SECTION A: PROJECT DESCRIPTION AND QUALITY OBJECTIVES

A1. Title and Approval Sheet

Quality Assurance Project Plan for the Salmon Trout and Yellow Dog River Watersheds Volunteer Stream Monitoring Program

Date: March 2, 2022
Version # 2
Organization: Yellow Dog Watershed Preserve Inc.

QAPP Prepared by: Sarah Heuer
Title: Programs Coordinator

Signature:

_____

MICORPS STAFF USE

MiCorps Reviewer: _____

Signature of Reviewer **Date**

This QAPP is approved for two years after the date given by the signature above. After this, the QAPP expires and must be approved again.

A2. Table of Contents

A3. Distribution List

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A4. Program Organization

Key Personnel	Role	Affiliation	Contact: Email/Phone
Chauncey Moran	Project Oversight	YDWP N4210 Co. Rd. KK Big Bay, MI 49808	(248)245-2442 criverwalkerr@aol.com
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Volunteers	Collectors & Pickers	NMU Local residents YDWP board & staff	

Management Responsibilities

1. Chauncey Moran, Project Oversight: Chauncey Moran (YDWP Chairman) reviews the Quality Assurance Project Plan, ensures the training of volunteers adheres to quality assurance standards, and provides experience in monitoring stream biota and habitat, and will evaluate the accuracy of chemical parameters measured.

2. Rochelle Dale, Program Administrator. Rochelle Dale provides grant administration, program implementation, and personnel management.

3. Sarah Heuer, Programs Manager. Sarah Heuer is responsible for assisting in the training of volunteers, coordinating sampling events, and volunteer management. She will be the team leader for the VSMP and is responsible for analysis, interpretation and documentation of all data obtained through this program.

4. Geoffrey Smith, Macroinvertebrate Analyst: Geoffrey Smith has had extensive background and training in benthic macroinvertebrate identification, behavior and function. He will be used to further identify questionable species in order to ensure the accuracy of our samples.

5. Paul Steen, Ph.D., Stream Program Manager. Paul Steen is an aquatic ecologist at the Huron River Watershed Council and he oversees the Michigan Clean Water Corps (MiCorps). Dr. Steen will be at our disposal, providing technical assistance, information regarding future grants and any changes pertinent to MiCorps stream monitoring protocol.

A5. Problem Definition/Background

The Yellow Dog and Salmon Trout Rivers are located within the major watershed, Dead-Kelsey, near Big Bay, MI. Both rivers flow into Lake Superior, with known populations of anadramous brook trout using these rivers for spawning. These rivers in some areas may be subject to excessive sedimentation, and or erosion causing changes in aquatic habitats. Most of these changes are human-induced, due to an increase in mining activity in the watershed and large scale logging operations that pose potential harm to water quality. Areas of great concern are inadequate or perched culverts directly effecting aquatic connectivity. It is important to monitor these rivers in order to document present stream conditions and establish a program that will continue monitoring in perpetuity in order to observe short and long-term trends and take action for remediation when necessary.

A6. Program Description

The purpose of monitoring the Yellow Dog and Salmon Trout Rivers is to assess the condition of the stream and trends in its health. The method used to assess the health will be the survey of benthic macroinvertebrate communities and their habitats. Specific data that will be collected under this project include species type, diversity, and frequency.

Volunteers will work in small teams led by trained leaders to monitor macroinvertebrate populations and stream habitat. The sampling will consist of 8 sites within the Salmon-Trout River watershed and 11 sites within the Yellow Dog River watershed. These sites were established based on specific geographic regions with diverse morphology and stream cover with recorded past, current and or proposed activity directly at the site or upstream of them.

All sites will be sampled within a two week period (in the spring and fall), rather than a single day, due to remoteness and limited accessibility to each site. It is intended that the sampling from year to year will take place during a consistent time period, with the realization that the actual dates will depend on weather and stream conditions. Ideally the sampling will take place from year to year during the same two week period surrounding target dates. Macroinvertebrate samples are stored in alcohol and further identified by the macroinvertebrate analyst if any samples are in question. The habitat conditions at each site will be measured bi-annually as well. Information will be entered into an in-house electronic database, as well as in MiCorps' Data Exchange. Datasheets will be saved in paper files at the Yellow Dog Watershed Preserve office and will be retained in perpetuity.

Volunteers will be recruited in the weeks leading up to each training or sampling event, using email, online notifications, and press releases. A volunteer database will be maintained by staff at the Yellow Dog Watershed Preserve throughout the project.

Project Goals and Objectives

The goals of the volunteer stream monitoring program are to obtain reliable data about the conditions of these freshwater ecosystems, and to use this information to determine conservation and restoration needs within the major watershed. Areas of concern will be reported to the MDNR, EGLE, local townships, the Huron Mountain Club, and other local community groups. Once stream conditions have been established and recognized, our objective is to carry out the steps necessary to remediate the problem and minimize future degradation, with the ultimate goal being to maintain and or improve these high quality waters.

A7. Data Quality Objectives

This study has been designed to characterize the habitat and macroinvertebrate community of selected sites in the Salmon Trout and Yellow Dog watersheds. The Yellow Dog Watershed Preserve's objectives are to collect data that is accurate, representative, complete, comparable and relevant, recognizing that the precision of the data will be confined to the elements of natural and temporal variability along with bias associated with sampling and identification inconsistencies. In order to collect data that provides the best general characterization of the habitat and macroinvertebrate community, we will attempt to minimize bias, increase precision, and control the quality of the data, to the degree that is attainable and addressed herein.

Precision and Accuracy

Precision and accuracy will be maintained by conducting consistent volunteer team leader training. Volunteer team leaders will be trained up joining the program, and retrained every three years (minimum). Techniques under review shall include:

- collecting style (must be thorough and vigorous);
- habitat diversity (must include all available habitats and be thorough in each one);
- picking style (must be able to pick thoroughly through all materials collected and pick all sizes and types of macroinvertebrates);
- variety and quantity of organisms (must ensure that diversity and abundance at site is represented in sample);
- transfer of collected macroinvertebrates from the net to sample jars (specimens must be properly handled and jars correctly labeled).

