

Aquatic Invasive Species Early Detection Monitoring in Wetlands

State of Wisconsin Department of Natural Resources

STANDARD OPERATION PROCEDURES

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DRAFT

These working draft protocols will undergo-DNR review in fall/winter 2021 & external review in winter/spring 2022. If you have comments or questions, please contact maureen.ferry@wisconsin.gov.

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MONITORING OBJECTIVES

The monitoring objectives are to detect new populations of NR 40 prohibited species and to understand the distribution of NR 40 restricted invasive species. The Wisconsin Department of Natural Resources (DNR) currently relies on a network of DNR lake biologists and volunteers (i.e. Citizen Lake Monitoring Network) to collect data on the presence and absence of invasive species. The biologist's efforts help evaluate the relationship between water quality and invasive species, and the variable volunteer efforts provide additional reconnaissance, but early detections from these efforts have been incidental. This monitoring will target vulnerable waterbodies for early detection monitoring.

This monitoring strategy may trigger statewide, regional or local implementation of a rapid response strategy, lead to an assessment of abundance and frequency within a waterbody and/or an evaluation of management activities.

Monitoring will be conducted by WDNR staff, partners, and volunteers.

DESIGN

Sample Period:	May 15 th – September 15 th ; sampling for some species may occur year-round
Frequency:	Rotating cycle or as needed
Locations:	Access areas, targeted sites, disturbances
Parameters:	list of invasive species
Methods:	1. 30 min. search at access area 2. 10 min. search at targeted sites that vary in habitat 2. Meander

SITE SELECTION

The most important factor influencing the introduction and establishment of invasive species are pathways for invasive species to favorable habitats for establishment (Vander Zanden and Olden 2008). The primary vectors for invasive species are anthropogenic, such as public access and recreational opportunity (Leung 2002; Vander Zanden and Olden 2008; Rothlisberger et al. 2011; Latzka personal communication). Disturbed or degraded ecosystems are generally unfavorable for native species and provide niches for invasive species establishment and expansion once a species is introduced (Didham et al. 2005, MacDougall and Turkington 2005, Havel et al. 2005; Johnson et al. 2008).

Our earlier studies suggest that urban land use increase risk of invasive species establishment along streams. Other research suggests that invasive species dispersal is about 15 miles, though more research is needed. Therefore, identifying pioneer populations of invasive species in these locations (i.e. urban land use and within 15-mile buffers of know populations) is important to detect new populations and enable response efforts.

Central Office will generate a list of lakes within 15-mile proximity to prohibited species for regional staff to choose from. Biologists will review a list of lakes each winter to monitor the following year. The priority list will be based on the following criteria (in descending order):

- Whether there is public access;
- ≤ 15 mi proximity to known occurrences of prohibited or uncommon restricted species; and
- $\geq 13\%$ development.

FIELD PREPARATION

Review the AIS Monitoring Field Preparation document which outlines procedures for communication, crews, general safety guidelines, snorkeling guidelines, and ethanol guidelines.

<https://dnrx.wisconsin.gov/swims/downloadDocument.do?id=239109781>

TARGET SPECIES

Table 1. Species targeted for aquatic invasive species surveys. Species **with (*)** are prohibited early detection species.

