Coldwater River Watershed Monitoring

Michigan Clean Water Corps (MiCorps) Volunteer Stream Monitoring Grant

Quality Assurance Project Plan (QAPP)

Timberland RC&D Council



Submitted to

MiCorps

This QAPP has been prepared to fulfill the requirements of the MiCorps Coldwater River Watershed Monitoring Project. The QAPP establishes the sampling procedures, quality control checks, data management, reporting, sampling frequencies, and analytical procedures consistent with requirements set forth in the monitoring plan provided by MiCorps. The section designations (e.g., A4) correspond with the QAPP requirements outlined by the MiCorps QAPP Review Checklist.

Coldwater River Watershed-MiCorps QAPP Rev 1 October 2014

SIGNATURE PAGE (A1)

A1.	Title and Approval Sheet
Qualit	y Assurance Project Plan for
Coldw	ater River Watershed Monitoring
Date:	10/13/2014
Versio Organ	n # 1 ization: Timberland RC&D Council
	Prepared by: Kristi Klomp
Signat	Executive Director, Timberland RC&D Council ure:
Olgital	uic.
	responsible individual: Aaron Snell
litle:	Principal, Streamside Ecological Services, Inc.
Signat	ure: _// <i>SCF</i>
(Other s	ignatures may be added as necessary)

MiCorps Staff Use

Tracking Number:
Paul Steen

MiCorps Reviewer:

Paul Steen

Returned for modifications

11/21/2014

Signature of reviewer

Date

TABLE OF CONTENTS (A2)

PROJECT MANAGEMENT (A)	4
Distribution List (A3)	
Program Organization (A4)	
Problem Definition/Background (A5)	5
Program Description (A6)	
Data Quality Objectives (A7)	
Special Training/Certifications (A8)	
MAP – SAMPLING SITES	10
PROGRAM DESIGN AND PROCEDURES (B)	9
Study Design and Methods (B1)	
Instrument/Equipment Testing, Inspection, and Maintenance (B2)	12
Inspection/Acceptance for Supplies and Consumables (B3)	
Non-direct Measurements (B4)	
Data Management (B5)	
SYSTEM ASSESSMENT, CORRECTION AND REPORTING (C)	14
System Audits and Response Actions (C1)	
Data Review, Verification, and Validation (C2)	
Reconciliation with Data Quality Objectives (C3)	
Reporting (C4)	
ADDENIDIY I	1.6

DISTRIBUTION LIST (A3)

MiCorpsPaul Steen, PhD, Project Officer

Timberland RC&D Kristi Klomp, Project & QA Manager

MDEQ
Dana Strouse, District Contact

Streamside Ecological Services, Inc. Aaron Snell, Project Lead Ecologist

PROGRAM DESCRIPTION AND QUALITY OBJECTIVES (A)

PROGRAM ORGANIZATION (A4)

Timberland RC&D (TRCD) is responsible for project coordination with MiCorps and primary QA oversight. Streamside Ecological Services, Inc. (SES) is responsible for volunteer coordination and will assist with program management and QA oversight, data analysis and reporting. Table 1 lists specific personnel and summarizes their responsibilities.

Contact information for the main personnel is provided below:

Kristi Klomp, Executive Director Aaron Snell

Timberland RC&D Streamside Ecological Services, Inc.

1345 Monroe NW, #243 3940 Timpson Ave SE Grand Rapids, MI 49505 Lowell, MI 49331 phone: (616) 451-4844 Phone: (616) 238-7372

Table 1. Personnel and Responsibilities

Category	Personnel	General Responsibilities
TRCD Project Manager and QA Manager	Kristi Klomp	Project management and oversight of all tasks, review all work for quality assurance, determine corrective actions if necessary, and preparation of final report.
SES Project	Aaron Snell	Coordinate and oversee volunteer sampling and
Lead Ecologist		conduct quality assurance review of project data to verify compliance with the QAPP.
Coldwater River Watershed	Volunteers	Lead and assist team of trained volunteers to
Council (CRWC) Sample		collect and assess macroinvertebrate samples.
Collection		
Oakbrook Trout Unlimited	Volunteers	Collect and assess macroinvertebrate samples.
(OTU) Sample Collection		

PROBLEM DEFINITION/BACKGROUND (A5)

The Coldwater River (HUC 040500070307) is located southeast of the City of Grand Rapids. The watershed covers approximately 120,737 acres and is dominated by agriculture (70.6%), forest (17.8%) and wetland (9%). The Coldwater River WMP, which was updated and approved to meet EPA's nine elements in 2009, lists the designated uses of partial and full-body contact recreation, coldwater fishery, and other indigenous aquatic life and wildlife as being impaired or threatened by *Escherichia coli* (*E. coli*) contamination, low DO levels, and anthropogenic and flow regime alterations (WMP p 1-3). The WMP identified excessive phosphorus and suspended sediment, and low dissolved oxygen as known or suspected pollutants/conditions impacting the coldwater fishery (p 23-29).

