A2. Table of Contents

Page #

A3. Distribution List…….3

A4. Program Organization……..……..3

A4. Problem Definition/Background…..…….3

A6. Program Description…….…….7

A7. Data Quality Objective…….…..……8

A8. Special Training/Certifications…….……..…….11

B1. Study Design and Methods…….…….11

B2. Instrument/Equipment Testing, Inspections and Maintenance……15

B3. Inspection/Acceptance for Supplies and Consumables…..……..15

B4. Non-Direct Measurements……..……..……16

B5. Data Management……16

C1. Assessments and Response Actions……..…….…….16

C2. Data Review, Verification and Validation……..……17

C3. Reconciliation with Data Quality Objectives…….…….17

C4. Reporting…….……17

A3. Distribution List

The following agency will review and approve this Quality Assurance Project Plan (QAPP):

Table 1. Distribution List for Plan Approval

Name	Agency/Organization
Paul Steen	Huron River Watershed Council

The following agencies, organizations and individuals will receive copies of the approved QAPP:

Table 2. Distribution List for Copies of the Approved Plan

Name	Agency/Organization
James Bales	Jackson County Conservation District
Lori Fitzgibbons	Jackson County Conservation District
Paul Rentschler	Upper Grand River Watershed Alliance/ASTI Environmental
Geoffrey Snyder	Jackson County Drain Commissioner
Paul Steen	Huron River Watershed Council

A4. Program Organization

Table 3 lists key personnel with the assigned role/responsibilities

Table 3. Program Key Personnel, Involved Organization and Specific Role/Responsibility

Key Personnel	**Organization**	**Specific Role/Responsibility**
James Bales	Jackson County Conservation District	Adopt-A-Stream Program Manager, recruiting and training volunteers, creating and distributing educational materials, and entering data into the MiCorps database.
Lori Fitzgibbons	Jackson County Conservation District	Provide administrative and budget oversight.
Paul Rentschler	Upper Grand River Watershed Alliance/ASTI Environmental	Quality Assurance Officer, provides QA oversight including updating the QAPP, provides volunteer training and data review, submits Final Report.

A5. Problem Definition/Background

The Upper Grand River Watershed located in Jackson County includes priority water bodies with multiple designated uses that are impaired as listed by the Michigan Department of Environment, Great Lakes, and Energy (EGLE). According to Section 303(d) of the Federal Clean Water Act and the United States Environmental Protection Agency's Water Quality Planning and Management Regulations, states can develop total maximum daily loads (TMDLs) for waterbodies that do not meet state water quality

standards. Through this mandate, Michigan has regulated TMDLs areas throughout Jackson County including the Portage River and Grand River. According to this report, biota for the Grand and Portage Rivers are impaired for *Warm Water Fishery, Other Aquatic Life and Wildlife, and Total and Partial Body Contact.*

Additionally, the Upper Grand River Watershed Alliance has developed an Upper Grand River Watershed Management Plan to assist in water quality improvements in Jackson County. Some of the goals and desired uses stated in the Watershed Management Plan that pertain to this volunteer program include:

- Reducing non-point source inputs of pathogenic and oxygen-depleting materials to the Upper Grand River to meet full-body contact health and water quality standards.
- Reducing other non-point source pollutants, particularly phosphorous, nitrogen, eroded soil and metals.
- Improving aquatic habitat and increasing the abundance and diversity of native fish, aquatic macroinvertebrates, and other aquatic flora and fauna.
- Restoring, developing and promoting the Upper Grand River as a recreational asset through development of river corridor and canoe trail systems.
- Fostering stewardship ethics among watershed residents.
- Developing institutional capacity for continued watershed management plan implementation and monitoring.

To accomplish these goals, the Jackson Urbanized Area Phase II Committee was formed in 2002 per National Pollutant Discharge Elimination System (NPDES) requirements. This Committee applied for a watershed-based storm water permit in March 2003. The Committee is obligated under their individual storm water permits to develop storm water pollution prevention initiatives (SWPPI), make efforts to accomplish the goals stated in the Upper Grand River Watershed Management Plan, file annual progress reports to EGLE, and develop an Illicit Discharge Elimination Management Plan and to develop a Public Education Plan.

The intent of the Adopt-A-Stream Program is to continue on-going annual sampling events in the Jackson Community, educate the public on water quality issues within the Jackson Urbanized Area and the Upper Grand River Watershed, to evaluate current conditions of the EGLE determined Total Maximum Daily Load (TMDL) areas, and meet goals stated in the Phase II Committee's SWPPIs.

