Guidance for Conducting Aquatic Invasive Species Early Detection and Baseline Monitoring in Lakes

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Summary

1. **This document was developed to provide a standardized set of procedures (protocol, field data sheet, and data inventory) to supplement DNR efforts in early detection and baseline monitoring of aquatic invasive species throughout various lakes in Minnesota.**
2. **This monitoring protocol is for those with considerable experience searching for and identifying aquatic invasive species**
3. **Search methods include a lake-wide meander of the near-shore zone as well as wading, snorkeling, netting, and rake sampling in areas most vulnerable to aquatic invasive species.**
4. **Data collected should be maintained by those conducting the monitoring and may be submitted to DNR AIS staff on an annual basis.**

INTRODUCTION

This is a guidance document meant for public and private entities that have training and experience in aquatic invasive species (AIS) identification and monitoring. These entities should have sufficient resources (proper equipment, support, and partners) available to carry out the monitoring protocols described below. Staff resources may include: AIS/water resource coordinators, field biologists, and/or water resource professionals with significant experience in aquatic species identification. Staff using this document should follow their employer's guidance on safety while working in the field. Organizations that may utilize this protocol could include local units of government, private consultants, lake organizations and/or universities. This document is not intended for groups with little experience in AIS monitoring.

At this time, data collected for all AIS monitoring should be managed by the collecting entities, unless a new AIS is discovered. **If new AIS are discovered that were not previously documented, the local DNR AIS Specialist must be notified immediately** (AIS staff contact information available here: http://www.dnr.state.mn.us/invasives/ais/contacts.html). DNR encourages using the field data sheet and data inventory form. The DNR will request survey information when 1) a new AIS is discovered, and 2) to update the DNR infested waters list.

This guidance has been developed for three main purposes:

1. To standardized methods and procedures for searching for, documenting and reporting new occurrences of aquatic invasive species in Minnesota.
2. To supplement DNR efforts in detecting and responding to new infestations of aquatic invasive species. Early detection and rapid response is crucial for minimizing impacts of invasive species as there may be a greater likelihood of containment and/or control.
3. To supplement DNR efforts in gathering baseline data on the presence/absence of ALL aquatic invasive species in Minnesota. DNR encourages collecting data on the general location and estimated densities of AIS within a given water body. In general, establishing baseline data on statewide AIS distributions will help the DNR evaluate AIS program efforts and develop appropriate management strategies.

The MN DNR AIS early detection and baseline monitoring guidance is adapted from portions of the Minnehaha Creek Watershed District (MCWD) AIS Early Detection/Baseline Monitoring Program (drafted July 2014) and Wisconsin Department of Natural Resources (WDNR) Aquatic Invasive Species Early Detection Monitoring Strategy (drafted June 2011, updated June 2014).

EARLY DETECTION/BASELINE MONITORING SUMMARY

Species Monitored: Priority is given to the detection of (in no particular order):

Shoreline/Emergent Plants: Purple Loosestrife (*Lythrum salicaria*), non-native Phragmites (*Phragmites australis)*, Flowering Rush (*Butomus umbellatus*), Yellow Iris (*Iris pseudacorus*), Chinese Water Spinach (*Ipomoea aquatica*), Water Soldiers (*Stratiotes aloides*), Australian Stone Crop (*Crassula helmsii*).

Submerged Plants: Eurasian Watermilfoil (*Myriophyllum spicatum*), Curly-Leaf Pondweed (*Potamogeton crispus*), Brazilian Elodea (*Egeria densa*), Hydrilla (*Hydrilla verticillata*), Parrot Feather (*Myriophyllum aquaticum*), Rock Snot (*Didymosphenia geminata*), Brittle Naiad (*Najas minor*), Fanwort (*Cabomba caroliniana*), African Oxygen Weed (*Lagarosiphon major*), Indian Swampweed (*Hygrophila polysperma*).

Floating-Leafed Plants: Yellow Floating Heart (*Nymphoides peltata*), European Frog-Bit (*Hydrocharus morsus-ranae*), Water Chestnut (*Trapa natans*), Water Hyacinth (*Eichhornia crassipes or E. azurea*), Water Lettuce (*Pistia stratiotes*), Giant Salvinia (*Salvinia molesta*).

Animals: Zebra Mussel (*Dreissena polymorpha*), Quagga Mussel (*D. bugensis*), Spiny Waterflea (*Bythotrephes longimanus*), Chinese Mystery Snail (*Cipangopaludina*), Banded Mystery Snail (*Viviparus georgianus*), Faucet Snail (*Bithynia tentaculata*), New Zealand Mudsnail (*Potamopyrgus antipodarum*), Asian Clam (*Corbicula fluminea*), Red Swamp Crayfish (*Procambarus clarkii*), Rusty Crayfish (*Orconectes rusticus*).

