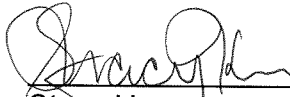


SECTION A – PROJECT MANAGEMENT


A.1 Title of Plan and Approval

Quality Assurance Project Plan

SheboyganRiver AOC Targeted Invasive Species Control Project


 Date: 07/28/2011
Stacy Hron

WDNR Project Manager/ Sheboygan River AOC Coordinator

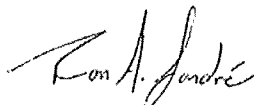
 Date: 07/28/2011
DonaleaDinsmore

WDNR Quality Assurance Coordinator/ WDNR Great Lakes Funding & Quality Assurance
Coordinator


Prepared by:
Cedarburg Science, LLC

 Date: 07/28/2011

Ginny Plumeau, Cedarburg Science LLC
Project Manager / President / Principal Ecologist

 Date: 07/28/2011

Ron Londré, Cedarburg Science LLC
QA Manager / Senior Ecologist / Botanist

 Date: 07/28/2011

Cindy Kowalchuk, Cedarburg Science LLC
Assistant Project Manager / Project Ecologist

 Date: 07/28/2011

Amanda Larsen, Cedarburg Science LLC
Project Coordinator / Environmental Scientist

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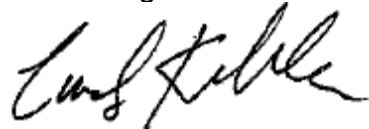
_____ Date: 07/28/2011
Stacy Hron
WDNR Project Manager/ Sheboygan River AOC Coordinator


_____ Date: 07/28/2011
DonaleaDinsmore
WDNR Quality Assurance Coordinator/ WDNR Great Lakes Funding & Quality Assurance
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Cindy Kowalchuk, Cedarburg Science LLC
Assistant Project Manager / Project Ecologist

 _____ Date: 07/28/2011
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Project Coordinator / Environmental Scientist

A.2 Table of Contents

SECTION A – PROJECT MANAGEMENT

A.1 Title of Plan and Approval	1
A.2 Table of Contents	2
A.3 Distribution List	4
A.4 Project/Task Organization	5
A.5 Problem Definition/Background.....	7
A.6 Project/Task Description.....	7
A.7 Quality Objectives & Criteria	8
A.8 Special Training/Certification.....	9
A.9 Documents and Records.....	9

SECTION B – DATA GENERATION & ACQUISITION

B.1 Sampling Process Design	11
B.2 Sampling Methods.....	11
B.3 Sampling Handling & Custody	11
B.4 Analytical Methods.....	11
B.5 Quality Control	12
B.6 Instrument/Equipment Testing, Inspection, and Maintenance.....	12
B.7 Instrument/Equipment Calibration and Frequency.....	12
B.8 Inspection/Acceptance of Supplies & Consumables.....	12
B.9 Data Acquisition Requirements for Non-Direct Measurements	12
B.10 Data Management.....	13

SECTION C – ASSESSMENT AND OVERSIGHT

C.1 Assessments and Response Actions	14
C.2 Reports to Management.....	14

SECTION D – DATA VALIDATION AND USABILITY

D.1 Data Review, Verification, and Validation.....	15
D.2 Verification and Validation Methods	15
D.3 Reconciliation with User Requirements.....	15

APPENDIX A

A.....	S
heboyganRiver AOC Invasive Species Survey – Datasheet& Photo Log	

List of Tables

Table A.1. Roles & Responsibilities.

Table A.2. Project Timeline.

List of Figures

Figure A.1. Organization Chart.