<u>Targeted Problem Areas</u>

The Adopt-A-Stream Program focus is on biota, which includes the collection and identification of macroinvertebrates. Targeted areas for the Adopt-A-Stream program focus on the 2003 EGLE (previously MDNRE) assigned TMDL for biota. Sites

associated with the other TMDLs (dissolved oxygen and e. coli) may also be targeted if volunteer turnout permits.

All three TMDL designated areas extend through much of Jackson County, primarily on a portion of the Grand River, Portage River and Albrow Creek (Appendix A). EGLE used background data dating back as far as 1960 to assign impaired areas throughout the Upper Grand River Watershed.

For the Adopt-A-Stream Program, ASTI Environmental (ASTI) used the representative TMDL areas as shown in Appendix A, additional background data obtained from EGLE reports, and visual observations of the watershed area to determine safe sites for volunteer sampling that contained a variety of suitable habitat for macroinvertebrates. Selected sites include primary and secondary sites which are presented in Appendix A.

Background MDNRE Staff Report Studies for TMDL Establishment

MDNRE staff reports were used to determine TMDL designated areas. Some of these studies were used for site selection for volunteer monitoring and include background macroinvertebrate sampling data. Table 4 includes macroinvertebrate data results from designated road crossing stations obtained during background research and Table 5 includes the designated TMDL areas with estimated distance of impact. Results and locations are also shown in Appendix A.

Table 4. Previous Macroinvertebrate Samples Collected

Station	Location	Macroinvertebrate Rating	Macroinvertebrate Description	Reference Code
8	High St.	5	Excellent	A
10	Monroe St.	Low/Med 1	Low/Med Acceptable	C A
11	Jackson WWTP Bridge (Locations south and north of bridge)	Medium (south) Medium (north)	Unavailable Unavailable	C C
12	Parnall Rd.	Med/High 1	Med/High Acceptable	C D
13	Maple Grove Rd.	-5 -7	Poor Poor	E A
14	Berry Rd.	-5	Poor	F
15	Lansing Ave.	Medium	Medium	C
16	Churchill Rd.	-1	Acceptable	A
21	M106	0	Acceptable	A
22	Hawkins Rd.	0	Acceptable	A
23	Wooster Rd.	1	Acceptable	A
26	Dixon	-1	Acceptable	F
27	Burt Ave. East	0	Acceptable	I
28	Burt Ave. West	1	Acceptable	I
29	Morrill Rd.	1	Acceptable	I
30	Lansing Ave. at Burt	0	Acceptable	I
31	Cooper St.	Medium	Medium	C

34	O'Brian	2	Acceptable	G
35	Cuff Rd.	3	Acceptable	G
36	Wellman Rd.	2	Acceptable	G
37	Benn Rd.	6	Excellent	G
38	Springport Rd.	5	Excellent	G
No Station #	Upstream of Lansing Ave., off Fieldstone Rd. and off Rocktree Rd.	0 1	Acceptable Acceptable	I I

*Station #s not shown above did not contain macroinvertebrate background data.

Reference Codes

The following reference codes, as shown in Table 4 are references from which sampling result information was obtained. Please note that studies prior to 1990 used a different scoring system compared to the system used today, as described in EGLE's (previously MDEQ's) Procedure 51, *Qualitative Biological and Habitat Survey Protocols for Wadable Streams and Rivers,* updated in 2002 (Appendix B).

Reference Codes

A – MDEQ Biota TMDL 2003
B – MDEQ Dissolved Oxygen TMDL 2003
C - MDEQ Staff Report 1989 Biological Survey of the Grand River
D – Upper Grand River Watershed Management Plan 2003
E – MDEQ Staff Report 1996
F – MDEQ Staff Report 1991
G – MDEQ Staff Report 1996, Biological Survey of Sandstone Creek and Mackey Brook
H – MDEQ Staff Report 2002, Dissolved Oxygen, TDS and Water Chemistry Study of the Grand River
I – MDEQ Staff Report 2002, A Biological Survey of the Tobin Snyder Drain

Table 5 lists EGLE designated TMDL areas with approximate distances of impaired waters.