Tyler Creek/Bear Creek (HUC 040500070306) and Pratt Lake Drain (HUC 040500070305) are listed as the highest priority subwatersheds in the WMP (Table 9, p 48; Figure 25). The Tyler Creek subwatershed covers 30,380 acres (Bear (18,943 acres) and Pratt (11,427 acres)) in southeast Kent and southwest Ionia Counties. A 2005 E. coli TMDL established by MDEQ (AUID 040500070307-03) addresses sources in the entire Tyler Creek subwatershed. Pollution in Tyler Creek gained much attention in 2006, when a large fish kill made local headlines. Subsequent analysis by an MSU laboratory found fecal matter in the gills of dead fish and later identified bovine feces as the primary source of *E. coli* bacteria (WMP p 23-24; Rose and Shibata, 2006).

A United States Environmental Protection Agency (EPA) Section 319 grant (#2011-0017) and a Michigan Department of Environmental Quality (MDEQ) Clean Michigan Initiative (CMI) grant (#2013-0516) are currently being implemented in the Tyler Creek subwatershed to source-track and reduce *E. coli* contamination and define the relationship between total suspended sediment (TSS) and *E. coli* within the watershed. The goals of these projects are to identify, monitor and restore areas where the designated uses of partial and full-body contact recreation, cold and warmwater fisheries and other indigenous aquatic life and wildlife are impaired (WMP p 54). To meet these goals, Timberland Resource Conservation and Development (TRCD) and project partners are using detailed stream inventory work to identify sources and causes of pollution, implementing physical best management practices (BMPs) at 14 sites, delivering an education and outreach program, and are using TSS and *E. coli* monitoring to pinpoint specific sources (overland runoff, tile lines, groundwater, etc) and locations for future implementation of BMPs.

Based upon the two seasons of monitoring under the 319 grant and the initial season of CMI monitoring, it is clear that *E. coli* remains to be a problem throughout the watershed. Of eleven surface water monitoring sites tested, ten consistently exceeded the water quality standards for *E. coli* (results have been submitted to DEQ, and are available upon request).

This MiCorps Volunteer Stream Monitoring project will provide a dataset of the macroinvertebrate community from seven locations within the Coldwater River watershed from which we can document changes in the subject streams, and will allow us to develop recommendations for long-term protection and enhancement of the Coldwater River and its tributaries.

PROGRAM DESCRIPTION (A6)

The Timberland RC&D Area Council seeks to monitor macroinvertebrate and habitat conditions at seven sites in the Coldwater River and its tributaries, including Tyler and Duck Creeks and Messer Brook. The Coldwater River and many of its tributaries are designated trout streams and are highly appreciated by the local angling community, and others. A variety of data have been collected and projects completed in recent years. However, a serious effort at macroinvertebrate community analysis has been lacking. The CRWC received a start-up MiCorps grant in 2012 and has developed a macroinvertebrate sampling program to be implemented on the following goal and objectives. The long-term dataset will be used to benchmark changing conditions in the streams and to develop recommendations for long-term protection and enhancement of the river and its tributaries.

Goal No. 1: Compile a dataset to be used as a benchmark against past and, more importantly, future conditions, to document changes in the subject streams, and to develop recommendations for long-term protection and enhancement of the Coldwater River and its tributaries.

Objective No. 1: Conduct macroinvertebrate sampling at seven locations in the Coldwater River and its tributaries, including Tyler and Duck Creeks, Messer Brook will be conducted twice a year; twice in the spring and twice in the fall.

Objective No. 2: Complete habitat assessment at each of the macroinvertebrate monitoring sites. Habitat assessment will be conducted once a year during the project, unless changes are observed.