Once a year, a single site will be selected to perform a duplicate sampling. Results will be compared to see if sampling techniques are adequate to reduce error. A given site's Stream Quality Index (SQI) score or total diversity (D) measure across macroinvertebrate 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 sampling events will be collected by a different collector. 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.

All stream data records will include the personnel of the monitoring team and each type of habitat sampled. The Program Manager will verify and correct all macroinvertebrate identifications made by the volunteer and staff.

Sample results that exceed these standards will be noted as "outliers" and examined to determine if the results are likely due to sampling error or true environmental variation. If sampling error is determined the data point shall be

removed from the data record. Volunteer teams that generate more than one outlier will be observed by the Program Manager at the next sampling event and be considered for retraining. The Program Manager will make the final identifications for each sample and samples in question will go to the macroinvertebrate analyst.

MiCorps staff conducted a site visit with the Program Manager and staff from YDWP on August 20, 2012 to ensure methods of collection were accurate. Emily Whittaker, Christy Budnick and Melinda Otto were all in attendance. This review consisted of a joint sampling event. MiCorps staff alongside YDWP participants collected, sorted, and identified macroinvertebrates. No major monitoring issues were noted but a few suggestions were made in order to maximize efficiency of the procedures. The Program Manager and fellow YDWP staff became certified through this program at that time. Since then, Rochelle Dale (YDWP Administrator) and Sarah Heuer (YDWP Programs Coordinator) have also been trained as team leaders and are experienced with MiCorps monitoring protocol.

Bias

Each site will be sampled by different collectors at least once every two years (minimum) 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. The Project Manager will review the results and address any potential bias observed through on site observation and retraining.

Completeness

Following a quality assurance review of 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. 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 Salmon Trout and Yellow Dog watersheds.

Sampling after extreme weather conditions may result in samples not being representative of the normal stream conditions. The Program Manager will compare suspect samples to the long term record as follows:

Measures of D and SQI for every sample will be compared to the median results from the past three years and each should be within two standard deviations of the median. If the sample falls outside this range, it can be excluded from the long-term data record (though can be included in an "outlier" database.).

Comparability

To ensure comparability, all volunteers in the watershed will follow the same sampling and site selection methods and use the same units of reporting. All participants will learn the standard MiCorps monitoring methods and will train additional 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 within a two-week period.

If a site is temporarily inaccessible, such as due to prolonged high water, road washouts or other blockages, the monitoring time may be extended for another two-weeks. If the issue concerning inaccessibility continues 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 volunteers 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/Certification

The Project Oversight, Program Manager, and Program Administrator have had hands-on MiCorps training to witness and learn first-hand how a volunteer-based stream monitoring program is expected to work. In addition, the Project Oversight has been running another volunteer stream monitoring program independently on the Yellow Dog River ever since 2004.

Training will be provided to each volunteer participating in the program. When new volunteers join a sampling event they will be paired up with more experienced volunteers so they can learn by "shadowing" volunteers with more experience. This technique will allow new volunteers to ask questions as they learn in a hands-on environment.

During sampling events, each sampling group will have an experienced streamside leader. This leader will be responsible for making sure data sheets are filled out properly, jars labeled, and reminding the collectors to cover all available habitats. New volunteers typically start out as pickers. No training is required to be a picker. Pickers are responsible for sorting through the samples collected by the collectors, picking out the macroinvertebrates, and putting them in a collection jar.

SECTION B: PROGRAM DESIGN AND PROCEDURES

B1. Study Design and Methods

Study Design

The benthic macroinvertebrate community in the Salmon Trout and Yellow Dog Rivers will be monitored twice a year, once in May/June and again in September/October, following MiCorps stream monitoring protocol. Instream and riparian habitat will be assessed during spring and fall conditions on a bi-annual basis.

Monitoring Task Schedule

APRIL: Program Coordinator checks that equipment is in good condition and fixes and or replaces what is needed.

MAY: Programs Coordinator sends out email blast to all interested volunteers at the beginning of the month. This email includes a live google spreadsheet/calendar so that volunteers can sign themselves up within the two-week time frame.
VSMP begins around the middle of this month. Volunteers who signed up will be instructed on where to meet and will be taken to the monitoring sites by the team leader.
New volunteers will sign a waiver form and the Programs Coordinator will keep track of all volunteers in YDWP's database.

JUNE: Monitoring may be extended into June depending on when it commenced. The Programs Coordinator will be sure to organize and collect all datasheets and sample jars. Data can be entered into electronic databases as soon as it is obtained. Macroinvertebrates in question will be given to the macroinvertebrate analyst for further identification.

SEPTEMBER/OCTOBER: The same process will commence as it did in the spring. Volunteers will be recruited, and the same sites will once again be monitored in the fall. All data will be interpreted and entered into electronic databases. Paper copies will be filed at YDWP's office. Macroinvertebrate samples will be stored here as well.

Salmon Trout Sampling Sites: (see corresponding Sampling Map (Fig.1) in Appendix A)

1) STR1 – Salmon Trout River (N 46.85810, W -087.80028). Known as the ***'weir site'***, this site is located within the Huron Mountain Club, Powell Township. Private access only for club members.

2) STR2 – Salmon Trout River (N 46.84849, W -087.79894). This site is also within the Huron Mountain Club property, Powell Township, private access. The center of this site is the bridge that crosses the Salmon Trout River before the Huron Mountain Club gate, off Co. Rd. KK.

3) STR3 – Salmon Trout River (N 46.81144, W -087.81328). This site is known as the ***'Lower Dam'*** site. It is within the Huron Mountain Club, Powell Township. Private access only. There is an old dam at the upstream end of this site.

4) STWB1 – Salmon Trout West Branch (N 46.7884722, W -087.881694). This site is just past Dodge City in Powell Township. It is accessed publicly off the North Western Road.

5) STMB1 – Salmon Trout Middle Branch (N 46.7796667, W -087.874583). This site is near Dodge City in Powell Township. It is accessed publicly off the North Western Road. The middle of this site is a large culvert under the road.

6) STEB1 – Salmon Trout East Branch (N 46.78552, W -087.85226). This site is past Dodge City and to the east in Powell Township. Private access only through a JM Longyear gate. There is a USGS gage station here.