Table 5. EGLE TMDL Defined Reaches

TMDL	River	Downstream End	Upstream End	Distance (miles)
Dissolved Oxygen	Grand	Tompkins Rd.	Brown Lake Rd.	29.52
	N. Branch Grand	Grand River confluence	Hoyer Rd. (5th Street)	2.11
	Portage	Grand River confluence	Wooster Rd.	4.95
E. coli	Portage	Grand River confluence	Wooster Rd.	5.06
	Grand	Tompkins Rd.	High Street	23.16
	Albrow Creek	South of Broughwell	Grand River Confluence	3.53
Biota	Grand	US 127	Burt Ave. East	7.96

A6. Program Description

The goal of this Adopt-A-Stream Program is to collect precise, accurate and representative data to use in collaboration with the MiCorps Program and provide public education regarding local water quality conditions. Specifically, volunteers will learn about proper sampling techniques, how to use macroinvertebrates as indicators of water quality, and gain information regarding existing watershed conditions and the principle causes of impairment. This monitoring project will also provide an opportunity for the public to ask questions related to the watershed and educate the public on efforts by local municipalities to enhance the water quality of the Upper Grand River Watershed. Additionally, this program is intended to establish a long-term monitoring program to track progress in water quality and TMDL attainment.

MiCorps Program

This program is a cooperative effort with the Michigan Clean Water Corps (MiCorps) Program. MiCorps is a network of volunteer monitoring programs in Michigan. It was created through an executive order by Governor Jennifer M. Granholm to assist EGLE in collecting and sharing water quality data for use in water resources management and protection programs.

The MiCorps approved Jackson County Conservation District's Adopt-A-Stream Program will provide education for the program staff and MiCorps certification for the Quality Assurance Officer(s). Data results will be distributed to the appropriate MiCorps representative.

Adopt-A-Stream Program Tasks and Target Dates

The Adopt-A-Stream Program plans to have macroinvertebrate collection days in the spring and fall, a winter stonefly hunt. Alternative collection dates will also be established in the event that rain or other conditions cause postponement of the event. Volunteers will be urged to sign-up for the events in advance in order to provide sufficient time for the program staff to assign team leaders and select sites.

Table 6 identifies anticipated dates for each program task, task description and anticipated time frames.

Table 6. Adopt-A-Stream Task Descriptions and Program Timeline

Task Description	Date	Duration
Winter Stonefly Hunt	Saturday in late January or early February	2 hours
Spring Adopt-A-Stream Training	Saturday in April or May	3 hours
Spring Adopt-A-Stream Collection Day	Saturday in April or May	4 hours
Spring Bug ID Night	Weeknight in April or May	3 hours
Fall Adopt-A-Stream Training	Saturday in September or October	3 hours

Fall Adopt-A-Stream Collection Day	Saturday in September or October	4 hours
Fall Bug ID Night	Weeknight in September or October	3 hours

A7. Data Quality Objective

The goal of this Adopt-A-Stream Program is to collect and analyze to the best capability, data that meet seven data quality objectives (DQOs) listed below. Methods to analyze DQOs will be used during the data collection and review process. Work being conducted outside of a certified laboratory and results obtained from a certified laboratory will be verified by appointed program staff to meet DQOs. The DQOs for this program include:

- Precision
- Accuracy
- Analytical Sensitivity
- Bias
- Completeness
- Representativeness
- Comparability

Precision

The evaluation of how consistently a program produces results. Along with bias, precision measures how close the measurements are to the true value of results. Measures of precision and bias are critical to assuring that a program's data are credible and reflect actual conditions.

The following will be reviewed every three years to evaluate the *precision* DQO:

- Sample collection style (must be thorough and vigorous)
- Habitat diversity (must include all habitats present and be thorough in each one)
- 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 staff to perform independent (duplicate) collections of the sampling sites, the goal for quality assurance will be conservative. A 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 have a relative percent difference (RPD) of less than 40%. This statistic will be measured using the following formula:

RPD = [(Xc - Xv) / (mean of Xc and Xv)] x 100,

Where Xc is the composite measurement and Xv is an individual measurement for each parameter.

Note that this evaluation requires that all stream data records must include the personnel of the monitoring team and the types of habitats sampled. A project quality assurance check will be designed by the Quality Assurance Officer to help verify identifications made by the volunteer teams during macroinvertebrate identification. A system using a random sampling method will be used for checking data. An error rate will be calculated for each identified sample using the same statistic as above. The RPD of identifications should be less than 5%. Sample results that exceed these standards should then 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 Quality Assurance Officer at the next sampling event and be considered for retraining. For more information on program staff certification, please see Section A8 of this report.