A.3 Distribution List

Stacy Hron
SheboyganRiver AOC Coordinator
1155 Pilgrim Road
PlymouthWI53073
Stacy.Hron@wisconsin.gov

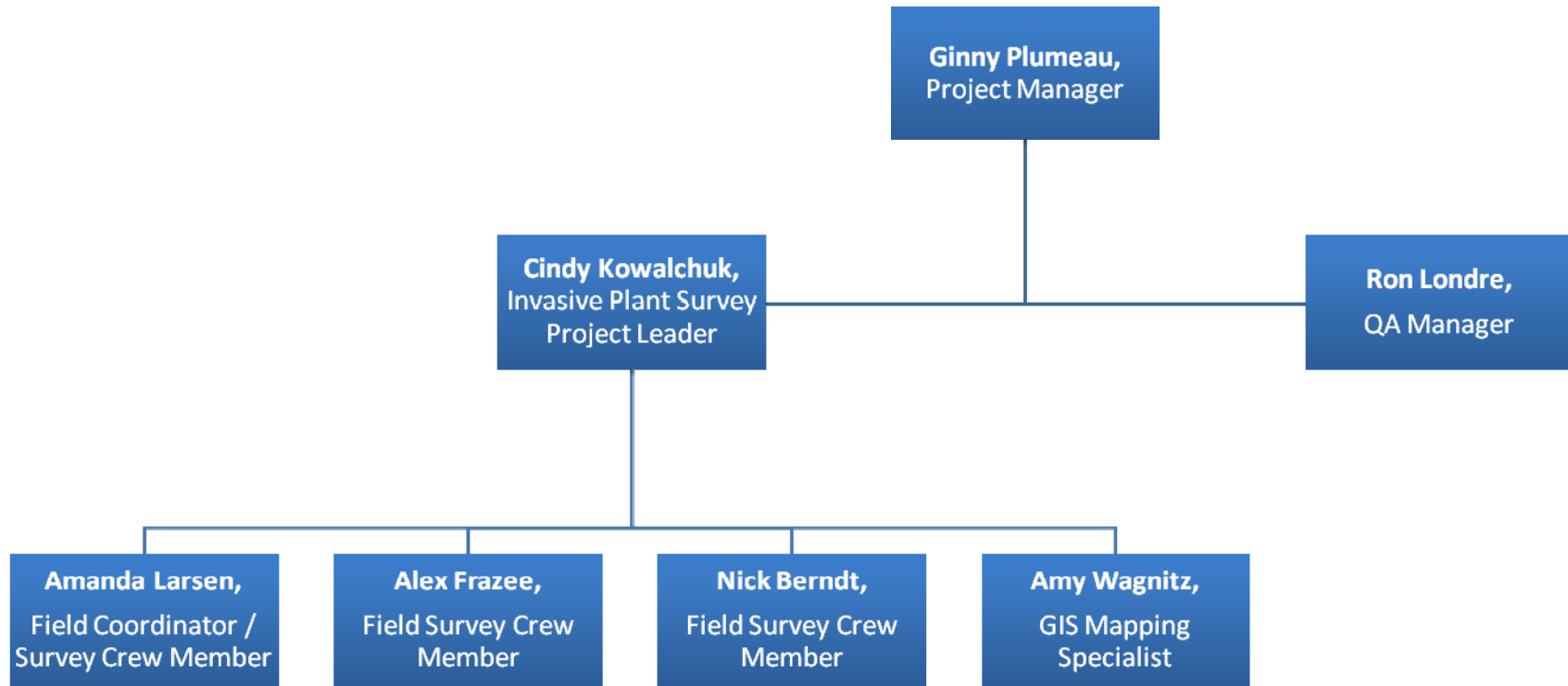
Donalea Dinsmore
WDNR Great Lakes Funding & Quality Assurance Coordinator
Wisconsin Dept. of Natural Resources
PO Box 7921
Madison WI 53707-7921
Donalea.Dinsmore@wisconsin.gov

A.4 Project/Task Organization

Table A.1. Roles & Responsibilities for SheboyganRiver AOC Targeted Invasive Species Mapping & Treatment Plan.