7) SNCR1 – Snake Creek (N 46.79805, W -087.82523). This is a tributary of the Salmon Trout located in Powell Township. Public access, but limited due to remoteness. Access is off the Blind M-35.

8) CLCR1 – Clear Creek (N 46.80569, W -087.80427). This is a tributary of the Salmon Trout located in Powell Township. Public access, but limited due to remoteness. Access is off the Blind M-35.

Yellow Dog Sampling Sites: (see corresponding Sampling Map (Fig.1) in Appendix A)

1) YDR 1 – Jean Farwell Wilderness Area (N 46.78287, W -087.67034). This site is located in a protected wilderness area in mostly wetlands. Private access through private property, in Powell Township.

2) YDR 2 – Remington Bridge site (N 46.76534, W -087.6602). This site is located off the old Antler's Road (Co. Rd. KCH), in Powell East Township. Public access. Bridge is the center of this site.

3) YDR 3 – Bear Lake site (N 46.75357, W -087.66157). This site is located off the Bushy Creek Truck Trail, off Co. Rd. 550, in Powell (SW) Township. Bear Lake is located to the left of the Yellow Dog River at this station. There are residential cabins near the river here.

4) YDR 5.1 – Big Pup Creek (N 46.7111, W -087.70418). This is a major tributary of the Yellow Dog River. Access is off the Co. Rd. 510, a dirt road in Ishpeming Township. The bridge crossing the 510 is the center of this site.

5) YDR 5.3 – Little Pup Creek (N 46.70856, W -087.68219). This is also a tributary of the Yellow Dog River. The Little Pup and Big Pup join together before they dump into the Yellow Dog River. Access to this site is off the Wilson Creek Truck Trail, off the Co. Rd. 510. This site is in Ishpeming (N) Township.

6) YDR 6.0 – Lost Creek inlet @ YDR (N 46.72879, W -087.70925). Lost Creek is a tributary of the Yellow Dog and empties into the Yellow Dog River at this site within the YDWP Community Forest. Access to this site is off the Community Forest foot trail in Ishpeming Township.

7) YDR 7.0 – Co. Rd. 510 bridge site (N 46.72663, W -087.71497). The Co. Rd. 510 passes over the Yellow Dog River here. The bridge marks the center of this site. This is the public access point into the YDWP's Community Forest in Ishpeming (N) Township.

8) YDR 8.0 – The Ford site (N 46.72876, W -087.74897). This site is accessed from the GGI Road off Co. Rd. 510, just north of site YDR 7.0. The center of this site used to be crossed by vehicles, hence the 'the ford' name. This area has long been used as a camping site. It is located in Champion (N) Township. Deer Creek inlet @ the YDR is on the downstream end of this site.

9) YDR 8.1 – Deer Creek Crossing (N 46.72801, W -087.74858). This is a small tributary of the Yellow Dog. The bridge crossing over Deer Creek marks the center of this site. The Yellow Dog River is only 245' downstream of the crossing. This site is an area of concern due to culvert failure under the bridge. There is heavy sediment build up on the upstream end where the culvert is perched. An EGLE grant was received for a remediation project to commence in 2022/2023.

10) YDR 14.0 – Clowry trail bridge site (N 46.72645, W -087.87205). The Yellow Dog River runs under the Clowry trail here. The bridge marks the center of this site located in Michigamme Township. Access is from the old Pine Camps road (Clowry/snowmobile trail) off the AAA. This site is located on the Yellow Dog Plains.

11) IR1 – Iron River site (N 46.81324, W -087.67605). The Iron River is still the Yellow Dog River, it flows out of Lake Independence in Powell Township into Lake Superior along this final stretch. There is a dam upstream of this site. The dam divides the lake and the river. Access to this site is off a private road, off Dam Rd. just outside of Big Bay. There is a bridge over the Iron River here and it marks the center of this site.

Locating and Identifying Monitoring Sites

Monitoring sites are located within the Salmon Trout and Yellow Dog River watersheds. Monitoring site locations are described using the name of the county, the creek, and the road crossing or other distinctive landmark. Maps are provided to the collecting team as well as written directions. Permission to access private property is obtained at least one week prior to the designated monitoring date.

Monitoring Benthic Macroinvertebrates

Our monitoring is intended to characterize the condition of the Salmon Trout and Yellow Dog Rivers, while involving numerous groups and members of the community. The macroinvertebrate community will be monitored and identified to order level twice per year, once in the spring and once in the fall. Samples will be saved to allow for the possibility of future identification to the family level.

All equipment to be used for this sampling process can be found in Appendix A (1) along with the stream operating procedures (SOP's). Literature references used for identification are materials recommended and/or provided by MiCorps, such as the *Guide to Common Freshwater Invertebrates of North America,* by J. Reese Voshell, Jr..

All sites are sampled within a two week period in the spring and fall. It is intended that the sampling from year to year will take place during a consistent time period, with the realization that the actual dates will depend on weather and stream conditions. If the site remains inaccessible for two weeks, or volunteers are not available to conduct the sampling at a different time, the site will not be sampled and there will be a gap in the data. Teams will do their sorting and identification alongside the banks of the monitoring site. Once the collection and sorting process is through, any water and or debris collected will be returned to the stream.

Multiple samples will be taken from each habitat type while wading and using a D-frame kick-net. This may include riffles, cobbles, boulders, leaf packs, submerged vegetation, pools, runs, undercut banks, woody debris and depositional areas. The trained team leader will record the types of sampled habitats within the monitored station.

The trained collector will transfer the material from the net into the collection bucket and later into white sorting trays. The remaining volunteers (pickers) will hand pick macroinvertebrates from the large sorting tray and place them in smaller sorting trays for further identification by the team leader. Once the macroinvertebrates have been properly identified and verified by the team leader, the representative sample will be placed into jars of ethyl alcohol. If any samples are questionable, they will be given to the macroinvertebrate analyst for further identification.

During the collection, the collector will provide information to the team 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 team leader will instruct and assist other team members in detecting and collecting macroinvertebrates in the sorting pans, including looking under bark and inside constructions made of sticks and other substrates. Potential sources of variability such as weather/stream flow differences, season, and site characteristic differences will be noted for each event and discussed in study results. There are places on the data sheet to record unusual procedures or accidents, such as losing part of the collection by spilling. Any variations in procedure should be explained on the data sheet. The data sheets are used on the identification day, after which they remain on file indefinitely.