Bias

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

Sites will be sampled by different team leaders at least once every three years in each season (two events among six sampling events, assuming the program continues and is conducted twice per year) to examine the effects of bias in individual collection styles. An RPD between the new measure and the mean of past measures should be less than 40%. Sites not meeting this DQO will be evaluated as above by the Quality Assurance Officer.

Completeness

Completeness is a measure of the proportion of data obtained that is judged to be valid. Completeness combines the results from all teams to give the program staff a measurement of how the program is functioning overall. Not all data generated in a study is automatically acceptable for use in addressing the objectives of the study since data may fail QA reviews.

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 DQO for completeness for each parameter for each

sampling event is 90%. If the program does not meet this standard, the program staff 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

This refers to the degree to which the measured data reflect the true conditions in the environment being studied. Since this cannot usually be measured directly, a qualitative discussion of the site selection and sampling methodologies should be presented. The site selection methodology should include a rationale that directly addresses the goals of the program and does not lead toward conclusions being drawn beyond the scope of the data collected. Generally, sampling sites should be located at or above stream junctions and then move upstream to segment the watershed into increasingly smaller contributing basins or better pinpoint a problem source. The sampling methodology should indicate that all representative habitats will be sampled and documented.

Study sites are selected to represent the full variety of stream habitat types available, 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 be represented each monitoring season. Additional subwatershed sites will be added as resources and volunteers allow.

Comparability

Comparability is a measure of the confidence with which one data set or method can be compared to another. At the core of this measure is the degree to which sampling methods are identical across all sampling events. The primary goal is for the data on all parts of a given watershed to be comparable, despite being measured by different people at different times.

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. 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 program staff as soon as possible and no later than the end of the first week in the sampling window in order for the program staff to arrange for another team to complete the monitoring. If no team is available, the program staff will, if feasible, sample the site. Otherwise, the site will go unmonitored for that season.

Direction and Options for Invalid Data

Data that does not meet the DQOs listed above will be labeled as outlier data and kept on file. The data will not be distributed or used in watershed documents, scientific documents or state documents.

A8. Special Training/Certifications

The program staff will learn the standard operating procedures for MiCorps monitoring during the annual training.

MiCorps Certification

The Quality Assurance Officer and program staff will be evaluated after the training and certified by a MiCorps representative. The MiCorps representative will conduct a method validation review of the Quality Assurance Officer to ensure his or her expertise. This review and certification consists of a joint sampling event, with MiCorps staff collecting, sorting and identifying the macroinvertebrates with the program staff. Any monitoring issues will be addressed on site. If no major concerns remain, the program staff will be considered "certified" by MiCorps.

As part of the MiCorps membership and certification, the Upper Grand River Adopt-A-Stream Program partners will become members of MiCorps and file this QAPP for approval by MiCorps. If this QAPP is approved by MiCorps, it will be used for the Upper Grand River Watershed Adopt-A-Stream Program. Information regarding membership, certification and approval into the MiCorps program can be found on their website located at www.micorps.net.

Specialized MiCorps Training

The Quality Assurance Officer and the program staff will assign team leaders upon the close of the volunteer sign-up. These volunteers will be selected based on commitment to represent a group and preferably have prior sample collection experience. Collection experience, training information, and volunteer contact information for all volunteers will be stored in a volunteer database. The number of team leaders solely depends on the number of volunteers that sign-up for this event. The team leader training will be provided by a certified program staff member.

B1. Study Design and Methods

Sampling will consist of macroinvertebrate sample collection with macroinvertebrate identification occurring on a later date and at a different location (see Table 6). The intent is to have volunteers collect the samples during the sampling event, transport the samples from each sampling site, and identify the samples within one week of the sampling event in a laboratory or classroom setting.

Designated Macroinvertebrate Sampling Locations

Sampling stations have been designated to protect volunteers from hazards. Sampling stations were selected based on background data, EGLE designated TMDL areas and by visual site evaluations conducted by ASTI. Each selected station contains a variety of habitat including gravel, cobble and boulders and has moderate accessibility. Six primary sampling sites have been designated for the program along with eight secondary sites. The additional sites will be sampled based on volunteer turnout. Prior to each Adopt-A-Stream sampling event, the potential sites will be scouted and locations will be chosen based on the number of volunteers signed up for the subsequent sampling event. If a particular site becomes inaccessible and the sampling event cannot be carried out as originally planned, the site will be revisited the following week. If the site is still inaccessible, sampling will not occur at that site for that sampling event. Designated primary and secondary sampling sites are listed in Table 7.