Donalea Dinsmore , WDNR Great Lakes Funding & Quality Assurance Coordinator	<ul style="list-style-type: none"> • Approve QAPP • Project reporting on Great Lakes Accountability System (GLAS)
Stacy Hron , SheboyganRiver AOC Coordinator	<ul style="list-style-type: none"> • Overall project management • Monitors study progress • Ensures project completion
Ginny Plumeau , Project Manager / Principal Ecologist / President	<ul style="list-style-type: none"> • QAPP preparation • Overall project management • Monitors field survey & mapping progress • Ensures project completion
Ron Londré , QA Manager / Senior Ecologist / Botanist	<ul style="list-style-type: none"> • QAPP preparation & distribution • Overall project QA/QC • Ensures QAPP is followed • Provides recommendations for development of an invasive species treatment strategy • Provides plant identification expertise
Cindy Kowalchuk , Invasive Plant Survey Project Leader / Assistant Project Manager / Project Ecologist	<ul style="list-style-type: none"> • Invasive plant survey project leader • Assist with project management • Performs field survey plant identification • Collects observational data for development of invasive species treatment strategy • Assists with GIS data collection • Develops an invasive species treatment strategy in cooperation with WDNR and Sheboygan River AOC Fish and Wildlife Technical Advisory Committee
Amanda Larsen , Field Survey Crew Member / Project Coordinator / Environmental Scientist	<ul style="list-style-type: none"> • QAPP preparation & distribution • Coordinates field survey and mapping teams • Performs GIS data collection • Collects observational data for development of invasive species treatment strategy • Produces GIS data and maps of invasive species locations • Develops an invasive species treatment strategy in cooperation with WDNR and Sheboygan River AOC Fish and Wildlife Technical Advisory Committee
Alex Frazee , Field Survey Crew Member / Field Ecologist	<ul style="list-style-type: none"> • Performs field survey plant identification • Collects observational data for development of invasive species treatment strategy • Assists with GIS data collection
Nick Berndt , Field Survey Crew Member / Field Ecologist, Aquatic Specialist	<ul style="list-style-type: none"> • Performs field survey plant identification • Collects observational data for development of invasive species treatment strategy • Assists with GIS data collection
Amy Wagnitz , GIS Mapping Specialist / Staff Ecologist	<ul style="list-style-type: none"> • Produces GIS maps of invasive species showing infestations. • Produces GIS data and maps in electronic format compatible with WDNR systems

Figure A.1. Organization Chart.



A.5 Problem Definition/Background

The Sheboygan River Area of Concern (AOC) Fish and Wildlife Technical Advisory Committee has been working on habitat restoration projects that address fish and wildlife related beneficial use impairments. The Wisconsin Department of Natural Resources (WDNR) has received Great Lakes Restoration Initiative (GLRI) funding to implement some of these habitat restoration projects. This project (the Sheboygan River AOC Targeted Invasive Species Mapping & Treatment Plan) is the first phase, in a two phase project, to control targeted invasive species within the Sheboygan River AOC. This phase of the project includes invasive species mapping and treatment planning. Invasive plant species targeted within this project include Japanese knotweed (*Polygonum cuspidatum*), giant reed grass (*Phragmites australis*), garlic mustard (*Alliaria petiolata*), and buckthorn (*Rhamnus spp.*). The goal of the project is to restore a diverse native plant community in the targeted areas that will provide habitat to a range of fish and wildlife species.

A.6 Project/Task Description

Cedarburg Science will identify and map populations of Japanese knotweed (*Polygonum cuspidatum*), giant reed grass (*Phragmites australis*), garlic mustard (*Alliaria petiolata*), and buckthorn (*Rhamnus sp.*) within the Sheboygan River AOC. The invasive plant species survey and mapping will include riverbanks, near shore riparian areas, and floodplains within 300 feet from the river. Populations of these invasive species are dispersed throughout the entire AOC as well as adjacent wetland and floodplain habitats.

Surveys will start at the Sheboygan Falls Dam and continue to the mouth of the Lake Michigan harbor (approx. 14 river miles along the Sheboygan River). The 14 mile section of the AOC is located in Sheboygan County Township 15 N Range 23 E Sections 22-23, 27-32 and Township 15 N Range 22 E Section 36.

Permission to survey on private property will be gained and coordinated with the WDNR.

Field surveys will be conducted between July 18– August 31, 2011. Depending upon the field conditions and terrain, surveys will be conducted by two to three ecologists and mapping specialists with GPS units that have sub-meter accuracy.