After monitoring is done at any site, the equipment is inspected, cleaned, and sanitized with a dilute bleach prior to reusing.

At the collecting site, all invertebrate sample jars receive a label stating the date, location, initials of collector, and number of jars containing the collection from this site. The data sheet also states the number of jars containing the collection from this site. The team leader is responsible for ensuring proper labeling occurs and for returning all jars and equipment to YDWP, which will be rechecked by the Program Coordinator. The alcohol is carefully changed (to avoid losing small specimens) in the jars every few years.

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 a different team will be sent to a site at least once every two years (minimum), but YDWP will strive to send collectors to different sites during every monitoring event, in order to diminish the effects of bias in individual collecting styles. Samples where the diversity measures diverge substantially (using the criteria in A7) 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.

Habitat Analysis

Streamside leaders and collectors, with pickers assisting as well, will complete a Habitat Assessment once a year during the fall season immediately following the macroinvertebrate sampling or at least within two weeks of the sample event. The Habitat Assessment will follow the procedure and datasheets given in Appendix B. A site sketch will accompany the assessment. The Habitat Assessment is a critical piece of the monitoring process and will be used to monitor changes in stream habitat over time, which may result in changes in water quality and corresponding macroinvertebrate diversity.

As many of the parameters within the Habitat Assessment are qualitative, personal bias is inherent. To account for bias and personal discrepancies, Streamside leaders will have on hand a copy of MiCorps Stream Monitoring Procedures, which details the qualitative criteria, and helps clarify questions. Streamside leaders will read questions aloud to their group and form consensus on question answers. Since the information reviewed in the Habitat Assessment hold considerable educational value for volunteers and the goals of the MiCorps program, it is important that streamside leaders inform other group members of the purpose of the assessment and encourage feedback from the group. However, final decisions on the scoring remains the responsibility of only those team members who have

undergone the volunteer training and have been certified by the Program Manager. All final Habitat Assessment data sheets will be reviewed by the Project Manager for correctness and completeness. There are places on the data sheet to record unusual procedures or accidents. Any variation in procedure should be explained on the data sheet.
As a critical role of the Habitat Assessment is to inform of any areas of habitat degradation that could impact water quality, any concerns noted in the data sheet will be reviewed by the Project Manager and appropriate action will be taken to resolve and/or address noted concerns including informing appropriate authorities.

B2. Instrument/Equipment Testing, Inspection, and Maintenance

In the days prior to a monitoring event, the Project Coordinator will check all equipment carefully. Supplies for each team will be put together including all macroinvertebrate and habitat assessment gear. All equipment will be stored at the Yellow Dog Watershed Preserve office in Big Bay.

- **D-frame kick nets:** will be inspected before and after each sampling session to look for any defects or tears in the nets.
- **Waders:** will be inspected for dirt, tears and or leaks in order to be cleaned and repaired before each sampling event.
- **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, improper seals, cracks, and chips.
- **Forceps/Pipettes**: will be cleaned and inspected to make sure the forcep tips meet before each sampling event.
- **Magnifiers/Dissection Scopes**: will be cleaned and inspected to make sure they are functioning properly before and after each identification event.
- **Open Reel Tape Measure (100-Ft.):** inspected before each use to look for defects and cleanliness.
- **Pole end of kick net:** this acts as a yard stick for measuring the average stream depth. It is marked in inch increments. Check that numbers are legible and pole is clean.
- **Bobber:** used to determine water velocity. Use clean bobbers that are not cracked.
- **Water Thermometer:** fishpond swift current thermometer is used to read water temperature. Thermometer will be cleaned before and after each use.

Decontamination Kit:

- 3 gallon bucket with lid
- MiCorps Volunteer Monitoring Invasive Species Prevention Kit User Guide
- Lint roller
- 8oz spray bottle for diluted bleach
- 16oz spray bottle for tap water
- Soft-bristled scrub brush
- Hoof pick
- Rags
- Bleach wipes
- Eye wash solution
- Safety goggles
- Reusable latex gloves
- 6mL oral syringe
- Sample vials for mud snails

B3. Inspection/Acceptance for Supplies and Consumables

- **D-frame Kick Nets** – Purchased July 2012. Poles are still good, but nets have been repaired multiple

times since and replaced at least twice. This year, 2022 they are due to be repaired before use.

- **Collection Jars** – Initial purchase was August 2012 and they have been resupplied every year since.
- **Forceps** – Purchased July 2012. New forceps and pipettes will be purchased this season, 2022.
- **Magnifier/Dissection Scope** – Purchased in August 2012. New magnifiers will be purchased this season, 2022.
- **Ethanol** – Purchased August 2012 and has been resupplied every year since.
- **Sorting Trays** – Purchased July 2012. Two older trays (lg.) are still in use and the third tray (lg.) was replaced in 2020. All small sorting trays remain in good repair since 2012.
- **Waders** – waders are constantly in flux. They have been donated and some purchased throughout the years since 2012. Most are currently unacceptable, beyond repair and YDWP is looking to get 2 new pairs this season, 2022. YDWP encourages volunteers to bring their own waders to ensure waders do not leak. Waders brought in from an external source are also cleaned before and after each use.
- **Open Reel Tape Measure (100**-Ft.) – purchased in 2012 and are still operational.
- **Bobbers** – replaced in 2020.
- **Water Thermometer** – Purchased (1) new in 2020. YDWP would like to purchase a second thermometer this year, 2022.
- **Garmin GPS unit** – purchased a new one in 2020.
- **OnX Hunt Application** – purchased in 2021 by a YDWP member.

Prior to a monitoring event, YDWP staff will make sure there are ample data sheets, labels, and that all equipment is in good working order. All water monitoring gear will be stored in the YDWP office and storage unit.

B4. Non-direct Measurements

Not applicable.

B5. Data Management

All data are recorded on original field paper data sheets. These data sheets are stored in hard copy and electronic format at the YDWP office. Raw data will be entered and managed in a Microsoft Excel database. All data is backed up before and after each sampling event's data has been entered.