DATA QUALITY OBJECTIVES (A7)

This study has been designed to characterize the habitat and macroinvertebrate community of selected sites in the Coldwater River watershed. TRCD'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 for future comparison as stream restoration and best management practices (BMPs) are established in the Coldwater River watershed, we will attempt to minimize bias, increase precision, and control the quality of the data , to the degree that is attainable, as addressed herein.

Precision and Accuracy

Efforts will be made to address data quality standards by using established MiCorps protocols for habitat and macroinvertebrate sampling.

The following techniques will be reviewed during training and in retraining of team leaders every three years: [1] collecting style (must be thorough and vigorous), [2] habitat diversity (must include all habitats present and be thorough in each one), and [3] the transfer of collected 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. 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 measures will be collected by different volunteer teams. The resulting measures of D and SQI for each site will be compared to the composite (median) results and each should be within two standard deviations of the median.

In addition, the Program Manager will seek opportunities to compare results with those from an external sampling group, such as MDEQ. Sample results that exceed quality control standards will be noted as "outliers" and examined to determine if the results are likely due to sampling error or a true environmental variation. If sampling error is determined the data point should be removed from the data record. Volunteer teams that generate more than one outlier should be observed by the Program Manager at the next sampling event and be considered for retraining.

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

Program Manager will be considered "certified" by MiCorps.

Bias

Sites will be sampled by different team leaders at least once every three years in each season (two events among six sampling events, if conducted twice per year) to examine the effects of bias in individual collection styles. The new measure should be within two standard deviations of the median of past measures. Sites not meeting this DQO will be evaluated as above by the Program Manager.

Completeness

Following a QA review of all collected and analyzed data, data completeness will be assessed by dividing the number of measurements judged valid by the number of total measurements performed. The data quality objective for completeness for each parameter for each sampling event is 90%. If the program does not meet this standard, the Program Manager will consult with MiCorps staff to determine the main causes of data invalidation and develop a course of action to improve the completeness of future sampling events.

Representativeness

Study sites are selected to represent the full variety of stream habitat types available locally, emphasizing the inclusion of riffle habitat. All available habitats within the study site will be sampled and documented to ensure a thorough sampling of all of the organisms inhabiting the site. Resulting data from the monitoring program will be used to represent the ecological conditions of the contributing subwatershed. Since not enough resources are available to allow the program to cover the entire watershed, some subwatersheds will not initially be represented. Additional subwatershed sites will be added as resources and volunteers allow.

Comparability

To ensure data comparability, all volunteers in the watershed will follow the same sampling and site selection methods and use the same units of reporting. Program directors and trainers will learn the standard MiCorps monitoring methods at annual trainings by MiCorps staff and will train their volunteers to follow those methods to ensure comparability of results among all MiCorps programs. To the extent possible, the monitoring of all study sites will be completed on a single day.

For each sampling event that is not completed on a single day, monitoring by volunteers will be completed within the same two week period. If a site is temporarily inaccessible, such as due to prolonged high water, the monitoring time may be extended for two additional weeks. If the issue concerning inaccessibility is continued beyond the extended dates, then no monitoring data will be collected during that time and there will be a gap in the data. If a team is unable to monitor their site during the specified time, the Team Leader will contact the Program Manager as soon as possible and no later than the end of the first week in the sampling window in order for the Manager to arrange for another team to complete the monitoring. If no team is available, the Program Manager will, if feasible, sample the site. Otherwise, the site will go unmonitored for that season.

SPECIAL TRAINING/CERTIFICATIONS (A8)

The Project Manager (K. Klomp, TRCD) and the Project Lead Ecologist (A. Snell, SES) have had considerable experience with aquatic macroinvertebrate sampling. Both have received the MiCorps training, as has one of the CRWC volunteers, Dick Smith. The two groups (CRWC, OTU) consist of several seasoned stream volunteers. Most of the individuals have participated in

past invertebrate sampling events associated with MiCorps, MDEQ-319, or other monitoring efforts. Training will be provided to each volunteer participating in the project. We will demonstrate proper procedure with the volunteers and oversee any new volunteers until properly trained.

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, samples labeled, and assure that all representative habitats are sampled. New volunteers will start out as streamside assistants and pickers (taking measurements, transporting samples to expedite the instream volunteers, and sorting samples).