Additional Species Information (found on the DNR website www.dnr.state.mn.us):

- Animals: http://www.dnr.state.mn.us/invasives/aquaticanimals/index.html
- Plants: http://www.dnr.state.mn.us/invasives/aquaticplants/index.html
- Early detection plant targets (either not present in Minnesota currently or with a limited distribution): http://www.dnr.state.mn.us/invasives/aquaticplants/earlydetection.html
- Distribution in Minnesota: Waters of the state are designated as infested if it is determined that they contain aquatic invasive species (AIS) that could spread to other waters. Infested Waters: http://www.dnr.state.mn.us/invasives/ais/infested.html

If you are targeting one species (e.g., zebra mussels) or a specific group of species (e.g., invertebrates only), a more intensive monitoring protocol may be needed. Consult your local DNR Invasive Species Specialist for more information.

Areas Monitored: This survey is designed for lake systems. High sampling intensity targeted in areas most vulnerable to invasion is recommended. These areas may include but are not limited to 1) public water accesses, 2) other areas of high boat traffic (e.g. privately owned water accesses), 3) near-shore/littoral zone (< 15 feet water depth), 4) areas of high human activity (e.g. beaches), 5) docks/boat lifts, and 6) areas connected to other waterbodies (vulnerable to dispersal).

Sampling Period: Sampling is recommended at least once per year between June and September. Intensity and frequency of sampling may vary. If possible, monitor each lake twice per year to account for early season (e.g. curly-leaf pondweed) and late season (e.g. purple loosestrife) species.

Safety: You are responsible for your own safety. Follow your employer's guidance on safety while working in the field.

Prevention: A variety of equipment will be used for this work, all of which have some risk associated with spreading AIS. All parties must comply with State Laws regarding AIS (http://www.dnr.state.mn.us/invasives/laws.html), especially those related to watercraft. Additional prevention precautions are recommended such as utilizing decontamination protocols after each monitoring/collection event. See the "MNDNR Aquatic Invasive Species (AIS) Watercraft Inspection Handbook" on the DNR website for more detail on the inspection process and decontamination protocols: http://www.dnr.state.mn.us/invasives/watercraft_inspect.html

Specimen Collection: All new AIS found must be reported immediately to a local DNR Invasive Species Specialist. See contact information and a list of offices in Appendix C. Details on collection procedures and how to report an aquatic invasive species can be found on the DNR website: http://www.dnr.state.mn.us/invasives/report_invasives.html

Minimally, one fully intact specimen is needed for identification. Specimen should be placed in a closed container and labeled (Lake name, sample ID (location), date collected). Digital photos (in high quality) are an acceptable alternative. The collector must also provide the location (e.g. sketched map or Geographic Digital Data) where new AIS were found. Below are other collection recommendations:

For aquatic plants: collect flowering parts (if present), leaves, stems, roots and any underground organs such as tubers or turions.

For invertebrates (mussels, clams, crayfish, and snails):

- Collect up to 5 individuals of *Dreissenids* (e.g. zebra mussels)
- Collect up to 5 of each invasive snail species observed

Data Collection and Management:

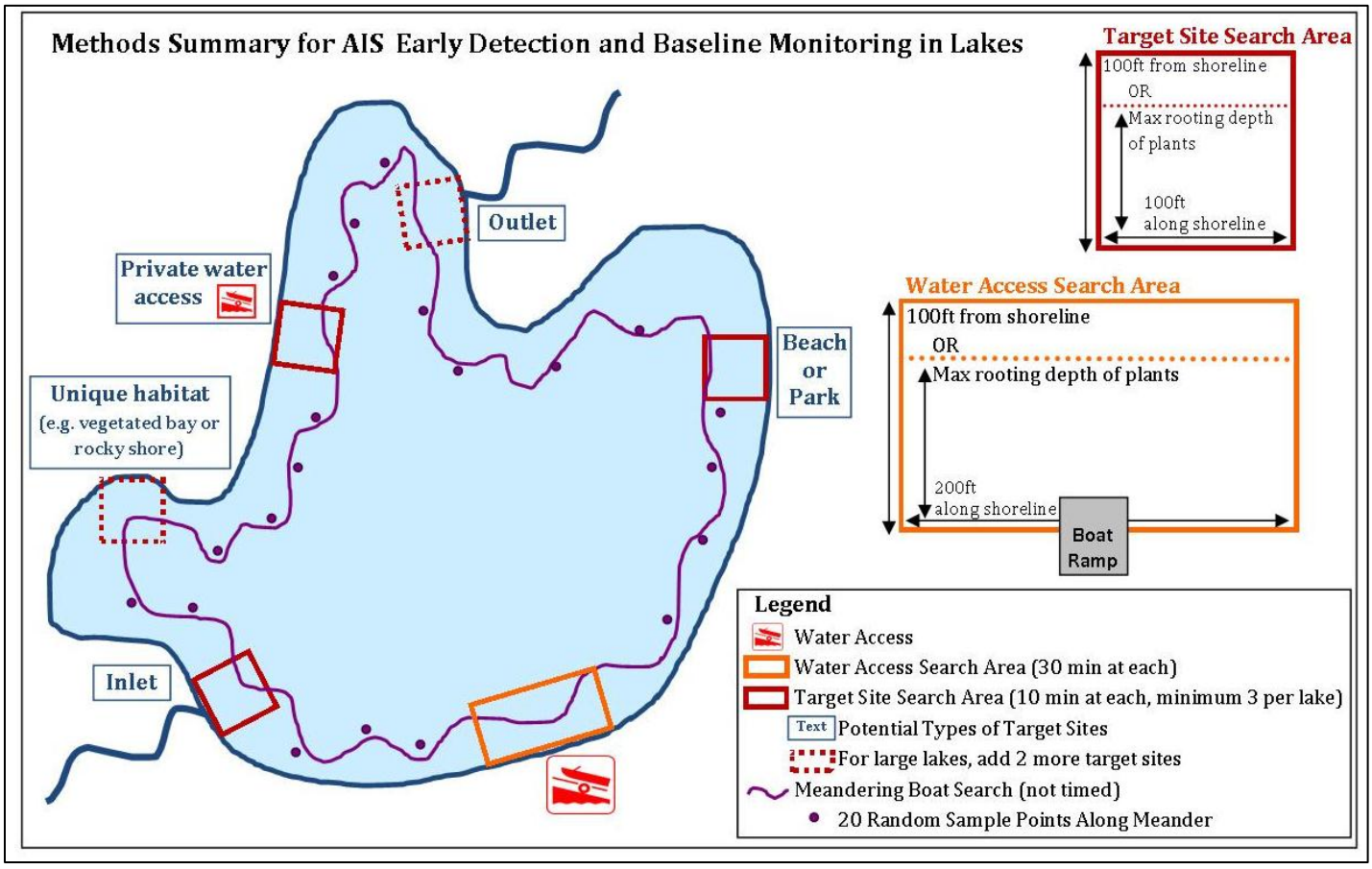
- Field Data Sheet – for collecting and recording data in the field.
- Data Inventory – for the collector to maintain a database of collected field data in a standard format.

SURVEY METHODS

This monitoring is not meant to be scientifically rigorous, but rather to gather information on the presence/absence and distribution of as many AIS as possible in a given water body (with time and staff availability permitting). A recommended equipment list is found in Appendix A and an example completed field data sheet is provided in Appendix B.

In preparation for the survey, review current list of AIS found in the lake. See MN DNR Lakefinder (http://www.dnr.state.mn.us/lakefind/index.html) or the Infested Waters List (http://www.dnr.state.mn.us/invasives/ais/infested.html). If the lake is not on the list, then there are no records of AIS present in that lake. NOTE: Due to the relatively widespread distribution of curly-leaf pondweed and purple loosestrife, these AIS are not documented in the infested waters list.

Figure 1. A schematic of the AIS Early Detection & Baseline Monitoring survey methods.



Survey methods below outline 2 different survey types to be completed during the *AIS Early Detection and Baseline Monitoring.* The first method below outlines in-water searches through snorkeling or wading, the second outlines a survey conducted via watercraft.

SNORKEL/WADING SEARCHES*:

**Follow standard snorkel/dive safety procedures as directed by your employer. If you are unable to snorkel, wading with goggles or other underwater-viewing devices may suffice. For snorkeling, a dive flag should be present once a snorkeler is in the water. Additionally, one spotter should remain on shore to monitor for incoming and outgoing boats. The spotter will also keep track of time, help identify species, and record necessary data. A life jacket or floatation device should be within reach or a throwable distance from snorkeler(s).*

Water Accesses (total 30 minutes per access – a minimum of 2 persons needed)

1. Conduct a 20 minute search using snorkel gear (2 swimmers at 10 minutes or 1 swimmer at 20 minutes) at each public water access. Privately owned water access areas can be addressed in the next section (Target Sites). Use discretion and snorkel only when safe.
   a. The snorkeler(s) will cover approximately 200 feet of shoreline out to the maximum rooting plant depth (<15 feet water depth) or 100 feet from shore, whichever is closest. The spotter should monitor for boat traffic, assist snorkeler(s) when needed, and alert snorkeler(s) when time is up.
   b. The snorkeler(s) should make every effort to visually inspect areas for AIS, and collect specimens if identification is questionable. Make sure to examine the dock itself for attached plants and invertebrates.
   c. If snorkeling is not possible (due to blue-green algae, stained water, heavy boat traffic, or other unsafe conditions) record reason(s) in the "Notes" column of the field data sheet for future reference and examine area(s) for AIS as possible either through wading or other means. Indicate how search was completed (e.g., "water was shallow so we waded with goggles or collected D-net and rake samples"). An

underwater camera mounted to a pole is another alternative when visibility on lakes is low.