Data will be entered by the data manager into YDWP's MS Excel database for long-term storage. Twice a year, all new data will be manually filed into MiCorps Data Exchange as shared public information. Hard paper copies will be filed indefinitely in YDWP's office.

Field data sheets are checked by the team leader in the field and rechecked and interpreted back at YDWP's office by the Program Manager. Any omissions or confusions are clarified as soon as possible. The Program Manager will enter data into a database which is then used for both analysis and reporting. The final data tables are checked against the data sheets. The results of monitoring will then be posted on YDWP's website and may be posted in their newsletter at times, as well as distributed directly to other participating groups or community organizations if need be.

Macroinvertebrates: A Water Quality Rating (WQR) is computed at each site. The method for calculating that metric can be found on the macroinvertebrate sampling data sheets (See Fig. 3 in Appendix A).

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

B6. Decontamination

Decontamination is of utmost importance in stopping the spread of invasive species and the transport of aquatic diseases. Team leaders will ensure the following decontamination steps are completed:

1) Conduct a visual inspection of gear before and after field work.

2) If not using equipment for at least 5 days, conducting plant/debris removal and letting gear dry is enough and decontamination is considered satisfactory.

3) If gear is reused right away, if visiting multiple sites within the same day, or multiple monitoring days in a row, all gear is disinfected with diluted bleach solution between locations using the instructions in the decontamination booklet.

4) Program Managers should use their best discretion when it comes to cleanliness of gear. Sometimes drying and bleach is not enough. Going to areas that are known to have been infected with invasives may require extra steps to clean gear. For example pressure washing equipment with very hot water would better help to completely sterilize and remove contaminants. Advanced decontamination techniques can be found at www.michigan.gov/invasives, and searching "decontamination."

5) Team Leaders need to watch out for New Zealand mud snails. If found or suspected, the snails will be collected and notes taken of their location. The Program Manager will follow up with MiCorps, who can contact EGLE and the MDNR.

SECTION C: SYSTEM ASSESSMENT, CORRECTION AND REPORTING.

C1. System Audits and Response Actions

Volunteer team leaders trained by the Program Manager ensure that quality assurance protocols are followed and report any issues possibly affecting data quality. When significant issues are reported, the Program Manager may accompany groups in the field to perform side-by-side sampling and verify the quality of work by the volunteer team. In the event that a group is determined to have done poor job sampling, a performance audit to evaluate how people are doing their jobs of collecting and analyzing the data is accomplished through side-by-side sampling and identification. During side-by-side sampling a team of volunteers and an outside expert sample the same stream. The statistic for checking this side-by-side sample is given in the Bias section (A7).

A system audit is conducted following each spring and fall monitoring event to evaluate the process of the project. The system audit consists of the Program Manager, any other program leader, and one or two active volunteers, and is a start to end review of the monitoring process and how things could be improved for the next event.

If deviation from the QAPP is noted at any point in the sampling or data management process, the affected samples will be flagged and brought to the attention of the Program Manager and the team that collected the sample. Re-sampling is conducted as long as the deviation is noted soon after occurrence and volunteers are available (two week window). Otherwise, a gap must be left in the monitoring record and the cause noted. All corrective actions are documented and communicated to MiCorps staff.

Details of the process for assessing data quality are outlined in section A7. Response to quality control problems is also included in section A7.

C2. Data Review, Verification and Validation

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

C3. Reconciliation with Data Quality Objectives

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

C4. Reporting

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

APPENDICES

Appendix A

OPERATING PROCEDURE

SALMON TROUT AND YELLOW DOG RIVER WATERSHEDS
VOLUNTEER STREAM MONITORING PROGRAM

SUBJECT: Macroinvertebrate Sampling.

PURPOSE: To establish a procedure for collecting and identifying macroinvertebrate samples.

WHO	DOES WHAT
TEAM LEADER/ DATA MANAGER & PICKERS	1) The Team Leader creates a crew of volunteers, consisting of no fewer than 2 people. The Team Leader is the macroinvertebrate Collector, who is trained in collection techniques. This person is the only one to use the d-net to pull out debris and macroinvertebrates from the sampling habitats in the stream. The Collector will have a Collector's Assistant who enters the water with them, and carries the collection bucket. The Team Leader directs the rest of the volunteers who will now be referred to as the Pickers. The Pickers and or Collector's Assistant do not have to be trained ahead of time. They work under the supervision of the Team Leader. 2) The Team Leader samples macroinvertebrates within a 300-foot reach of each assigned site. The sampling station will be 150 feet upstream and downstream of designated staging area. The Collector will have 35-45 minutes of total sampling time. The sample start and end times will be recorded. Samples will be taken from all available stream habitats to maximize diversity and quality. Habitats include, but are not limited to stream margins, undercut banks, woody debris, leaf packs, deep pools, cobble/gravel, boulders, aquatic plants, riffles and runs. A dip net with a 1mm mesh will be used for sampling. The Collector may also collect samples by turning over larger submerged items by hand. The Collector will be sure to filter as much sand and silt out of the d-net during the collection period to ensure a clean sample is taken, which makes identification efforts much easier. 3) The Collector will be responsible for following MiCorps ***collection techniques*** as outlined in MiCorps Stream Monitoring Procedures Manual. a) Collecting will begin at the downstream end of the stream reach and work upstream. b) Do not collect mussels, clams or crayfish. Make note of them if found. c) Be aggressive. Macroinvertebrates hold tight to their various habitats and they need to be shaken loose. d) Always face the opening of the net upstream so specimens do not wash out with the current. e) The Collector will follow trained techniques for sampling in different habitats. As each habitat has unique features and sampling protocol, these methods must be exercised when in these various environments. 4) After the collection time is up, the Collector, along with the Pickers will sort through the sample bucket. Samples are taken out of the bucket and placed in white sorting trays with clean water. The Team Leader will instruct the Pickers on sorting techniques and fill out the data sheets. The idea is to be thorough yet efficient. The Pickers and Team Leader should work on macroinvertebrate sorting for approximately one hour or until they have gone through all their sample material, whichever comes first. The time when the last specimen is placed in the jar will be recorded.