PROGRAM DESIGN AND PROCEDURES (B)

STUDY DESIGN AND METHODS (B1)

Seven monitoring sites within the watershed have been selected; three sites are located along the main branch of the Coldwater River, the other four sites are located along the tributaries, Messer Brook, Duck, Cain, and Tyler Creeks. Each site will be sampled four times over the two year project. Monitoring events are planned for the Fall of 2014, spring and fall of 2015, and spring of 2016.

Each site/team will be supplied with the following supplies:

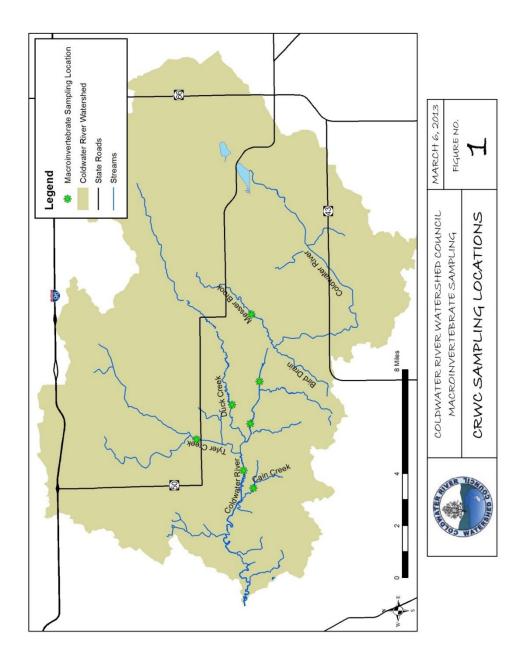
- (1) 5 gal. buckets
- (2) D-Nets
- (1) measuring stick for depth measurement
- (2) sorting trays
- (4) forceps
- (4) 2 oz. jars with lids prefilled with ethanol for specimens
- (1) water bottles for rinsing specimens
- (1) 100' reel-style measuring tape
- (2) pencils

Pre-made labels with site number printed

Disposable gloves

waders (limited supply, most volunteers have their own)

Map of site, data sheets, clipboard, pencils, flagging



Sampling the Benthic Community: Each site will be assigned a Streamside Leader, someone who has some experience with the methodology and who is familiar with the area. The Streamside Leader will ensure that multiple collections will be taken from each habitat type present at each site, including riffle, rocks or other large objects, leaf packs, submerged vegetation or roots, and depositional areas, while wading and using a D-frame kicknet. Samples will be carefully transferred from the D-frame kicknet into white buckets. The buckets will be transported by the instream Collector to a common area where the Project Manager will take and maintain custody of the samples (any deviation of custody will be recorded on the data sheet).

Under the guidance of the Project Manager and Project Lead Ecologist, samples will be sorted at a common streamside area, by volunteers into white ice cube trays. The organisms will be identified on-site by the Project Manager and verified by the Project Lead Ecologist. Samples will be preserved in jars of 70% ethyl alcohol for later verification (if needed). Any organism that cannot be positively identified in the field, will be isolated for later identification from expert colleagues or the MiCorps Program Manager. All invertebrate sample jars will be labeled inside the jar, in pencil with jar number, site location, name of collector, and number of jars containing the collection from this site. Jar numbers will recorded on site data sheets for cross-referencing.

The trained Streamside Leader will record the number of locations sampled within the monitored reach in each habitat type and note the locations sampled on a site map. The trained Collector will transfer the material from the net into buckets. During the collection, the Collector will provide information to the team Streamside Leader in response to questions on the data sheet that review all habitats to be sampled, the state of the creek, and any changes in methodology or unusual observations. The streamside leader will instruct and assist other team members in detecting and collecting macroinvertebrates, including looking under bark and inside of constructions made of sticks or other substrates. Each streamside leader will be provided with cell phone contacts of Project Leaders in case of potential problems or if a deviation in standard operating procedures needs to be discussed. 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. (See APPENDIX I for data sheets.)

The buckets will be transported by the Collector to a common area where the Project Manager will take and maintain custody of the samples (any deviation of custody will be recorded on the data sheet). Under the guidance of the Project Manager and Project Lead Ecologist, samples will be sorted at a common streamside area, by volunteers into white ice cube trays. The organisms will be identified on-site by the Project Manager and verified by the Project Lead Ecologist. All samples will be preserved in jars of 70% ethyl alcohol for later verification (if needed). Any organism that cannot be positively identified in the field, will be isolated for later identification from expert colleagues or the MiCorps Program Manager. All invertebrate sample jars will be labeled inside the jar, in pencil with jar number, site location, name of collector, and number of jars containing the collection from this site. Jar numbers will recorded on site data sheets for cross-referencing.