GIS maps of the invasive species colonies will be generated and will include information and data gathered by River Alliance of Wisconsin Project RED and WDNR Bureau of Endangered Resources. The WDNR will supply this data in electronic format. Maps will be produced at a sufficient resolution, providing a comprehensive overview of the frequency and size of terrestrial invasive species populations.

Cedarburg Science will also develop and implement a treatment strategy for Japanese knotweed (*Polygonum cuspidatum*), giant reed grass (*Phragmites australis*), garlic mustard (*Alliaria petiolata*), and buckthorn (*Rhamnus sp.*) within the project area. The treatment strategy will be developed in cooperation with WDNR staff and the Sheboygan River AOC Fish and Wildlife Technical Advisory Committee. Treatment sites will focus on other potential restoration project locations, high priority natural areas, and satellite populations that pose a threat to further spread within the AOC. Areas will be prioritized and selected for treatment based on funding available. Permission for treatment on private property will be secured during the development of the treatment plan.

The treatment plan will:

- plan for implementation in 2012,
- address continued monitoring and mapping needs to determine treatment success and follow up actions/alternations to the treatment plans,
- make contingencies for replacement of vegetation if necessary in treatment areas,
- incorporate treatment of the targeted invasive species through 2015, and
- include a quality assurance project plan.

Submission of final products and invoices will be completed by September 30, 2011, and include:

- GIS Maps of Invasive Species showing the infestations,
- GIS data and maps in electronic format compatible with WDNR systems displayed in Grid Coordinate System WTM83/91 (Wisconsin Transverse Mercator, referenced to the North American Datum of 1983, 1991 adjustment), and
- the Conservation Plan (6 printed copies and an electronic copy).

Table 2. Project Timeline.

Activity	Start	Finish
Project Preparation/Pre-field Reviews, Coordinate with WDNR	June 28, 2011	July 15, 2011
Field Survey, Invasive Plant Inventory & Mapping	July 18, 2011	August 31, 2011
GIS Mapping and Report Development	August 1, 2011	September 15, 2011
Completion of Services, Report Submittal, Final Invoice Submission		September 30, 2011

A.7 Quality Objectives & Criteria

The purpose of this project is to conduct a GIS survey of invasive plant species, generate GIS data and maps, and produce a restoration and conservation plan to manage the invasive plant species to improve fish and wildlife habitat. The data collected by surveyors from this project will provide data to allow ecologists and planners to develop a restoration strategy to manage the invasive plant species.

Quality Objectives:

- 100% accurate plant identification expected between skill of survey team and voucher procedure.
- Accurate GIS mapping
- Effective restoration strategy

Field survey quality objectives will be met by assembling field survey teams comprised of members specializing in invasive plant identification, restoration ecology, and GIS mapping. Accurate plant identification will be accomplished by the use of trained ecologists experienced with invasive plant identification. Voucher specimens may also be taken by field crew members and verified by Cedarburg Science Botanist and QA manager Ron Londré. Accurate GIS mapping will be

accomplished by the use of mapping specialists trained and experienced with GIS data collection. GIS data collection will be conducted using high performance Trimble GeoXT GPS equipment with sub-meter accuracy. This method of surveying invasive plant species does not support measurable precision nor accuracy/bias calculations therefore quantitative analysis is not possible. Qualitative analysis will be performed by a review process. Survey data will be reviewed on a regular basis by Cedarburg Science GIS mapping specialist Amy Wagnitz and Cedarburg Science QA manager / Botanist / Senior Ecologist Ron Londré.

Data for populations of the target species that occupy an area less than approximately 15 feet in diameter will be recorded using a single data point. If the population is within this area but intermixed with other non-target or target species an approximate number of target species will be noted in the NOTES section of the data sheet. For intermixed target species a separate data sheet will be filled out for each species the identification number of the other data sheets associated with that GPS location will be referenced in the NOTES section of the data sheet. Separate GPS points will not be taken for additional target species. Data for any population of the target species that is greater than approximately 15 feet in diameter will be collected using a polygon. If the target species is intermixed with other non-target or target species within the area an approximate number of target species will be noted in the NOTES section of the data sheet. For intermixed target species a separate data sheet will be filled out for each species and the identification number of the data sheets associated with that GPS location will be referenced in the NOTES section of the data sheet. Separate GPS points will not be taken for additional target species.