Appendix A

OPERATING PROCEDURE

SALMON TROUT AND YELLOW DOG RIVER WATERSHEDS
VOLUNTEER STREAM MONITORING PROGRAM

SUBJECT: Macroinvertebrate Sampling

WHO	DOES WHAT
TEAM LEADER/ DATA MANAGER & PICKERS	5) The Collector will place all macroinvertebrate samples found into a collection jar of ethanol preservative. This jar will be labeled with the site number, collector's initials, and date. The team should strive to get at least 100 specimens. The Water Quality Rating (WQR) is designed to be most accurate with sample sizes of at least 100 specimens. 6) Once all samples are collected, the datasheets will be completed. The Team Leader will calculate a WQR. Please refer to Fig. 2 & 3 at the end of Appendix A. 7) Before leaving the monitoring site the Team Leader and Pickers will thoroughly clean the net, buckets and sorting trays to avoid transporting animals or plants. Since multiple monitoring sites will be done at this time of year, waders and all other gear must be disinfected in order to sanitize it before entering another body of water. Full instructions on decontamination procedures can be found at https://www.hrwc.org/volunteer/decontaminate/.

Appendix A (1)

Basic Equipment List for Macroinvertebrate Sampling

2 Five Gallon Buckets
D-frame collection net
Spare net bags
Waders (at least 2 pair)
Sorting trays (one large tray and two small refrigerator trays)
Featherweight forceps
Eyedroppers
Specimen jars
Ethanol (preservative)
Garbage bags
Decontamination kit

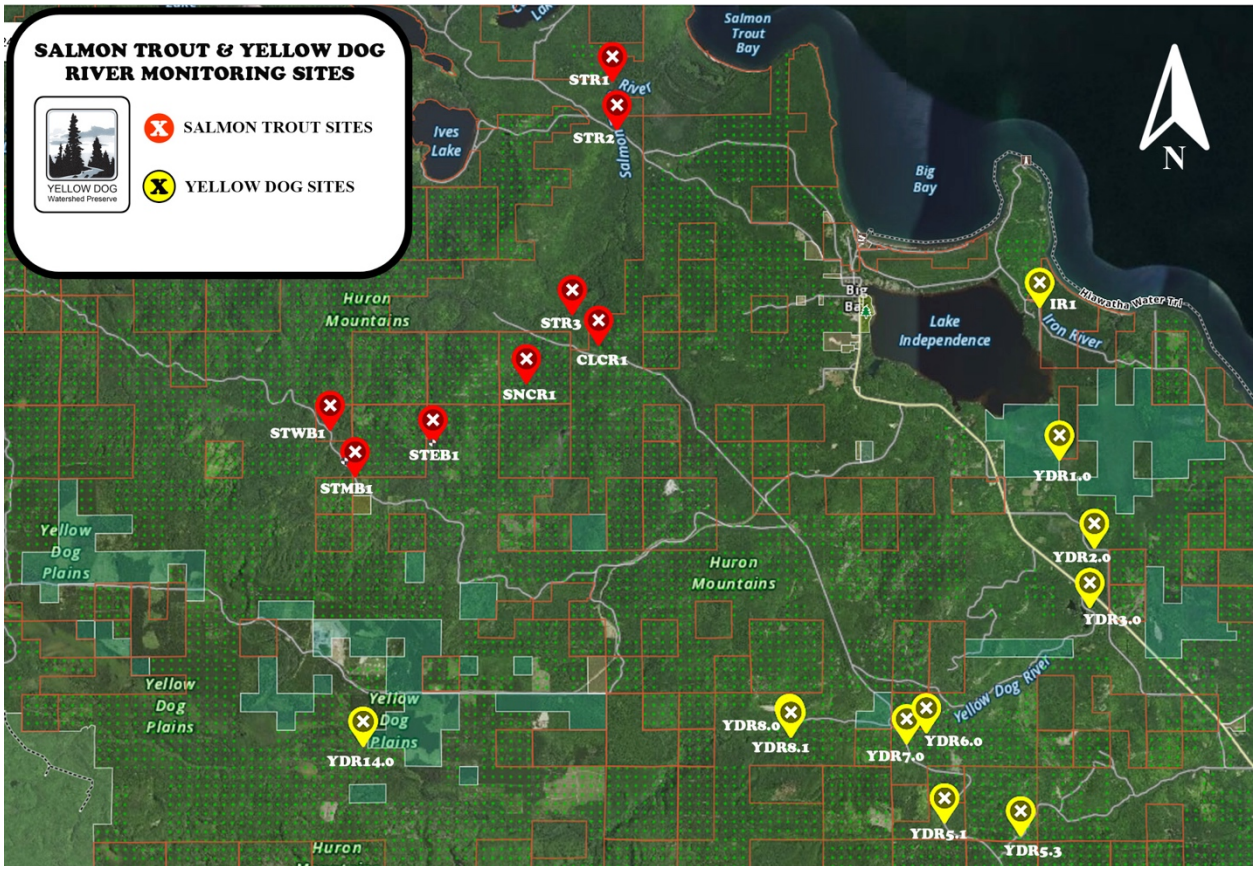
Appendix A

OPERATING PROCEDURE

SALMON TROUT AND YELLOW DOG RIVER WATERSHEDS
VOLUNTEER STREAM MONITORING PROGRAM

SUBJECT: Macroinvertebrate sampling.

Figure 1. VSMP sites within the Salmon Trout and Yellow Dog Watersheds.



Appendix A

OPERATING PROCEDURE

SALMON TROUT AND YELLOW DOG RIVER WATERSHEDS VOLUNTEER STREAM MONITORING PROGRAM

SUBJECT: Macroinvertebrate Sampling.

Figure 2. MiCorps Macroinvertebrate Datasheet (1)

MiCorps Site ID#:_____

Michigan Clean Water Corps

Stream Macroinvertebrate Datasheet

Site Name: _____

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

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

Latitude:_____ Longitude:_____

Names of Team members: _____

Stream Conditions:

Average water depth:_____feet

Notable weather conditions of the last week:_____

Are there any current site conditions that may impede normal macroinvertebrate sampling? (weather, flooding, poor visibility, etc?)

