

Streams & Rivers Aquatic Invasive Species Early Detection Monitoring

State of Wisconsin Department of Natural Resources

STANDARD OPERATION PROCEDURES

June 2020

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.

Table of Contents

MONITORING OBJECTIVES	3
DESIGN	3
SITE SELECTION	3
FIELD PREPARATION	4
TARGET SPECIES	5
FIELD GUIDES	6
EQUIPMENT	6
FIELD METHODS.....	7
FOLLOWING FIELD PROTOCOL.....	10
REFERENCES.....	11

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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 along streams. The Wisconsin Department of Natural Resources (DNR) currently relies on a network of DNR stream biologists and volunteers (i.e. Water Action Volunteers, River Alliance of Wisconsin, Trout Unlimited, etc.) 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 through September 15 th
Frequency:	Rotating cycle or as needed
Locations:	Access points, transects, and boat landings
Parameters:	Listed invasive species
Methods:	<ol style="list-style-type: none">1. Determine number of sampling transects based on mean stream width,2. 2 minutes examining the right bank for riparian invasive plants.3. 2 minutes examining the left bank for riparian invasive plants.4. 2 minutes examining the stream bed for invasive aquatic plants/algae and invertebrates.5. 5 minutes or less collecting or macroinvertebrate samples from a cross-sectional transect of the stream bed.6. Survey streambed and banks between transects.7. Repeat 2-5 along each transect.

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).

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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 stations 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 a public boat landing is present;
- ≤ 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>

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TARGET SPECIES

Table 1. Species targeted for aquatic invasive species surveys. Species with an asterisk (*) 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>Cipangopaludina chinensis</i>	CMS

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Banded mystery Snails
New Zealand Mudsnail
Red Swamp Crayfish*
Rusty Crayfish

Viviparus georgianus
Potamopyrgus antipodarum
Procambarus clarkii
Orconectes rusticus

BMS
NZMS
RSC
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](#)
- Miller, M., Songer, K., and Dolen, R. 2014. Field Guide to Wisconsin Streams. University of Wisconsin Press. Madison, Wisconsin. (<http://uwpress.wisc.edu/books/4887.htm>)

EQUIPMENT

Equipment is needed for defining mean stream width (MSW), sample collection, macroinvertebrate screening, identification, documentation, preservation, and vouchering.

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All Streams

- 50 m tape measure
- 600-micron mesh kick D-net
- Dredge in waterbodies too deep to use a D-net
- A datasheet for each site.
- Geographic positioning system (GPS) unit
- Multiple pairs of waders if sampling more than one site
- Hips boots
- Safety vest with lots of pockets (surveyor vest works well)
- Walking sticks
- Kayaks or canoes (kayaks are preferred)
- White trays
- Forceps
- 580 and 300 micron sieves
- Funnels
- Hand lens
- Scrap paper
- Pencils
- Spray bottles
- Field Guide to Wisconsin Streams (Miller et al. 2014)
- Invasive Plants to be on the Lookout for in Wisconsin Streams laminated handout

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

- Ziploc bags or sample jars
- Labels
- Camera
- Ethanol
- Plant press
- Dissecting scope

FIELD METHODS

Station Setup

DNR employees will monitor assigned sites for target invasive species using methods described below. At each station, monitoring will target either upstream or downstream of the access point. Mean stream width (MSW) is an important characteristic of each stream assessment station (reach), and is used to define the length of the station for most wadable streams. The MSW is based on the mean of **10** preliminary measurements of stream width from throughout the station (within approximate station

boundaries), including all types of macro-habitats. If the stream width does not vary significantly throughout the approximate station length, the 10 width measurements can be taken closer to the start of the station to save time, instead of walking the entire approximate station length. **Station length should be 35 times the MSW for streams between 2.9 m and 23 m MSW.** For streams with a MSW less than 2.9 m, a 100 m long station should be sampled, and streams greater than 23 m MSW an 800 m long station is assessed (Table 2). Number of sites sampled in each station will vary with 35 times the MSW as identified in Table 2. The number of sites on each station will be equally divided in either direction from the access point.

Table 3 Reference table identifying the station length and number of sites for each range of mean stream width

Mean stream width (MSW) (m)	35 x MSW (m)	Number of sites
< 2.9	<100	4
2.9 < 5.7	100 - 200	5
5.7 < 11.5	200 - 400	6
11.5 < 17.1	400 - 600	7
17.1 < 23	600 - 800	8

If the water level appears to be substantially (> **0.15 m**) above normal, sampling should not occur (see below for determination of water levels). Sampling will occur if stream is close or below normal, and access is legal. Any road crossing is a legal access point. However, if the stream crosses private land you may only be in the stream up to the normal high water mark, meaning no walking on the banks without permission. Once the MSW for a station has been determined, this value is used for **all** future AIS sampling, including future years when changes in riparian land use or instream habitat improvements may have caused a change in the actual stream width.

If working on a river with differentiated pools and flowages with separate WBICs, use the Early Detection in Lakes protocol instead.