Common Name	Latin Name	Species Code
Aquatic Plants		
European Frog-bit*	<i>Hydrocharis morus-ranae</i>	EFB
Yellow Floating Heart*	<i>Nymphoides peltata</i>	YFH
Water Chestnut*	<i>Trapa natans</i>	WC
Brazilian Waterweed*	<i>Egeria densa</i>	BWW
Brittle Naiad*	<i>Najas minor</i>	BRN
Hydrilla	<i>Hydrilla verticillata</i>	HYD
Curly-Leaf Pondweed	<i>Potamogeton crispus</i>	CLP
Fanwort*	<i>Camboba caroliniana</i>	FW
Parrot Feather*	<i>Myriophyllum aquaticum</i>	PF
Eurasian Water Milfoil	<i>Myriophyllum spicatum</i>	EWM
Water Hyacinth*	<i>Eichhornia crassipes</i> and <i>E. azurea</i>	WH
Water Lettuce*	<i>Pistia stratiotes</i>	WL
Didymo*	<i>Didymosphenia geminata</i>	DIDY
Wetland Plants		
Flowering Rush	<i>Butomus umbellatus</i>	FR
Tall Manna Grass*	<i>Glyceria maxima</i>	
Phragmites	<i>Phragmites australis</i>	PHRG
Japanese Knotweed	<i>Polygonum cuspidatum</i>	JK
Giant Knotweed*	<i>Polygonum sachalinense</i>	GK
Purple Loosestrife	<i>Lythrum salicaria</i>	PL
Japanese Hop	<i>Humulus japonicus</i>	JH
Yellow Iris	<i>Iris pseudoacorus</i>	YI
Japanese Stilt Grass*	<i>Microstegium vimineum</i>	JSG
Narrow-Leaf Cattail	<i>Typha angustifolia</i>	NLC
Hybrid Cattail	<i>Typha x glauca</i>	HC

Java Waterdropwort	<i>Oenanthe javanica</i>
Lesser Celandine	<i>Ficaria verna</i>
Hairy Willowherb	<i>Epilobium hirsutum</i>
Graceful Cattail	<i>Typha laxmanni</i>
Southern Cattail	<i>Typha domingensis</i>
Bohemian Knotweed	<i>Polygonum x bohemicum</i>
Golden Creeper	<i>Ernodea littoralis</i>
European Swamp Thistle	<i>Cirsium palustre</i>
Poison Hemlock	<i>Conium maculatum</i>

Invertebrates

Zebra Mussels	<i>Dreissena polymorpha</i>	ZM
Quagga Mussels*	<i>Dreissena bugensis</i>	QM
Asian Clam*	<i>Corbicula fluminea</i>	AC
Faucet Snails*	<i>Bithynia tentaculata</i>	FS
Spiny Waterfleas*	<i>Bythotrephes longimanus</i>	SWF
Chinese Mystery Snails	<i>Cipangopalundina chinensis</i>	CMS
Banded mystery Snails	<i>Viviparus georgianus</i>	BMS
New Zealand Mudsnail	<i>Potamopyrgus antipodarum</i>	NZMS
Red Swamp Crayfish*	<i>Procambarus clarkii</i>	RSC
Rusty Crayfish	<i>Orconectes rusticus</i>	RC

FIELD GUIDES

For guidance on target species identification and habitat preference, please review the attached and the following guides:

- [AIS Identification Guide](#) (multi-page) and [AIS Identification Guide](#) (one-page)
- [Crayfish of Wisconsin Guide \(2017\)](#) (multi-page)
- [Citizen Lake Monitoring Network Aquatic Invasive Species Monitoring Protocol](#)
- [Field guide to Wisconsin Streams](#)
- [Key to Wisconsin Freshwater Snails](#)

EQUIPMENT

All lakes

- Gazetteer
- Bathymetric map of lake
- GPS
- Waterproof camera
- Polarized sunglasses
- Waterproof paper (to print monitoring forms and specimen labels on)

- Ziploc bags for plant preservation (can be reused)
- Plastic bottles for benthic invertebrate specimens (~3 per lake)
- Bottle labels printed on waterproof paper

Disinfection Equipment

- Long-handled stiff bristled brush

- Portable Jiffy steam cleaner
- Jugs for clean water
- Tubs for equipment disinfection
- Backpack or handheld sprayer
- Bleach solution
- Black plastic bags
- Nitrile gloves
- Emergency eyewash station or eye wash solution
- Eye protection meeting ANSI Z87 (safety sunglasses are acceptable)
- Splash goggles and/or a face shield

- Dust mask respirator (optional – requires training)
- Chlorine solution and/or Virkon® Aquatic

Preservation and Vouchering

- Water proof camera
- Ethanol (non-denatured preferred) for veliger sample preservation and prohibited species
- Plant press, newspaper and herbarium paper for prohibited plant species