Habitat Types: Check the habitats that were sampled. Include as many as possible.

____Riffles ____Backwater areas ____Submerged Wood
____Rocks ____Leaf Packs
____Aquatic Plants ____Pools
____Runs ____Undercut banks/Overhanging Vegetation

Did you see any crayfish? #:_____, Clams/mussels? #_____
remember to include them in the assessment on the other side!

Do not take crayfish, fish, clams, and mussels from the water.

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

Identifications made/supervised by:_____

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

Datasheet checked for completeness by:_____ Datasheet version 11/13/2020
Data entered into MiCorps database by:_____ Date:_____

Appendix A

OPERATING PROCEDURE

SALMON TROUT AND YELLOW DOG RIVER WATERSHEDS VOLUNTEER STREAM MONITORING PROGRAM

SUBJECT: Macroinvertebrate Sampling.

Figure 3. MiCorps Macroinvertebrate Datasheet (2)

MiCorps Site ID#:_____

Michigan Clean Water Corps

IDENTIFICATION AND ASSESSMENT

*** Do NOT count empty shells, pupae, or terrestrial macroinvertebrates****
Taxa are listed from most pollution sensitive to most pollution tolerant*

Count	Common Name	Scientific Taxa	Sensitivity Rating (0-10)	Count x Sensitivity
	Hellgrammite (Dobsonfly)	Megaloptera, Corydalidae	0.0	
	Clubtail Dragonfly	Odonata, Gomphidae	1.0	
	Sensitive True Flies (water snipe fly,net-winged midge, dixid midge)	Athericidae, Blephariceridae, Dixidae,	1.0	
	Stonefly	Plecoptera	1.3	
	Caddisfly	Trichoptera	3.2	
	Mayfly	Ephemeroptera	3.5	
	Alderfly	Megaloptera, Sialidae	4.0	
	Scud	Amphipoda	4.0	
	Dragonfly	Odonata	4.0	
	Beetle	Coleoptera	5.1	
	Somewhat Sensitive True Flies	Dipterans (those not listed elsewhere)	6.0	
	Crayfish	Decapoda	6.0	
	Bivalves/Snails	Pelecypoda, Gastropoda	6.9	
	True Bug	Hemiptera	7.7	
	Damselfly	Odonata	7.7	
	Sowbug	Isopoda	8.0	
	Tolerant True Fly (mosquito, rat-tailed maggot, soldier fly)	Culicidae, Syrphidae, Stratiomyidae	8.7	
	Leech	Hirudinae	10.0	
	Aquatic Worm	Oligochaeta	10.0	

	Total Abundance

Sum of (Count x Sensitivity):	

First: If your total abundance is
Less than 30 → Automatically give it a WQR of 10 (Very Poor rating)
Less than 60 → Automatically give it a WQR of 7 (Poor rating)

Water Quality Rating		Degree of Organic Pollution
0.0-3.50	excellent	Pollution unlikely
3.51-4.50	very good	Slight pollution possible
4.51-5.50	good	Some pollution possible
5.51-6.50	fair	Fairly substantial pollution likely
6.51-7.50	fairly poor	Substantial pollution likely
7.51-8.50	poor	Very substantial pollution likely
8.51-10.0	very poor	Severe pollution likely

Water Quality Rating =

Sum of (Count x Sensitivity)
Divided By
Total Abundance

= _____

Datasheet checked for completeness by:_____ Datasheet version 11/13/2020
Data entered into MiCorps database by:_____ Date:_____

Appendix B

OPERATING PROCEDURE

SALMON TROUT AND YELLOW DOG RIVER WATERSHEDS
VOLUNTEER STREAM MONITORING PROGRAM

SUBJECT: Habitat assessment.

PURPOSE: To establish a procedure for assessing the physical habitat.

WHO	DOES WHAT
TEAM LEADER/ DATA MANAGER & VOLUNTEERS	1) The team leader along with volunteers will walk the length of the 300-foot section of the designated site, observing the stream features. The team leader will be sure to educate and familiarize the volunteers with the habitat assessment datasheets, so they are aware of what they are to be looking for. This can be done in advance or on site. Based on the team's observations, the datasheets can be completed and questions can be answered and agreed upon by the team as a whole. 2) Photos can be taken to note significant findings or changes at the monitoring site. They are useful for interpretation and comparisons among different sites and for long-term studies of the same site. 3) A site sketch will be done by a selected team member. The team member will not have to do this from scratch. An aerial site photo will be printed in advance highlighting the main components of that particular section of stream. The volunteer conducting the sketch will fill in more detailed features and make note of any changes and or mark areas of concern if any. 4) It is important that each datasheet contains the stream name, site number, and date. Data will be entered strategically for each section. The team will also take note of water temperature, dissolved oxygen and pH with YDWP's handheld YSI multiparameter meter. 5) Section III will document sources of degradation (Fig.2). This includes not only what the team is observing but what may occur in the future, considering potential sources of degradation. 6) The team will also use an open reel measuring tape to measure the stream width. A bobber test will be conducted to determine stream velocity, and the average stream depth will be measured with a DIY measuring stick, made from the d-frame kick-net pole. 6) Volunteers new to this procedure will be given a physical copy of MiCorps VSMP monitoring procedures. This will be a reference guide and will be helpful for all members of the team to complete the datasheets in an educated and informed way.

Appendix B (1)

Basic Equipment List for Habitat Assessment.

Open reel tape measure (100-ft.)
Bobbers/Stopwatch
YSI meter
DIY yard stick (D-frame kick-net pole)
Garmin GPS unit/OnX hunt app on iphone

Appendix B

OPERATING PROCEDURE

SALMON TROUT AND YELLOW DOG RIVER WATERSHEDS VOLUNTEER STREAM MONITORING PROGRAM

SUBJECT: Habitat assessment.