Upon return to the TRCD office building, the collections will be checked for labels, the data sheets checked for completeness and for correct information on the number of jars containing the collection from the site, and the jars are secured together with a rubber band and site label and placed together in one box. They will be stored at the TRCD office in a cool, dry, storage area at room temperature. The alcohol will be monitored and carefully changed as needed. The data sheets will remain on file indefinitely.

Parameters and Timing:

• Macroinvertebrate community will be monitored and identified to family level. Literature references used for identification include:

Merritt, R.W. and K.W. Cummins (editors). 1996. *An introduction to the aquatic insects of North America, 3rd ed.* Kendall/Hunt Publishing Company, Dubuque, Iowa.

Pennak, R.W. 1989. Freshwater invertebrates of the United States, 3rd ed. J. Wiley & Sons, New York.

Monitoring events will occur in the Fall of 2014, Spring and Fall of 2015, and Spring of 2016. Efforts will be made to confine the sampling event within a two week period in May and October.

• Habitat will be monitored once a year for the duration of this project, and at least every five years in the spring or fall. See Section B5 for monitoring procedures and methods of metric computation.

A check list will be used to ensure quality control procedures for use with equipment maintenance, field activities, and data analysis, such as listed below:

Equipment & Field Procedures Quality Control:

- Check to make sure equipment is in working order and not damaged
- Clean equipment before and after taking it into the field usage
- Check the expiration date of chemical reagents prior to each use
- Check the batteries of all equipment that requires them
- Make sure equipment is calibrated appropriately before sampling
- At least once every three years in each season: change the composition of the field crews to maintain objectivity and minimize individual bias
- Review field records before submitting for analysis to minimize errors

Quality Assurance Frequency:

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

INSTRUMENT/EQUIPMENT TESTING, INSPECTION, AND MAINTENANCE (B2)

All equipment will be checked prior to usage to make sure it is in working order and will be sanitized before and after taking it into the field.

Waders – If any waders are reported damaged after use they will be replaced. Waders will be stored in TRCD's designated storage area, where temperature and humidity are regulated. Volunteers will be alerted to maintain and sanitize their waders before and after sampling.

Nets – Nets will be inspected and sanitized after each use. Nets will also be stored in a designated storage room, where temperature and humidity are regulated. Volunteers will be alerted to maintain and sanitize their nets after sampling.

Small equipment – Forceps, droppers, etc. will be stored in this same store room. Large equipment – Buckets, sorting trays, tarps, etc. will be stored at SES.

INSPECTION/ACCEPTANCE FOR SUPPLIES AND CONSUMABLES (B3)

Supplies such as Ethanol, glass jars with poly seal lids, etc. will be inspected after each sampling date. Low supplies will be replenished immediately after sampling date to insure they will be ready for the next event. All supplies will be stored in the designated TRCD storage area.

NON-DIRECT MEASUREMENTS (B4)

Not applicable.

DATA MANAGEMENT (B5)

Include copies of all data collection forms and a description of the qualifications of volunteer data collectors.

Example:

Raw data will be entered and managed in Microsoft Excel workbooks. All data is backed up biweekly and a copy is kept off premises. Computer passwords will be used to provide data security. All data will be double-checked for accuracy and correctness.

- Data will be entered from data sheets into the online MiCorps database by a single trained volunteer, intern, or TRCD personnel for storage within the MiCorps data exchange system. Data sheets will be filed at TRCD's office for a period of at least five years.
- Data will be entered by the data manager into a database (e.g. Excel) for long-term storage. All new data will be exported to a MiCorps compatible format and sent to MiCorps for inclusion in their data exchange system. Data sheets will be filed at TRCD's office for a period of at least five years.

Data will be summarized for reporting into four metrics: All taxa, insects, EPT (Ephemeroptera + Plecoptera + Trichoptera), and sensitive taxa. Units of measure are families counted in each metric. The MiCorps Stream Quality Index (SQI) will also be computed.

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

SYSTEM ASSESSMENT, CORRECTION AND REPORTING (C)

SYSTEM AUDITS AND RESPONSE ACTIONS (C1)

- Side-by-side sampling took place on September 23, 2014 with the Project Manager and Dr. Paul Steen. Dr. Steen evaluated the Project Manager for procedural adherence and offered suggestions as necessary.
- Data sheets will incorporate essential QAPP procedures, such as properly labeled specimen jars and the number of net samples taken from each type of habitat.
- Volunteer team leaders trained by MiCorps will monitor that quality assurance protocols are followed and report any issues possibly affecting data quality.