There is no minimum or maximum population or stand requirement for assessment. Any populations of target species found will be assigned an identification number, have GPS data collected, and a data sheet completed. This includes found populations comprised of one or two individuals of a target species.

An effective restoration strategy objective will be met by use of the GIS data and by collecting observational field data on invasive plant stands. Observational data will be taken by ecologists experienced in the field of restoration ecology and stormwater management. Observational data will include species identification, phenology, relative abundance of invasive plants within a stand, approximate slope %, and presence/absence of preexisting erosion. This observational data will allow ecologist and planners to determine if management needs will require only invasive plant management or supplemental soil stabilization with planting, seeding, and erosion control BMPs. An effective restoration strategy objective will also be met with the use of information provided from the River Alliance of Wisconsin Project RED and WDNR Bureau of Endangered Resources. Quantitative analysis of the restoration planning is not possible without implementation of the restoration strategy and is not within the scope of this portion of the project. Qualitative analysis of the restoration strategy will be achieved through the collaboration and review process of Cedarburg Science, WDNR, and the Sheboygan River AOC Fish and Wildlife Technical Advisory Committee.

A.8 Special Training/Certifications

The Sheboygan River AOC Targeted Invasive Species Mapping and Treatment Plan team leader will be responsible for ensuring that the Cedarburg Science field survey crews are trained and prepared with background information. Prior to conducting the field surveys the QA Manager will go over survey methods, data collection methods, review vegetation identification, and review safety training.

To minimize potential health and safety risks related to field survey work a qualified member of the Cedarburg Science team will conduct a canoe safety review. Flotation safety vests will be provided. Surveys will be suspended during flood events or thunderstorms. The field crews will have at least one individual with recent CPR and first aid training and this individual will review first aid and CPR methods with the other field crew members. All field crew members will be physically able to conduct field work under demanding conditions and be well prepared to handle contingencies or emergencies. Nearby clinics and hospital ER locations will be reviewed with field crews.

A.9 Documents and Records

The surveyor of invasive plants will supply the following records and documents:

- GPS/GIS files documenting locations of invasive plant species.
- Voucher specimens, which will be kept temporarily for identification purposes and disposed of after September 30, 2011.
- Photographs of invasive species individuals, populations, and habitats within the Sheboygan River AOC. Digital photos will be provided as .jpg files. The digital cameras that will be used are not GPS capable and the GPS unit(s) that will be used are not photo capable; photo logs will be matched with appropriate GPS data point(s).
- Oral progress reports upon the request of the Team Leader, QA Manager, or Project Manager.

Field data sheets compiled by the surveyors will be scanned and saved electronically as PDF files (Portable Document Format) and sent to the Team Leader and QA Manager.

An Invasive Species Treatment Strategy will be developed after the field work is completed in collaboration with WDNR staff and Sheboygan River AOC Fish and Wildlife Technical Advisory Committee. This treatment strategy will include:

- GIS maps
- Summary and discussion of GIS maps
- Data collected
- Summary and discussion of results

Data files from this project will become the property of the WDNR and the Sheboygan River AOC Fish and Wildlife Technical Advisory Committee. All data will be electronically provided in shapefile format in the WTM83/91 datum to ensure full compatibility with WDNR's mapping framework.

SECTION B – DATA GENERATION & ACQUISITION

B.1. Sampling Process Design

The purpose of this project is to identify and map populations of Japanese knotweed (*Polygonum cuspidatum*), giant reed grass (*Phragmites australis*), garlic mustard (*Alliaria petiolata*), and buckthorn (*Rhamnus sp.*) in the Sheboygan River AOC. This information will then be used to develop an invasive species treatment strategy.