Figure 1. MiCorps Habitat Assessment Datasheets (1&2)

STREAM HABITAT ASSESSMENT

Michigan Clean Water Corps

Volunteer Stream Monitoring Program

I. Stream, Team, Location Information

Site ID:_____ Date:_____ Time:_____

Site Name:_____ Lat/Long _____

Names of Team members:_____

II. Stream and Riparian Habitat

	A. General Information *Circle one or more answers as appropriate*					Notes and Observations: Give further explanation when needed.
1	Average Stream Width (ft)	< 10	10-25	25-50	>50	
2	Average Stream Depth (ft)	<1	1-3	>3	>5	
3	Has this stream been channelized? (Stream shape constrained through human activity- look for signs of dredging, armored banks, straightened channels)	Yes, currently	Yes, sometime in the past	No	Don't know	
4	Estimate of current stream flow	Dry or Intermittent	Stagnant	Low	Medium	High
5	Highest water mark (in feet above the current level)	<1	1-3	3-5	5-10	>10
6	Which of these habitat types are present?	Riffles	Pools	Large woody debris	Large rocks	Undercut bank
		Overhanging vegetation	Rooted Aquatic Plants	Other:	Other:	Other:
7	Estimate of turbidity	Clear	Slightly Turbid (can partially see to bottom)		Turbid (cannot see to bottom)	
8	Is there a sheen or oil slick visible on the surface of the water?	No	Yes			
9	If yes to #8, does the sheen break up into pieceswhen poked with a stick?	Yes (sheen is most likely natural)		No (sheen could be artifical)		
10	Is there foam present on the surface of the water?	No	Yes			
11	Does the foam smell soapy and look white and pillow like or look gritty with dirt mixed in?	Soapy (foam could be artifical)		Gritty (foam is most likely natural)		
The following are optional measurements not currently funded by MiCorps						
8	Water Temperature					
9	Dissolved Oxygen					
10	pH					
11	Water Velocity					

MiCorps Site ID#:_____ Date:_____

II. Stream and Riparian Habitat (continued)

B. Streambed Substrate

Estimate percent of stream bed composed of the following substrate.

Leave blank if group will take transects and pebble counts (in Section IV).

Substrate type	*Size*	*Percentage*
Boulder	>10" diameter	
Cobble	2.5 - 10" diameter	
Gravel	0.1 - 2.5" diameter	
Sand	coarse grain	
Silt/Detritus/Muck	fine grain/organic matter	
Hardpan/Bedrock	solid clay/rock surface	
Artificial	man-made	
Other (specify)		
Can't see		

You may wish to take photos of unstable or eroded banks for your records. Record date and location.

Comments:

C. Bank stability and erosion.

Summarize the extent of erosion along each bank separately on a scale of 1 through 10, by circling a value below. Left/right banks are identified by looking downstream.

Excellent	Good	Marginal	Poor
Banks Stable. No evidence of erosion or bank failure. Little potential for problems during floods. < 5% of bank affected.	Moderately stable. Small areas of erosion. Slight potential for problems in extreme floods. 5-30% of bank in reach has areas of erosion.	Moderately unstable. Erosional areas occur frequently and are somewhat large. High erosion potential during floods. 30-60% of banks in reach are eroded.	Unstable. Many eroded areas. > 60% banks eroded. Raw areas frequent along straight sections and bends. Bank sloughing obvious.
LEFT BANK 10 - 9	LEFT BANK 8 - 7 - 6	LEFT BANK 5 - 4 - 3	LEFT BANK 2 - 1 - 0
RIGHT BANK 10 - 9	RIGHT BANK 8 - 7 - 6	RIGHT BANK 5 - 4 - 3	RIGHT BANK 2 - 1 - 0

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Appendix B

OPERATING PROCEDURE

SALMON TROUT AND YELLOW DOG RIVER WATERSHEDS VOLUNTEER STREAM MONITORING PROGRAM

SUBJECT: Habitat assessment.

Figure 2. MiCorps Habitat Assessment Datasheets (3&4)

MiCorps Site ID#:_____ Date:_____

II. Stream and Riparian Habitat (continued)

D. Plant Community

What percentage of the stream is covered by overhanging vegetation/tree canopy?

<10% 10-50% 50-90% >90%

Using the given scale, estimate the relative abundance of the following:

Plants in the stream:		*Plants on the bank/riparian zone:*	
Algae on Surfaces of Rocks or Plants, or floating	Filamentous Algae (Streamers)	Shrubs	Trees
Macrophytes (Standing Plants)	**0= Absent 1= Rare 2= Common 3= Abundant**	Herbaceous plants	**0= Absent 1= Rare 2= Common 3= Abundant**
Identified species (optional)		Identified species (optional)	

E. Riparian Zone

The riparian zone is the vegetated area that surrounds the stream. Right/Left banks are identified by looking downstream.

1. Left Bank

Circle those land-use types that you can see from this stream reach.

Wetlands Forest Mowed Grass Park Shrubby/Grassy Field Agriculture
Construction Commercial Industrial Highways Golf Course Other_____

2. Right Bank

Circle those land-use types that you can see from this stream reach.

Wetlands Forest Mowed Grass Park Shrubby/Grassy Field Agriculture
Construction Commercial Industrial Highways Golf Course Other_____

3. Summarize the size and quality of the riparian zone along each bank separately on a scale of 1 through 10, by circling a value below.

Excellent	Good	Marginal	Poor
Width of riparian zone >150 feet, dominated by vegetation, including trees, understory shrubs, or non-woody macrophytes or wetlands; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	Width of riparian zone 75-150 feet; human activities have impacted zone only minimally.	Width of riparian zone 10-75 feet; human activities have impacted zone a great deal.	Width of riparian zone ,10 feet; little or no riparian vegetation due to human activities.
LEFT BANK 10 - 9	LEFT BANK 8 - 7 - 6	LEFT BANK 5 - 4 - 3	LEFT BANK 2 - 1 - 0
RIGHT BANK 10 - 9	RIGHT BANK 8 - 7 - 6	RIGHT BANK 5 - 4 - 3	RIGHT BANK 2 - 1 - 0

3

MiCorps Site ID#:_____ Date:_____

III. Sources of Degradation

1. Does a team need to come out and collect trash?

2. Based on **what you can see** from this location, what are potential causes and level of severity of any degradation at this stream?

(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)	S	M	H
Highway/Road/Bridge Maintenance and Runoff	S	M	H	Resource Extraction (Mining)	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
Invasive Species	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	S	M	H	Source(s) Unknown	S	M	H

Additional comments:

Michigan Clean Water Corps

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