Table 7. Primary and Secondary Sampling Locations

Primary Sampling Locations	
River	*Location*
Grand	Draper Rd., South of the City of Jackson
Portage	Wooster Rd.
Grand	High Street, within the City of Jackson
Grand	Maple Grove Rd. North of the Portage River Confluence
Grand	Tompkins Rd.
Sandstone Ck.	Springport Rd.
Secondary Sampling Locations	
River	*Location*
Grand	Hague Rd., South of the City of Jackson
Grand	Monroe, within the City of Jackson
Grand	Parnall, South of the Portage River Confluence
Portage	M-106
Batteese Ck.	Coon Hill Rd. at Grand Western Railroad
Batteese Ck.	Kennedy Rd.
Grand	Berry Rd., North of Maple Grove
Grand	Churchill, West of 127

Standard Operating Procedure for Collection of Macroinvertebrates

Samples will be collected at the six primary locations during the Adopt-A-Stream sampling event. Approximately three to five samples will be collected from each sampling location and will include a variety of habitat including riffle, rocks or other large objects, leaf packs, submerged vegetation or roots and depositional material. Kick nets will be used to gently "kick" habitat into the net to acquire macroinvertebrates. Kick nets will have a 1mm mesh to allow macroinvertebrates from being flushed out once collected. Prior to sampling, each team leader will conduct a training session on sampling technique and instructions to fill in field data forms. During this training, individual tasks will be assigned. Volunteers will collect samples using a kick net and sieve bucket with a 1mm screen, remove large organic debris, place the macroinvertebrate samples onto

sorting pans and then into whirly packs or jars. Distilled water in spray bottles will be provided to assist with transferring the macroinvertebrate samples from the kick nets or sieve buckets onto sorting pans. Prior to placement in whirly packs or jars, each container will be labeled with permanent marker. Macroinvertebrates will be transferred from sorting pans into whirly packs or jars using distilled water spray bottles or triceps. Each container will be preserved with 70% ethyl alcohol and placed in a cooler. For every sampling site, a field data form is required. The team leader will assist volunteers with data sheets and record the number of habitats sampled and habitat type. Additional required information including weather conditions and habitat available at each site will also be recorded on field data sheets. The team leader is responsible for overseeing that all data is complete and accurate. Copies of the field data forms can be found in Appendix C. Sampling equipment will be rinsed clean with water and inspected to make sure no macroinvertebrate debris is carried from one study site to the next.

Macroinvertebrate Sample Identification

Organisms will be identified at a later date in a laboratory or classroom setting. Organisms will be identified by volunteers using microscopes and will be checked for accuracy by the Quality Assurance Officer or other experienced individuals.

Macroinvertebrates will be identified to the taxonomic level indicated in Appendix B. Primary keys will be used to identify macroinvertebrates, particularly R.W. Bouchard Jr.'s *Guide to Aquatic Invertebrates of the Upper Midwest – Identification Manual for Students, Monitors, and Aquatic Resource Professionals* (2004). During sample identification, each sample should be organized to identify where the sample was collected, the total number of organisms collected in each sample, the number of each taxa identified, the sample identification date, time and location. After collection samples will be stored in plastic jars at the Jackson County Conservation District Office.

For sample analysis, a macroinvertebrate score will be assigned for each station based on the sum of the nine metrics listed below. Table 8 contains EGLE Procedure 51 metrics for macroinvertebrate scoring.

Table 8. EGLE Procedure 51 Metrics for Macroinvertebrate Sample Analysis

Metric Number	Description
1	**Total Number of Taxa.** This is the total number of taxa identified, as specified in Appendix B, in the macroinvertebrate subsample. Increases in number of taxa are well documented to correspond with increasing water quality and habitat suitability. Small, pristine headwater streams may, however, be exceptions and show low taxa richness.
2	**Total Number of Mayfly Taxa.** This is the number of taxa in the order Ephemeroptera. Mayflies are an important component of a high-quality stream biota. As a group, they are decidedly pollution sensitive and are often the first group to disappear with the onset of perturbation. Thus, the number of taxa present is a good indicator of environmental conditions.
3	**Total Number of Caddisfly Taxa.** This is the number of taxa in the order Trichoptera. Caddisflies are often a predominant component of the macroinvertebrate fauna in larger, relatively unimpacted