FIELD METHODS

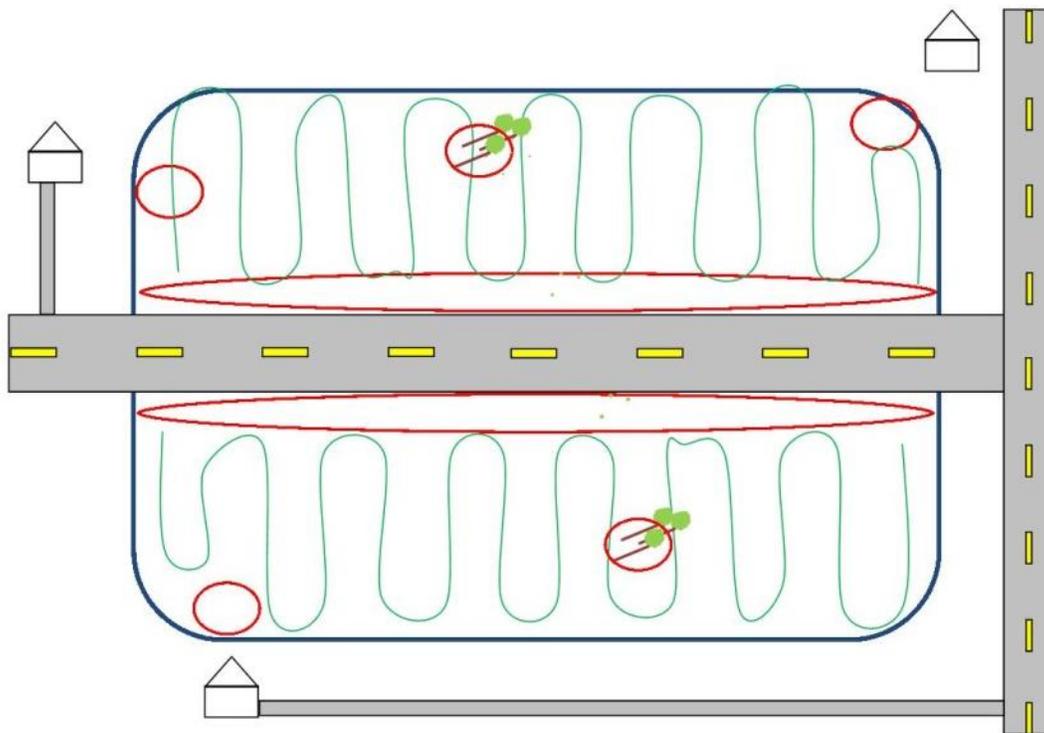


Figure 1 Schematic of Wetland AIS Early Detection Survey Design. Survey along road accesses and 5 target areas (red circles). Target areas include areas of anthropogenic influence like roads or homes and disturbances like blow down. Survey along transects between target sites for broad coverage of the wetland (green line).

Data Collection

Collect data using appropriate forms on waterproof paper.

- [Aquatic Invasive Species Early Detection Monitoring Form](#)

Photo/Specimen Collection Protocol

- Collect **photographs** of all new AIS occurrences for verification purposes. Follow the DNR Photographing Aquatic and Wetland Invasive Species Guidance: <https://dnrx.wisconsin.gov/swims/downloadDocument.do?id=145712698> .
- Collect specimens of **prohibited** or unusual invasive species for vouchering. Collect about 5 intact specimens that contain all the identifying characteristics. While in the boat, store specimens in separate sample bottles or in Ziploc bags with water or a wet paper towel.
- Upon completion of the survey, specimens should be properly preserved and submitted to the Regional DNR AIS Coordinator as soon as possible.
- Record data on the Early Detection Form.

Wetland Invasive Species Monitoring Project Protocol:

1. **Review** Department General Safety [Guidelines](#).
2. **Review** [Department Safety SOPs](#) 1, 2, 3 (4 and 6 are only necessary for boat use).
3. **If sites to be field checked are locations previously reported** to WDNR, species and location information simply need to be confirmed, along with estimating site size. The WDNR/UWEX Wetland Invasive Species (WIS) Program can often supply data for such sites. **Always obtain access permissions** from landowners before entering private land sites. Local stakeholders may help acquire permissions to conduct such monitoring, but the WIS Program can often supply landowner contact info (or even acquired permissions) once accurate location, species and site size info is reported to the Program. Road right-of-way permissions are also generally necessary (see below).
4. **Become familiar with [target species](#)** in aquatic and wetland sites (also see the Guide to Invasive Plants in Wisconsin at <http://dnr.wi.gov/files/pdf/pubs/fr/fr0436a.pdf>). Develop accurate search images for target species based on time of year and appropriate physical characteristics.
 - a. Species specifically targeted for these GLRI grants this fall/winter include *Phragmites*, *Glyceria*, hairy willow herb, giant hogweed, and Japanese knotweed.
 - b. Additional species will be targeted in spring/summer.
5. **Check what records** are known in the work area to know whether there are any previous records that need verification, and if [disinfection methods](#) are needed to prevent further dispersal of exotic species during field work.
6. **Review local area maps** to identify vulnerable habitats and areas to search that are likely to have target species, such as roadsides, developments, other transportation corridors, possible source locations, etc.
 - a. WIS Program may provide small scale site maps for reported target populations.
 - b. Township maps will show infested road sites and other known area AIS locations.
 - c. These will provide clues to where other roads/areas might harbor additional sites that should be checked.
 - d. Roads travelled should be marked on maps for area work records. Maps that have been marked on should be scanned and saved to the project in SWIMS.

- e. Wis. Atlas/Gazetteer may be used to orient township map locations & help devise efficient travel routes.
7. **Equipment** that may be necessary to conduct the survey (not necessarily inclusive).
- a. Roadsides: Retroreflective vest, red flashing light(s) for car, orange safety cones.
 - b. GPS unit to record coordinates, and tracks if doing a moving survey.
 - c. Camera to collect photos of specimens. Geo-coded camera or smart phone preferred.
 - d. Ziploc bags with label pens for preserving prohibited specimens. Ideally save in plant press later for vouchering specimens. Labels are used to properly identify the collection site.
 - e. Binoculars/scope to scan distant sites & Range finder, if available, to estimate distance.
 - f. [Wetland Invasive Plant Monitoring form](#) (on waterproof paper) for each site.
 - g. Portable Jiffy steam, car inverter and long handled stiff bristled brush for disinfection.
 - h. Multiple pairs of boots or waders for sampling multiple sites where decontamination is necessary. Walking sticks may be useful.
8. **Surveys:**
- a. **Take photographs** for each species observed following the [Photographing Guidance](#) found in the [verification process](#) guidance document. Photographs of each physically distinct population will be needed for verification for any species, especially difficult to distinguish from look-a-like species (e.g. Phragmites subspecies). For other species, only one photo is necessary for all the same species recorded in a wetland. Send photos to the regional DNR AIS Coordinator.
 - b. **Collect specimens** for prohibited species or for difficult to identify species. Collect plant parts critical for effective ID and label carefully. Send specimens to the regional DNR AIS Coordinator.
 - c. Record the **start coordinates (access point)** and AIS presence/absence on the [Wetland Invasive Plant Monitoring form](#).
 - d. **If monitoring a roadside population:**
 - i. **WDOT permits** are required for roadside surveys on state and federal ROWs, and county or town permission is wise for their roads. Only check plants that are within the legal right-of-way unless private land permissions have been acquired. The ROW is typically 66' (out to 33 feet each side from the road center line) on most 2 lane county, state, federal and 20'+ wide town roads (49.5' ROW on 16'-18' town roads). Contacting landowners adjacent to roads before entering ROWs, if possible and safe, is useful since neighbors often care for these areas and may want to know your purpose, but their permissions are not required for entry into ROWs.
 - ii. **All legally invasive wetland plants in ROWs** or within eyesight of road should be reported, but right-of-way field site checks will be most common for some species. Make a note in the comments if a population is outside the ROW.
 - iii. **For previously reported sites**, prepare routes, maps or any other aids based on site locations to check sites as efficiently as possible.
 - iv. **Drive & work carefully** while scanning for any species, especially if also monitoring GPS coordinates to find a previously reported site. Keep all WDOT work safety requirements in mind when deciding to stop, including having your

retroreflective vest on constantly. Have the vehicle flashers on whenever driving slower than other traffic. The vehicle should be driven entirely off pavement and onto the road shoulder, if possible. Consider parking either side of a site if necessary for this. Leave the vehicle from its left side, if possible.