B.2 Sampling Methods

1. The surveyors will conduct field inventories for the targeted invasive species, in appropriate weather conditions. Since weather conditions may affect both the surveyors and survey results, the surveyors will collect data in optimal weather conditions.
2. Each stand of invasive species will be given an identification number in the order found, and letter corresponding to which bank (N/S) it is found on.
3. The surveyor will document invasive species stands with GPS coordinates, data sheets including species identification, phenology, percent ground cover, habitat type, moisture regime, approximate slope %, and presence/absence of preexisting erosion. If necessary, a voucher specimen may be collected using the most appropriate method (i.e. photograph or specimen collection) based on the population size. Waypoints may be taken if a stand of invasive species is unreachable due to site restrictions. These stands will be described in the datasheets along with the corresponding GPS waypoint. All specimens collected as vouchers will be properly labeled and put in plant presses.
4. Photos for each GPS location will be given an alpha-numeric tag that will correspond with the field notes. Field notes will include photo tags, and no photos will be deleted until a proper review of photos has been completed.
5. Access points along the river from nearby roads may be limited; therefore the surveyors may utilize a canoe to aid in the collection of data and search for invasive species stands.
6. Copies of surveyor field notes and datasheets will be made and submitted to the project manager at the end of each day. Uploading of GPS data will be done on a regular basis to back up information already collected.
7. Surveyors and project managers will be in contact with Stacy Hron to ensure that permission is granted to survey on private lands along the Sheboygan River AOC. Surveyors will also carry documentation of access permission.

B.3 Sampling Handling & Custody

The only samples to be collected will be voucher specimens. Each surveyor will label and submit collected voucher species to the project manager. Label will include GPS coordinates and photos associated with it.

B.4 Analytical Methods

All observations will be conducted in the field. Analytical equipment will not be used for this survey.

B.5 Quality Control

Data collected by this project will be used to identify stands of Japanese knotweed (*Polygonum cuspidatum*), giant reed grass (*Phragmites australis*), garlic mustard (*Alliaria petiolata*), and buckthorn (*Rhamnus spp.*) within the Sheboygan River Area of Concern. It will be used for the planning and development of an invasive species treatment strategy. This strategy will be used to

control or eradicate invasive plant species (especially pioneer colonies) deemed to be the greatest threat to fish and wildlife habitat. The goal of the project is to restore a diverse native plant community in the targeted areas that will provide habitat to a range of fish and wildlife species.

Quality Control Activities

Plant species identification will be performed at the survey site by the surveyors, using his or her experience and identification sheets as necessary. Photo or specimen vouchers will be taken as necessary to represent invasive species stands. All vouchers will be checked by Ron Londré, QA manager. In the event that a surveyor is unsure of an invasive species listed, a voucher will be collected and identified by the QA manager.

Quality control review will also be conducted on the GIS mapping to verify that the map projections are spatially accurate. Map accuracy will be crosschecked using GPS tags on selected monuments of known position such as the monuments listed in B.7.

Corrective Actions

If the QA manager disagrees with an identification made by a surveyor and a voucher can be clearly identified, the proper change will be made in the database by the QA manager.

B.6 Instrument/Equipment Testing, Inspection, and Maintenance

The primary instrument that will need testing and maintenance will be the Trimble GeoXT GPS unit. The project leader will be responsible for maintaining and keeping the GPS in operable condition and refer to the owner's manual as needed. Any problems that may occur with the GPS should be reported to and resolved by the project leader.

Other equipment that may need to be inspected is the cameras, bags for containing voucher specimens, and scissors or pocket knives for voucher collection. The canoe and flotation devices will be properly inspected for safety at the beginning of the day prior to use.

B.7 Instrument/Equipment Calibration and Frequency

This survey does not use instruments or equipment that can be calibrated. The accuracy of the GPS will be verified using the following established monuments.

1. Center of County Road PP bridge over Sheboygan River
2. Left side of the Waelderhouse Dam
3. Center of County Road A bridge over Sheboygan River
4. USGS 0408600 station, left bank of Sheboygan 0.4 miles upstream from Esslinger Park.
5. Center of County Road 28 Bridge and Sheboygan River
6. The mouth of the Sheboygan River

The locations of these monuments are near estimated starting and ending points for each survey day and spaced such that at least two per day will be used to establishing accuracy of the GPS unit.

