visit is under considerable pressure to support continued development.

The EPA-approved 2005 Grand Traverse Bay Watershed Protection Plan states that sediment and excessive nutrient loading are two of the highest priority pollutants threatening the cold water fishery, aquatic life, and other designated uses in the Grand Traverse Bay watershed. Currently (2020), TWC is authoring an update to the Grand Traverse Bay Watershed Protection Plan focusing on the coastal watershed; aquatic habitat loss is now an additional priority threat in the region. 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 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 TWC's 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 in-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, local planners, and state water resource professionals with a quick baseline assessment of our area streams' condition. TWC uses results from our volunteer stream monitoring program to assist us with our ongoing protection efforts including stream restoration projects, BMP installation, advocacy efforts, and partnering with local governments, NGO's, and residents for outreach and education purposes. Results are distributed to local media and posted on TWC's website

## **A6. Project Description**

TWC'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 Environment, Great Lakes, and Energy's (EGLE; formerly the Michigan Department of Environmental Quality or 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 is a year-round activity and includes advertising in local newspapers, on TWC's website, and on social media, 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 300 feet 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, waders or hip boots, and a D-net. 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 TWC.

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 several 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. Macroinvertebrate Experts will verify all identifications made by the volunteer teams by re-identifying macroinvertebrates in sample jars. The Macroinvertebrate 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 Program Manager will then reinforce the importance of the techniques described above. Time permitting, TWC 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 team members will sample each site for a single collection event to check for systematic bias. If there is a large discrepancy between biotic index scores among sampling teams, the Program 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 Program 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 Macroinvertebrate Expert and each team will receive their datasheet with the verified biotic index score, potential misidentified species descriptions, and 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. The Program Manager 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 Program 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, Program Manager, has been involved in TWC's Adopt-A-Stream Program since 2016 and has attended the MiCorps Conference and Training from 2016-2019. Smith has nearly a decade of 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 2-3 hour, in-person New Team Orientation & Training will be offered once in the spring and once in the fall prior to the sampling window if there is a demand. This is our most in-depth training that includes both a classroom and in-field portion and is for new potential volunteers or those volunteers looking for a full orientation and training.

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. Aquatic invasive species (AIS) decontamination, including what AIS are, how to be on the lookout for priority species like the New Zealand mud snail, and property decontamination steps to reduce the likelihood of spreading AIS while monitoring or recreating in waterbodies and waterways.
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. Volunteers will collect macroinvertebrate samples to identify streamside.
4. Stream-side practice in identifying macroinvertebrates.

New Team Leaders are required to attend the New Team Orientation & Training prior to joining the program. In addition, new Team Leaders are required to shadow seasoned volunteers 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 Program Manager's discretion.
- B) Sample their new site with the aid of the Program Manager. This will allow the new Team Leader to be coached through macroinvertebrate sampling and identification, as well as completing datasheets. This is the route that most new teams choose to follow.

A 2-hour, in-person training session (referred to as the Refresher Training) will be offered once in the spring and once in the fall prior to the sampling window. This training session serves to refresh current Team Leaders, with a strong focus on invertebrate identification and sampling protocols.

Each new volunteer team will be mandated to send at least one designated Team Leader to either the New Team Orientation & Training or Refresher Training once a year for three years to ensure they understand protocols and feel comfortable with invertebrate identification (referred to as the "training period").

After the volunteer team has successfully completed three in-person training sessions (Refresher Training and/or New Team Orientation & Training) within the first three years of initiation into the program, they will complete 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 either the Refresher Training or New Team Orientation & Training once every three years.

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. Feedback is given to each team after the quiz is complete; any errors are discussed with Team Leaders. 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 Program Manager.

All volunteers are welcomed to either of the in-person trainings each spring and fall, regardless if they are due for training

## **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.

The table below (Table 1) lists Adopt-A-Stream sites that were actively monitored by volunteers using MiCorps protocols in 2019 or 2020 and are anticipated to be monitored in 2021.