	streams and rivers but are also important in small headwater streams. Though tending to be slightly more pollution tolerant as a group than mayflies, caddisflies display a wide range of tolerance and habitat selection among species. However, few species are extremely pollution tolerant and, as such, the number of taxa present can be a good indicator of environmental conditions.
4	**Total Number of Stonefly.** This is the number of taxa in the order Plecoptera. Stoneflies are one of the most sensitive groups of aquatic insects. The presence of one or more taxa is often used to indicate very good environmental quality. Small increases or small declines in overall numbers of different stonefly taxa are thus very critical for correct evaluation of stream quality.
5	**Percent Mayfly Composition.** This is the ratio of the number of individuals in the order Ephemeroptera to the total number of organisms collected. As with the number of mayfly taxa, the percent abundance of mayflies in the total invertebrate sample can change dramatically and rapidly in response to minor environmental disturbances or fluctuations.
6	**Percent Caddisfly Composition.** This is the ratio of the number of individuals in the order Trichoptera to the total number of organisms collected. As with the number of caddisfly taxa, percent abundance of caddisflies is strongly related to stream size with greater proportions found in larger order streams. Optimal habitat and availability of appropriate food type seem to be the main constraints for large populations of caddisflies.
7	**Percent Contribution of the Dominant Taxon.** This is the ratio of the number of individuals in the most abundant taxon to the total number of organisms collected. The abundance of the numerically dominant taxon is an indication of community balance. A community dominated by relatively few taxa for example, would indicate environmental stress, as would a community composed of several taxa but numerically dominated by only one or two taxa.
8	**Percent Isopods, Snails, and Leeches.** This is the ratio of the sum of the number of individuals in the order Isopoda, class Gastropoda, and class Hirudinea to the total number of organisms collected. These three taxa, when compared as a combined percentage of the invertebrate community, can give an indication of the severity of environmental perturbation present. These organisms show a high tolerance to a variety of physical and chemical parameters. High percentages of these organisms at a sample site are very good evidence for stream degradation.
9	**Percent Surface Dependent.** This metric is the ratio of the number of macroinvertebrates which obtain oxygen via a generally direct atmospheric exchange, usually at the air/water interface, to the total number of organisms collected. High numbers or percentages of surface breathers may indicate large diurnal dissolved oxygen shifts or other biological or chemical oxygen demanding constraints. Areas subject to elevated temperatures, low or erratic flows may also show disproportionately high percentages of surface dependent macroinvertebrates. Appendix B contains a list of surface dependent aquatic macroinvertebrates.

Decontamination

Proper training of decontamination methods will be given to volunteers and Project Team leaders prior to sampling. Decontamination is required when re-usable equipment such as kick nets, 5-gallon buckets, sorting pans etc. are used. Decontamination is to be conducted following ASTI Standard Operating Procedure for Sampling Equipment Decontamination (Appendix D).

Sample Handling Requirements

All macroinvertebrate whirly packs and bottles will be properly labeled with a permanent marker and include the sample date, time, location, initials of collector, and the number of packs or bottles. The team leaders will be in charge of organizing the samples and checking for proper labeling. The Quality Assurance Officer will be in charge of

organizing all the samples collected throughout the day and checking each data sheet and jar for labeling consistency. The macroinvertebrate samples will be permanently preserved in ethyl alcohol and kept at the Jackson County Conservation District Office for the duration of the project.

Quality Control

Prior to sampling, all equipment will be inspected and checked to insure proper working condition. All reusable equipment will be decontaminated prior to use in the field.

The Quality Assurance Officer will review field records and ensure bottles are labeled properly. The Quality Assurance Officer will also be sure that sampling methods are being performed adequately.

During the project duration, it will not be assumed that one single sample is representative of that location. Rather, we consider results reliable after repeated collections at the same location spanning at least three years. The results will be compared to other studies at the same locations within the watershed that have been sampled the same way. Additionally, field checks will be included in the program by the Quality Assurance Officer. The Quality Assurance Officer will conduct an evaluation during sample identification to ensure each volunteer is identifying using the same techniques and is accurately identifying.