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

If deviation from the QAPP is noted at any point in the sampling or data management process, the affected samples may be deleted from the data set. Re-sampling will be conducted if warranted and feasible, given that the deviation is noted soon after occurrence and volunteers are available. Otherwise, a gap may be left in the monitoring record. All corrective actions, such as above, will be documented and communicated to MiCorps.

DATA REVIEW, VERIFICATION, AND VALIDATION (C2)

For benthic macroinvertebrate collections, volunteer team leaders and collectors will receive training in completing field data sheets thoroughly and accurately. Volunteers performing habitat assessments will also receive training. Macroinvertebrate and habitat data sheets will be double checked in the field. All data sheets will be reviewed by TRCD and SES staff for thoroughness and clarity. Data entered into the database will be checked against the respective hard copy of the data sheet. If new data deviate from previous records, outliers will be identified, and the site may be resampled by the Project Manager, or the data will be thrown out. The Project Manager has primary responsibility for identifying questionable data and taking corrective action.

RECONCILIATION WITH DATA QUALITY OBJECTIVES (C3)

We will review our data within one week after sampling. If a sample deviates from previously state data quality objectives, the parameter will be re-sampled if it is feasible to do so within a two week period to maintain consistency of environmental conditions. Any limitations discovered in the data will be identified and reported to MiCorps and data users.

REPORTING (C4)

Reporting will be a key component to the success of this project. Many reports between volunteers and the project managers will be informal, and will be completed over email, telephone, or in person. These informal reports will help ensure the continued success of the sampling/identification events. The Project Manager will also report to the MiCorps program in a more formal way on a regular basis in the form of quarterly reports. Any issues in quality control will be included in these reports.