Table 1: TWC Adopt-A-Stream active monitoring sites.

Stream Site	Location	Latitude	Longitude	MiCorps Site ID	Monitored Since	Accessibility
Acme Creek - Site 2	U/S of M-72	44.7729538	-85.4940735	Acme 2	2005	private
Baker Creek - Site 3	D/S of Five Mile Rd	44.7464894	-85.5259037	Baker 3	2014	public - road crossing
Bissell Creek - Site 1	West of Williamsburg Road Crossing	44.7572173	-85.4037237	Bissell 1	2009	public - road crossing
Williamsburg Creek	at Watson Road	44.77294	-85.40093	Williamsburg 1	2009	public - road crossing
Carpenter Creek - Site 3	Below Confluence with Twenty-Two Creek	44.6444360	-85.4324970	Carpenter 3	2017	private
Hines Creek - Site 1 (AKA Cedar Creek 2)	U/S of Cherry Bend Rd; Near Cedar Creek Commons and Woodwinds	44.8021117	-85.6514368	Hines 1	2005	public - road crossing
Kids Creek - Site 7	D/S of Silver Lake Rd	44.749583	-85.64075	Kids 7	2018	public - road crossing
Kids Creek - Site 1	Behind MSUE office	44.7645039	-85.6311546	Kids 1	2005	public - road crossing
Kids Creek - Site 2	at 11th Street	44.7561667	-85.6378333	Kids 2	2005	public - road crossing
Kids Creek - Site 3	Behind Kohl's; U/S of Footbridge	44.7363997	-85.6474400	Kids 3	2008	public - township park
Kids Creek - Site 4	U/S of Price Point Bridge	44.7385032	-85.6442642	Kids 4	2008	unsure
Kids Creek - Site 5 (Kids Creek Trib AA)	New daylighted portion D/S of Beaumont Crossing	44.7632394	-85.6412333	Kids 5	2014	public - Munson Medical Center Campus
Kids Creek Trib AA - Site 1	Between the Commons and the Pavilions (200 ft U/S of Elmwood Ave)	44.7576000	-85.6417200	Kids AA 1	2017	public - township/city parkland
Leo Creek - Site 1	U/S of TART trail at Leo Creek Preserve	44.9674890	-85.6509960	Leo 1	2017	public - preserve
Miller Creek - Site 3	at Miller Creek Reserve (at footbridge)	44.72168	-85.63385	Miller 3	2019	public - preserve
Mitchell Creek - Site 2	Parsons and 3 Mile Rd intersection; Reffitt Nature Preserve at bridge	44.7454	-85.56002	Mitchell 2	2005	public - preserve
SB Boardman River - Site 1	U/S of Boardman River Rd Bridge	44.6495900	-85.2915300	SB Boardman 1	2016	public - road crossing
SB Boardman River - Site 2	U/S of Trail #55 Bridge	44.66136	-85.31294	SB Boardman 2	2016	public - road crossing
Water Wheel Park Creek - Site 1	Water Wheel Park, U/S of Wheel	44.9779138	-85.6526756	Water Wheel 1	2010	public - village park
Weaver Creek - Site 2	D/S of M-22	45.04689	-85.59354	Weaver 2	2019	public - road crossing
West Arm Acme Creek - Site 1	U/S of South Rainbow CT	44.75205	-85.48206	WA Acme 1	2019	public - road crossing
Yuba Creek - Site 1	D/S of Yuba Road	44.8198379 3	- 85.45603752	Yuba 1	2013	public - road crossing