B2. Instrument/Equipment Testing, Inspection and Maintenance

Each team leader will be provided the necessary equipment such as kick nets, sorting pans, gloves, sample jars or whirly bags, spray bottles, ethyl alcohol and distilled water. Routine inspection of equipment will be performed by the team leader throughout the sampling event. Back-up equipment, if needed, will be provided by the program staff. Equipment testing will be performed on all equipment prior to use. Equipment is stored in the District office and at an off-site District storage unit.

B3. Inspection/Acceptance for Supplies and Consumables

Supplies and equipment needed for the Adopt-A-Stream Program include:

- Kick nets
- Whirly packs
- Latex and nitrile gloves
- Sorting pans
- Spray bottles
- Sample bottles
- 70% Ethyl alcohol
- Distilled water
- Alconox detergent
- Waders

- Sieve buckets
- Permanent markers
- Clip boards
- Microscopes

The amount of equipment needed will be dependent upon volunteer turnout. Donations will be accepted from local organizations and sponsors. All other equipment will be provided by the Program Partners. The program staff may appoint a volunteer to take charge of the equipment and transport the equipment from site to site. Sampling equipment will be rinsed clean between sites and sampling events. Prior to each sampling event, program staff will inspect sampling equipment and necessary repairs will be made. Microscopes used for Bug ID night are owned and maintained by the Conservation District. Between seasons, the sampling equipment is cleaned and stored at the District storage unit. Records for supply purchases are maintained at the Conservation District office.

B4. Non-direct Measurements

Not applicable.

B5. Data Management

Data collected from each site will be transferred onto field data forms. At the end of the sampling event, each team leader is responsible for delivery of the data to the Quality Assurance Officer. Each team leader will review the data sheets and bottle labels before the groups depart. The data from the field sampling event will be given to the Quality Assurance Officer for review. Data will also be saved electronically in Microsoft Word and Microsoft Excel files. Data will be entered electronically into the MiCorps online database. Macroinvertebrate data is also submitted to EGLE in a STORET spreadsheet as part of the Upper Grand River Implementation Project (UGRIP). The program staff will save all hard copies from the field and electronic copies as backups.

C1. Assessments and Response Actions

Assisted and side-by-side sampling will take place with volunteers, program staff and the team leaders. Trained team leaders will monitor that quality assurance protocols are followed.

For macroinvertebrate sampling results, total diversity reported by each group must equal at least 70% of the diversity previously found at the site. Sites with results less than 70% will be re-sampled by the Quality Assurance Officer to verify or discard such unusual results, which could be the result of poor sampling. If the sampling event is the first of the volunteer monitoring program, background data should be used as comparative data; however, no percentage requirement for diversity is proposed.

Corrective Actions

If deviation from the Quality Assurance Project Plan (QAPP) is observed at any point during sampling, sample identification or data entry, the data may be deleted from the data set. Re-sampling will be conducted if feasible, given that the deviation is noted soon after occurrence and volunteers are available. All corrective actions will be documented and communicated to MiCorps.

C2. Data Review, Verification and Validation

The Quality Assurance Officer will review all data from the field data forms before the data is entered into spreadsheets. The data will be compared to well-known reference standards (as noted earlier in this report). Any abnormal data or data far from the reported standard will be reviewed, rejected or accepted by the Quality Assurance Officer. For macroinvertebrate identification, a skilled aquatic biologist or entomologist will be used to spot check the samples. Based on the results of the review, data may be deleted, accepted or thoroughly investigated.

The process used for macroinvertebrate identification includes examination under a microscope and using project approved dichotomous keys.

C3. Reconciliation with Data Quality Objectives

The Quality Assurance Officer will review data entry, the number of macroinvertebrates collected at each location and data reported from the Quality Assurance Officer. The Quality Assurance Officer will evaluate the sampling stating whether or not DQOs were met during sampling. The Quality Assurance Officer will evaluate the macroinvertebrate identification procedure and report whether or not DQOs were met. If DQOs were not met, improvements for next years sampling event will be incorporated into the program and the data will not be reported to MiCorps.

C4. Reporting

The final report will be completed by the Quality Assurance Officer and include the program overview, results compared to background data and quality control results. The report will be distributed to the appropriate MiCorps representative and to members on the QAPP Distribution List. Data will be submitted to EGLE for entry into the EPA STORET database. Electronic copies of all macroinvertebrate and habitat data will be submitted utilizing the STORET data submission templates available on the EGLE NPS Unit website (Appendix C).