The locations of these monuments are near estimated starting and ending points for each survey day and spaced such that at least two per day will be used to establish accuracy of the GPS unit near the beginning and end of each survey day.

B.8 Inspection/Acceptance of Supplies & Consumables

The main supplies that are needed for this survey will be batteries, black non-smudge markers, and, plastic bags for voucher collection. The surveyor is responsible for making sure that any supplies and consumables required are in good condition before sampling.

B.9 Data Acquisition Requirements for Non-Direct Measurements

Secondary data used include data provided from Project R.E.D. and WDNR Endangered Resources. The content of Project R.E.D. was provided in Excel format and contained the NSEW coordinates for the target invasives Japanese knotweed (*Polygonum cuspidatum*), and giant reed grass (*Phragmites australis*). WDNR Endangered Resources is an interactive webpage that provides detailed description of endangered resources and their locations in Wisconsin.

B.10 Data Management

At the end of each day, survey data recorded by the surveyor on paper will be copied and sent to the team leader and QA Manager. GPS data and photos will be uploaded to our server as backup and copied to the team leader and QA Manager, as well as the GIS specialist.

The surveyor will record the survey data on paper, using datasheets created by Cedarburg Science. Examples of each can be found in Appendices A & B.

- Invasive Plant Survey Form (Appendix A)
- Photo Log (Appendix B)

Ron Londré, QA Manager, will check the data, using photos and vouchers available to confirm species identifications. After the survey information is checked for accuracy, it will be included in the treatment plan for the Sheboygan AOC Targeted Invasive Species Control Project.

PART C – ASSESSMENT AND OVERSIGHT

C.1 Assessments and Response Actions

The QA Manager for this project will be responsible for assessments for this project. The QA Manager and the Team Leader will conduct a meeting with all staff who will be conducting the surveys at the beginning of the project. Staff will be encouraged to ask questions during this meeting. General surveillance will be the primary assessment technique of the project activities. No other types of assessments are necessary. Data checks will be performed during the project and the QA manager for the project will be responsible for ensuring that any necessary corrective actions are carried out, verified, and documented.

C.2 Reports to Management

The Team Leader for the project will communicate verbal status reports to the QA Manager and Project Manager on a daily basis. For example, after Day 1 of the field survey, the Team Leader will call or meet with the QA Manager or Project Manager and give a verbal status report. These status reports will include work accomplished, any issues that came up, and work goals for the next day.

This information will be used by the Project Manager and QA Manager to monitor the projects status. If any problems should occur, the QA Manager is responsible for reporting them. QA information will then be included in the final report.

PART D – DATA VALIDATION AND USABILITY

D.1 Data Review, Verification, and Validation

The Team Leader and QA Manager for this project will be responsible for critically reviewing all project data and quality control data to determine if there are any problems that may compromise data usability. All data will be reviewed for completeness and correctness.

To ensure accuracy of all data throughout the survey, data points and polygons of the target species will be checked against the surveyor's data points collected at the monuments specified in B.7. Each data sheet will be checked against the log numbers of photos on that sheet to ensure correct identification of target species, population size and density. Each data sheet will be then be matched with the corresponding data point on the GIS map for final verification.

D.2 Verification and Validation Methods

The Team Leader and QA Manager for this project will be responsible for assuring that all data has been verified and validated. The procedure for evaluating field data includes checking for transcription errors and reviewing all the field notebooks. The surveyors will also check their data in the field and will check it again when copying the information to the Team Leader and QA Manager. Any problems that may affect the use of the data for the development of a treatment strategy will be reported to the Project Manager.

D.3 Reconciliation with User Requirements

The Team Leader and QA Manager will be responsible for critically reviewing all project data and any problems will be reported to the Project Manager. The Project Manager will make the final decision regarding the validity and usability of the survey data collected and will compare it with any pre-existing data from prior or current project data as provided by the WDNR. The Project Manager will then evaluate any sample collections and data reporting processes to determine if the data is of sufficient quality in order to meet the objectives of developing an invasive species treatment strategy.

All GPS data will be collected and mapped using the WTM83/91 datum to ensure full compatibility with WDNR's mapping framework.