Yuba Creek - Site 2	D/S of US-31	44.82475	-85.458	Yuba 2	2019	public - road crossing
Kids Creek - Site 8	U/S of Silver Lake Rd	44.74892	-85.640565	Kids 8	2019	public - road crossing
West Branch Four Mile Creek - Site 1	U/S of Vanderlip Rd	44.721834	-85.545894	WB Four Mile 1	2019	public - road crossing
NB Boardman River - Site 1	D/S of Broomhead Road	44.69	-85.36731	NB Boardman 1	2019	public - road crossing
Brewery Creek - Site 2	at Grandview Rd. TART trail	44.7898678	-85.6433439	Brewery 2	2006	public - at trail crossing
East Creek - Site 1	At East Creek Reserve; D/s of Mayfield Rd	44.6275170	-85.5039830	East 1	2017	public - at preserve
Jack's Creek - Site 4	Bridge to Second bend at Boardman River Nature Center Trails	44.70931	-85.62291	Jack's 4	2019	public - at preserve
Acme Creek - Site 1	outlet to bay; on GT Resort Property	44.7744	-85.5042	Acme 1	2005	private
Rapid River - Site 7	At 7 Bridges Natural Area	44.7882924	-85.2008629	Rapid 7	2011	public - at preserve

Team Leaders will pick up equipment at TWC 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)
- MiCorps Volunteer Monitoring Invasive Species Prevention Kit (also called the AIS Prevention Kit)
- 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 TWC's office or designated storage area.

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 regarding 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., 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 have 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 or ethanol and each jar will be labeled on the cap and in the jar with stream name, location, and date.

Streams receive a macroinvertebrate score based off a biotic index; this index is based on the diversity and abundance of macroinvertebrates present. All macroinvertebrates found will be preserved except for 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 AIS decontamination and will be asked to take decontamination steps to lessen the likelihood of unintended invasive introductions.

Each in-person and virtual training event will cover AIS and the importance of decontaminating gear while stream monitoring. After sampling is complete, teams will return sampling kits, datasheets, and preserved macroinvertebrates to TWC.

Volunteer teams will be encouraged to err 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 Program Manager as soon as possible if they anticipate being unable to sample during the two-week sampling window.

## **B2. Preventing the Spread of AIS**

There is a strong focus on AIS prevention as new volunteers join the program. Each in-person and virtual training event will cover AIS and the importance of decontaminating gear while stream monitoring and recreating in waterbodies and waterways. Each season, TWC staff will ensure volunteer teams are aware of new AIS threats and will be asked to be on the lookout for newly established communities of priority AIS. For instance, New Zealand mud snails have been found in the Boardman River within the Grand Traverse Bay watershed. Because this particular species has been found within the watershed, volunteers are asked to carefully check stream sites for this species and report any potential sightings to TWC staff.

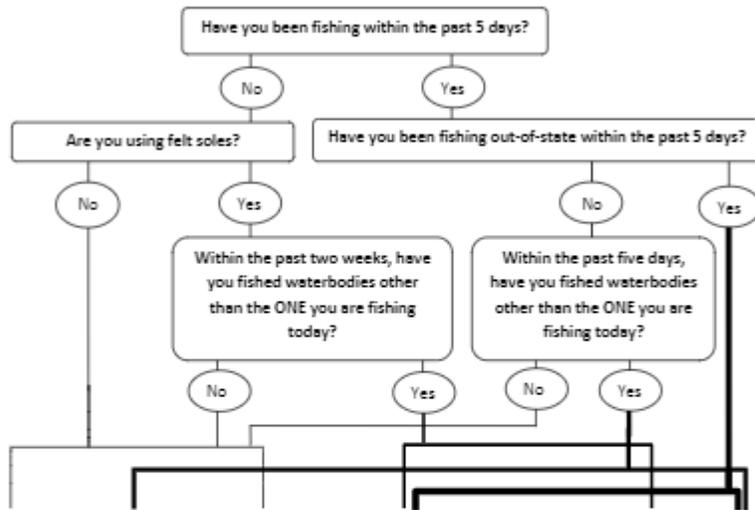
For teams that monitor multiple sites, an AIS Prevention Kit, which contains directions on decontamination as well as the supplies needed to decontaminate, will be available. The program manager will ask teams who are

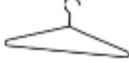
using their own waders to borrow an AIS Prevention Kit and follow appropriate decontamination steps or ensure their waders have been dry (out of any other waterbody/waterway) for five to ten days prior to use. As volunteer sample stream sites in the open two-week sampling window, equipment will be borrowed and returned, cleaned thoroughly by TWC staff using dilute bleach or 409, and redistributed to other teams. This will allow TWC staff to reduce the likelihood of spreading AIS through the program.