Note: Channel characteristics rather than the amount of precipitation in the recent past should be used to determine water level. Streams with a high proportion of ground water input may retain normal flows well into drought periods. Conversely, such streams may show little response to heavy rains, particularly if the local water table has been greatly lowered by prolonged drought. On the other hand, streams that are runoff dominated may fluctuate greatly in water level in response to short-term wet and dry periods.

To determine how a stream system responds to rain events, use the [USGS Gauge Station Website](#).

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. Beware of private property and trespassing laws when identifying or collecting riparian species for verification/vouchering. Collect about 5 intact specimens that contain all the identifying characteristics. While in the stream, 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.

Field Protocol

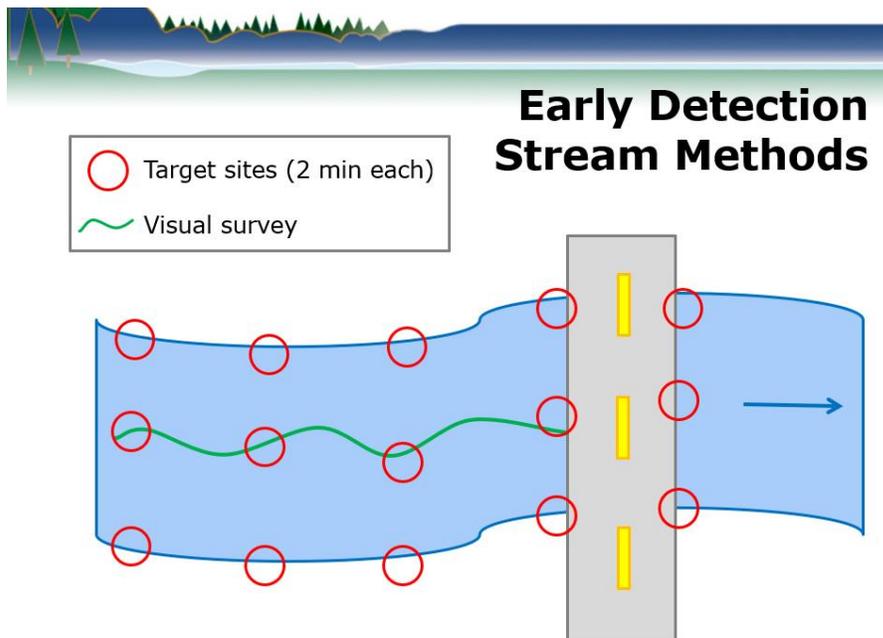


Figure 1 Schematic of AIS Early Detection Stream Survey Design.

1. The following method will be used at each of the access (upstream and downstream) and target sites (riffle, run, and pool, or evenly spaced if habitat variation does not exist). Depending on AIS observed, the total estimated time on each site is no more than 4 hours.
2. 2 minutes examining the right bank for riparian invasive plants.
3. 2 minutes examining the left bank for riparian invasive plants.
4. 2 minutes examining the stream bed for invasive aquatic plants/algae and invertebrates.

5. 5 minutes or less collecting macroinvertebrate samples from a cross-sectional transect of the stream bed.
 - Sample with a dip net by holding the net frame firmly against the stream bottom and disturbing the substrate upstream (approximately a full arm's length) from the net with your feet.
 - Dig deeply into the substrate with the heel or toe to dislodge macroinvertebrates from the streambed.
 - Avoid kicking coarse debris into the net (let the macroinvertebrates wash downstream into the net).
 - Make sure that the plume of silt that results from disturbing the substrate is flowing into the net, as this plume also contains the dislodged invertebrates.
 - In streams that lack riffles, vegetation (twigs, leaves, grass) caught in instream snags or logjams, or riparian vegetation overhanging into the stream can be sampled. Sample by jabbing the net into the vegetation to dislodge the clinging invertebrates.
 - The net should be inspected often to make sure the invertebrates that are being dislodged are washing into the net.
 - If two people are collecting the sample, one person can hold the net while the other manually removes vegetation from the snag or logjam and rinses it into the net or shakes the snags to loosen the vegetation caught so it drifts into the net.
 - Coarse debris should be removed from the net, while making sure to rinse the macroinvertebrates that are clinging to the vegetation back into the net.
6. Within transects, collect all rooted vegetation and vegetation caught in logjams, snags, and vegetation overhanging from the stream banks by hand. Coarse debris should be examined and removed from the net. Place macrophytes in a sample jar. Examine and rinse off small rocks, coarse debris, artificial substrates and hard substrates too large to collect, depositing or allowing all removed materials to float into the net. Examine each macroinvertebrate sample using various sized sieves and a white screening tray for about 10 minutes.
7. Record species observed incidentally within each sample site, and not within targeted habitat features.
8. If target species are observed during the survey these will be recorded as incidental sites:
 - Collect photographs that illustrate species and general area/habitat, if possible.
 - Beware of private property and trespassing laws when identifying, collecting, or photographing riparian species for vouchering.
9. Complete field data sheet

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 in a waterbody 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>

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