Appendix I Data Sheets for Macroinvertebrate & Habitat Assessment

	deetification varified by:(optional)	Wichigan Clean Water Corps				
	dentification varified by(optional) AQUATIC MACROINVERTEBRATE IDENTIFICATION WITH INSECT		MiCorp S	Site IDiff	Michigan Clean Water Corps	
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is C	Jiss littler code (R. (race) = 1-10, C. (common) = 11 or more) to record the approximant of each toos found is the stream reach. Only use the blank by the main take heading COLECPTERS) when there are cognising their carend be identified to the lower tank triate both the family level data as well as the order lovel date into the Michigan Date.	numbers or organisms. Jo. ANNELDA, Omit Issues	AQUATIC	MACROINVERTEBRATE IDENTIFICATION I		
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	ANNELIDA— Segmented Worm DIPTERA— continu Heudines	d.	Cosmopler Nepticulity	rgidaeDi	echycentridae pseudopsidae kesosomatidae	
	COLEOPTERA - Baston		Noctuides Pyralides Tortrickte	Ge	oeridae Noopsychidae	
	Chrysomeldae EPHEMEROPTERA	Mayfles		Hy	odropsychidae	
	Orrodovidos Acarihametropodido Dycokias Dyfacidas Ameletidas Dyfacidas Ameletopodidas		MEGALOP Corydelida Sialidae	e Lo	pfroptilidae spidosiomaridae pfrooriidae	
	Elmidse Arthropisidae Gymidae Bastidee			No.	nnephilidae olannidae	
	Halipidae Baet codae Hydraenidae Caenidae		Aestridao	— Damselfies, Dragonties Od Ph	fontoceridae Nopotamidae	
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	Staphylinidae Nacephemeridae Oligoneuridae Oligoneuridae		Macromida Petaluridae	90		
	COLLEMBOLA — Springtei Polymitarcyldae		PELECYPO			
	CRUSTACEA— Crustaceans Pseudronidae Pseudronidae Sphionaldae		Corbiculida Dreissenida Sobjectida	-		
	Amphipoda Sphlonuridae Decapoda Tricorythidae Isepcia		Unionidae			
	DIPTERA — True Fies GASTROPODA — 5 Antoylidae	als, Umgels	PLATYHEL Turbelloria	MINTHES— Flatworms		
	Blipharloendse Planorbidse Ceratopogonidae Right-handed shall		PLEDOPTE	RA— Stoneflies		
	Chiconomidae HEMIPTERA — Truo	Виря	Cionistae Chioroperio Leutridae	iso		
	Culicatee Belostomatidos Disidas Cortodas		Nemouridae Parlidae			
	Dolichoporidase Galastocoridae Empiditae Gerridae Ephydridae Hebridae		Periodidae Pteronercyk	fae		
	Muscitae Hydromesiae Phoridae Mesovelidae		Teen optony	gidae		
	Psychodidae Naucoridae Psychopteridae Napidae					
	Sercophagidae Notonectidae Sciomyzidae Pieldae		Datasheet c	hecked for completeness by:	Datesheet version 6/6/08	
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	STREAM HABITAT ASSESSMENT	Michigen Cleon Water Corps				
		Water Cosps	MiC	crps Site ID#: Dat	tec Michigan	Clean
	I. Stream, Team, Location Information			×		nor Corps
	Site ID: Date: Tis		II. S	tream and Riparian Habitat (continu	ued)	
	Location:			B. Streambed Subs	strate	
	Name(s):			Estimate percent of a	stream bed composed of the following	
	II. Stream and Riparian Habitat			if group will take tran	sects and public counts (in Section IV), econd the measured percentages.	
	A. General Information Circle one or more property as appropriate	Notes and Observators:		advantate type	Domeston:	
	1 Average Stream Witth (ft) < 10 10-25 25-50	Give further explanation when houses,		Boulder Cobbie	>10" diameter 2.5 - 10" diameter	
	2 Average Stream Depth (ft) <1 1-3 >3	>5		Graval	0.1 - 2.5" diameter	
	3 Has this stream been channelized? Yes, Yes, No (Stream shape constrained through currently sametime in	Don't know		Send	coarse grain	
				Fines: Sitt/Cetritus/Mac	the grain/organic metter	
	dwdging, armored banks, straightened channels) 4 Estimate of current stream flow	Medium High		Planspan Bedrock	solid obylrock surface mari-made	
	Bittermittent	640		Other (specify)		
	5 Highest water mark (in feet above <1 1-3 3-5 the current level) 6 Which of these habitat types are Riffles Deep Pools Large	6-10				
	6 Which of these habitat types are Riffles Deep Pools Large present? Route Riffles Deep Pools Large woody	Large rocks Undercut bank		C. Bank stability and erosion.	CANADA DE CANADA	
	Overhanging Rosted Other:	Other: Other.		Summarize the extent of erosion atom circling a value below. Left/right bank	ng patih batik separately on a scale of 1 through 10, by its are liferified by looking downstream. Poor	
	Plants			Escollent Good Banks Stables, No Modernsty stable systema of excelon or bank failure. Little potential for pro-		
	7 Estimate of turbidity Clear Slightly Turbid (can partially see to bottom	Turbid (cannot see to bottom)			Sendi Modoranidy arristelle. Singh Modoranidy arristelle. Units 146. Shary enalest areas occur frequently and are frequently and areas frequently	
	8 is there a sheen or oil slick visible on No Yes the surface of the water?			potential for problems during fleeds. + 5% of bank affected. of arcsion.	Sign) Enrotional areas occur Monto in Separatify and care S-30% of consenhant large. High status areas floods, 30-80% of banks altogething obvious.	