Teams will be provided with the following AIS decontamination guidelines produced by the River Alliance of Wisconsin.

**Practice Clean Angling (or Monitoring)  
Protect Wisconsin's Rivers from Invasives (or Michigan's Rivers)**

Do you know when you are at risk of transporting invasive species between waterbodies? You pose the greatest threat when you use felt soles or travel out of state. Use the flow chart below to decide what measures you should take to prevent the spread of invasive species.



<p><b>CHECK, CLEAN, DRY</b> Inspect gear, clean off mud and plant material. Drain water. This is <u>required by law</u> before leaving any waterbody.</p>  	<p><b>SCRUB</b> all equipment with tap water and a stiff brush</p> 	<p><b>SPRAY</b> all equipment with a mild bleach solution (1 Tbsp bleach per gallon of water). Keep wet for 10 min.  Does NOT apply to felt; does NOT kill New Zealand mudsnails!</p> 	<p><b>SOAK</b> equipment with a mild bleach solution (1 Tbsp bleach in one gallon of water) for 10 minutes.  Does NOT kill New Zealand mudsnails!</p> 	<p><b>FREEZE</b> equipment for 6-8 hours.</p> 	<p><b>Dry</b> for at least 5 days before reuse, preferably in direct sunlight  Does NOT apply to felt!</p> 
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For more information contact the River Alliance of Wisconsin at (608) 257-2424 or visit [www.wisconsinrivers.org](http://www.wisconsinrivers.org).

**B3. 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 TWC's office or designated storage area for storage and verification by the Macroinvertebrate 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 TWC for a period of three years.

**B4. Analytical Methods**

The habitat and benthic macroinvertebrate assessment methods used have been developed by the MiCorps and EGLE 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 B1 for monitoring procedures.

## **B5. 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 training session and will “shadow” or be “coached” by a vetted volunteer team and/or the Program Manager prior to joining the program (see Section A8). New Team Leaders that have 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 Macroinvertebrate Experts before final biotic indices are recorded for each site.

Volunteer teams will be contacted by the Program 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 Program 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 Program Manager, etc.). All datasheets will be reviewed by the Program Manager to check for transcribing errors.

Each season, the Program 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 Program Manager to observe if monitoring protocols are followed; this will also provide an opportunity for the Program Manager to discuss any deviations from protocol. See Sections A7, A8, B1, and B2 for more information.

## **B6. Instrument/Equipment Testing, Inspection, and Maintenance**

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

## **B7. Instrument/Equipment Calibration and Frequency**

N/A – for Water Chemistry Projects Only

## **B8. Inspection/Acceptance for Supplies and Consumables**

The Program 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.

## **B9. Non-direct Measurements**

N/A

## **B10. Data Management**

The Program 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 Macroinvertebrate Experts. In addition, data will be entered into TWC'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 Program Manager. Datasheets will be filed at TWC 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 Program Manager. Trainings for new and veteran Team Leaders helps 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 Program Manager.

If the Program 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 Program Manager.

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

All data collected during this project will be reviewed by the Program 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 Program Manager will decide whether data are accepted, rejected, or qualified.

The Program Manager, along with TWC's Executive Director, will determine which volunteers can become "Macroinvertebrate Experts" used to verify macroinvertebrate field identifications.

Data will be entered into the MiCorps and TWC databases by the Program Manager or trained TWC volunteer within three months following the sampling window. Entries will be spot checked by TWC staff or volunteers who did NOT do the initial entry. Transcription errors will be reviewed if present; the Program 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 Program 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 Program 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 Program 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 project sponsors. Data also will be compared to those collected in previous years to establish water quality trends in the Grand Traverse Bay watershed.