- v. **Collect GPS** point where monitoring is initiated and record on the datasheet as “access” and indicate whether AIS were observed or not. If AIS were observed, estimate the area and density. Provide GPS accuracy in the comments of the data sheet.
 - vi. **Turn GPS tracking ‘on’** during the search to keep track of the search route.
 - vii. **Search (meander)** along the road. Each time an AIS is observed, record the coordinates as “meander” and estimate the area and density. Populations ~20 feet apart can be recorded as a new population.
 - viii. At the **end of the search track**, record the end point as an “access”, collect coordinates and records whether AIS were observed or not. If AIS were observed, estimate the area and density.
 - ix. **Confirm the species and collect** the latitude/longitude coordinates at the population center point for each monitoring location (with shape if a polygon), as well as infestation size. If a population is visible from the road, but not accessible, estimate the distance, direction (with range finder if possible) and size. Use binoculars. Before reporting distant sites, confirm population center point and size later from recognition of the infestation on Google Earth or using other mapping software so that accurate land ownership can be determined for getting access permission.
 - x. **Complete** the [Wetland Invasive Plant Monitoring form](#). Be sure to estimate the area and density of each population.
- e. If monitoring a whole wetland:**
- i. **Turn GPS tracking ‘on’** during the search to keep track of the search route.
 - ii. **Examine predetermined vulnerable target areas** identified as vulnerable during desktop reconnaissance. Additional target sites may be added upon visual inspection of the wetland (blowdown, construction, etc.). Target sites will be recorded as ‘target’ and AIS presence/absence will be recorded. Species found that were not at pre-determine target locations will be recorded as ‘incidental’ sites.
 - iii. **Complete the Wetland Invasive Plant Monitoring form.**
- f. **Describe** each search site and the overall wetland on the form.
 - g. **Record the stop location** and presence/absence of AIS on the form.
 - h. **Turn tracks ‘off’** and save them by the station name and date. They will be saved to the SWIMS project and attached to the ROI later.
9. When leaving a site where you have entered a wetland (actual entry is not always necessary), [decontaminate](#) any clothing or equipment that was used per the Boat, Gear, and Equipment Decontamination and Disinfection Manual Code 9183.1.
10. **Enter the data** from the Wetland Invasive Plant Monitoring form into SWIMS.
- a. The excel spreadsheet will identify if a station already exists or whether a station needs to be created.

- b. The collector will create any stations that need to be creating and all surveyed stations to the project and enter the data.
 - c. Be sure to save scans of the data sheet and attach them to the project.
 - d. To obtain treatment results quickly, the collector will also add verification and acreage estimates to the excel spreadsheet.
11. **Submit incident reports** for AIS occurrences observed while in route to monitoring station.
 12. Provide **photos/specimens** to the regional verifier.
 13. Follow the [communication protocol](#) following new discoveries.

FOLLOWING FIELD PROTOCOL

Equipment Disinfection

- Review the manual code and best management practices on the [Boat, Gear and Equipment Decontamination and Disinfection Website](#)

Verification

- Follow the AIS Early Detection Monitoring Verification and Voucher Guidance for all suspected new AIS occurrences: <https://dnrx.wisconsin.gov/swims/downloadDocument.do?id=145713313>

Data Entry

- Enter Early Detection form data into SWIMS once each week in the “Aquatic Invasive Species Early Detection Surveys” project.
- Contact your Regional AIS Coordinator if you have questions about SWIMS data entry. The regional DNR AIS Coordinator will contact the Statewide AIS Monitoring Lead if they have questions.

Notification

- If AIS not previously observed are found, follow the Department’s communication protocol:
<http://dnr.wi.gov/water/wsSWIMSDocument.ashx?documentSeqNo=118813642>.

Voucher

- Follow the AIS Early Detection Monitoring Voucher Guidance for all new NR40 prohibited or unusual species occurrences:
<https://dnrx.wisconsin.gov/swims/downloadDocument.do?id=145713415>