		n could be			D. TARON M.	
	10 is there fearn present on the surface No Yes of the water?			LEFT BANK 10 - 8 LEFT BANK 8 -	- 7 - 8 LEFT BANK 5 - 4 - 3 LEFT BANK 2 - 1 - 0 - 7 - 6 RIGHT BANK 5 - 4 - 3 RIGHT BANK 2 - 1 - 0	
	of the water? 11 is yes to #10, does the form feel Gritty (from is most likely Scopy () gritty or scopy? pritty or scopy?	sim could be		Secure many in a leading broad in	- 7 - 0 ROUNT BANK 5 - 4 - 3 RICHT BANK 2 - 1 - 0	
	grity or scapy? natural) arstical) This following are optional measurements not correctly funded by Microsa.			You may wish in take photos of unstable	to or arodad banks for your records. Record data and location.	
	8 Water Temperature		Comm	nents:		
	9 Dissolved Oxygen					
	11 Water Velouty					
						2
				MiCorps Site ID#		Minimum Co.
MiCorps Site ID#:	Michigon Clean Water Corps	MiCorps Site ID#: Date:	Michigan Clean Water Corps		Site Sketch	Michigan Clean Water Corps
II. Stream and Riparlan Habitat (continued)	Water Corps	III. Sources of Degradation	Water Corps	Stream Name:	Location:	
D. Plant Community		III. Sources of Degradation 1. In what ways is this stream degraded, if any?		Date:	Drawn by:	
Estimate the percentage of the stream covered by overhan				Draw a bind's aye view of shudy site. Include enoug detail that you can easily the site pagint Include to following items in the size	fine	
Using the given scale, assimate the relative abundance of s	the following:	Does a team need to come out and collect trash?		detail that you can pasity the site again! Include to	Dheet Dheet	
Plants in the sheam: Algae on Surfaces of Pilamentous Algae	Plants on the bankinperior zona:	Based on what you can see from this location, what are the potential ca degradation? Only judge what you can see from the site.	suses and level of severity of this	following items in the ske	ich:	
Rocks or Ptents (Streamers)	Shrubs Trees	degradation? Only judge what you can see from the site.		Direction of water Which way is non		
Macrophytes (Standing, Floating 0= Absent 1= Rare	Grasses Qu Abount 1= Paro	(Severity: S - slight; M - moderate; H - high) (Indicate all t	hat apply)	Which way is not Large wood in the	20 E) E 20	
Phanis) 24 Common 3r Abundant	2º Contrion 3º Abundant	Crop Related Sources S M H Land Disposal	S M H	Vegetation		
(optional)	(optional)	Creating Related Sources S M H Condition Wassawater Syste Interesting Animal Feeding Operations S M H Shifculture (Forestry)	ms S M H	 Bank features 		
		Highway/Road Bridge Maintenance S M H Shicuture (Forestry) and Runoff S M H Resource Extraction (Mini	8 M H	 Areas of erasion 		
E. Riparian Zone	2000			• Riffes		
The riperion zone is the vogotated area that surrounds the stownstream.	stream. RightLeft tranks are identified by looking	Channelization S M H Recnational/Tourism Acti		 Pools 		
Left flank Circle those land-use types that you can see from this street	um reach.	Dredging S M H • Golf Courses	S M H	Location of road Trees	150 n	
		Removal of Reparies Vegetation S M H • Marines/Recreational I (water releases)	Boating S M H	Fences	1931	
Construction Commercial Industrial Highways 2. Right Bank Direct those land-use types that you can see from this street Methods	Golf Course Other	Bank and Shereline Erosion! S M H • Marinas/Recreational I Modification/Destruction S M H • Marinas/Recreational I	Boating S M H	Parking lots		
Circle those land-use types that you can see from this street Wetlands Forest Residential Lawn Park	im reach.	Flow Regulation/ Modification S M H Dabris in Water (Hydrology)	S M H	 Buildings 		
Wetlands Forest Residential Lawn Park Construction Communical Industrial Highways 3. Summarize the size and quality of the reperior zone slong 10, by circling a value below. Excellent Residential	Shrub, Clid Field Agriculture Golf Course Other	Invasive Species S M H Industrial Point Source	S M H	 Any other notable features 		
Summarize the size and quality of the riperian zone along to circling a value below.	g each bank expandely on a scale of 1 through	Construction: Highway, Road, Bridge, Curvert Source	S M H			
Excellent Good	Marginal Poor	Construction: Land Development S M H Natural Sources	S M H			
Excellent — 6000 / Middle description of the first of digitals are 750-1000 / Middle digitals	an or more are able to: Which of reporter zone ,10 feet little or no riparian or innoced zone a result procederior due to human	Urban Runoff S M H Source(s) Unknown	S M H			
shrubs, or non-weady minimally, deal meanophytos or wetlands;	at activities.	Additional comments:	-1-1-1			
grazing or moving minimal or not oxident, almost all plants		575 (A. 1400) (A. 1400) (A. 1400)				
elitived to grow naturally.					200 t	
LEFT BANK 10 - 9 LEFT BANK 8 - 7 - 6 LEF RIGHT BANK 10 - 9 RIGHT BANK 8 - 7 - 6 RIG	TTBANK 5 - 4 - 3 LEFTBANK 2 - 1 - 0 HT BANK 5 - 4 - 3 RIGHT BANK 2 - 1 - 0					
PEGHT BANK 8 - 7 - 8 REC			0		Date	heat version 6/22/05
	3		4			