2. Conduct a 10 minute search along 100 feet of the shoreline on either side of each public water access (200 feet total) prior to or following the snorkel search.
   a. Be aware of your surroundings - do not trespass on private shoreland property.
   b. Shoreline areas should be examined for riparian/wetland invasive plants such as purple loosestrife or yellow iris and for aquatic invasive invertebrates (e.g. under rocks, attached to hard substrates).
   c. An aquatic plant rake can be used to collect and closely inspect plants and a D-net can be used to sample for invertebrates that may be out of sight of the snorkeler (e.g. in very shallow water, slightly buried in the substrate).

3. Complete field data sheet:
   a. Record "WA" (Water Access) + number under the "Site" column in the field datasheet (e.g. if there are two water accesses, you would have WA1 and WA2 listed in the site column).
   b. Record invasive species found and depth of water in which it was found. If no AIS were found at this site, record "none" or "—"
   c. Provide an estimate of density by ranking each species on a scale of 1-4. See field datasheet for density rankings.
   d. Record if a specimen was collected and other observations about the site.
   e. Each water access location should be documented by GPS.

Target Sites (10 minutes per site - a minimum of 2 persons needed)

1. Conduct a 10 minute search at a minimum of three (up to five) scattered lake sites representing different within-lake habitat, substrate or shoreline characteristics. For larger lakes with a variety of habitat, a minimum of five sites is recommended. Sites should maximize areas most vulnerable to invasion within a lake such as inlets, highly developed shorelines, private water accesses, plant filled bays, rock bars/points, etc.

Search can be split into two segments: A 5 minute search using snorkel gear and a 5 minute search using rakes/D-nets.

a. The snorkeler will cover approximately 100 feet of shoreline out to the maximum rooting depth (<15 feet water depth) or 100 feet from shore, whichever is closest. The spotter should monitor for boat traffic, assist snorkeler(s) when needed, and alert snorkeler(s) when time is up (1 snorkeler for 5 minutes).
   i. *Follow standard snorkel/dive safety procedures as directed by your employer.*
   ii. The snorkeler(s) should make every effort to visually inspect the area for AIS, and collect specimens when appropriate.
   iii. If snorkeling is not possible (due to blue-green algae, stained water, heavy boat traffic, or other unsafe conditions) record reason(s) in the "Notes" column in the field data sheet for future reference and examine area(s) for AIS as possible. Indicate how search was completed (i.e. water was shallow so we waded with goggles and/or collected D-net and rake samples). An underwater camera mounted to a pole is another alternative when visibility on lakes is low.

b. Search along 100 feet of shoreline (1 person for 5 minutes).
   i. Do not trespass on private property. If necessary, remain in the watercraft or in the water while conducting this portion of the survey.
   ii. Shoreline areas should be examined for riparian/wetland invasive plants and for aquatic invasive invertebrates (i.e. under rocks, attached to hard substrates).
   iii. An aquatic plant rake can be used to collect and closely inspect plants and a D-net can be used to sample for invertebrates that may be out of sight from the snorkeler (e.g. in very shallow water, slightly buried in the substrate).

2. Complete field data sheet:
   a. Record "TS" (Target Site) + site number under the "Site" column in the field datasheet (e.g. with a minimum of 3 sites, you will have at least TS1, TS2, and TS3).
   b. Record invasive species found and depth of water in which it was found. If no AIS were found at this site, record "none" or "—"
   c. Provide an estimate of density by ranking each species on a scale of 1-4. See field datasheet for density rankings.
   d. Record if a specimen was collected and other observations about the site.
   e. Each target site location should be documented by GPS.

MEANDERING BOAT SEARCH:

Offshore (Not timed - Lake wide survey via boat)

1. Determine the maximum rooting depth of aquatic vegetation in the lake (approx. <15 feet water depth). Conduct search by driving a boat in a meandering pattern between the shoreline and the maximum rooting depth. The boat speed should be slow enough for spotters to scan submerged rooted vegetation and confidently identify AIS.
2. Select 20 random points throughout the meander to collect plant samples with a rake (a double sided rake is recommended) or invertebrate samples with a D-net.
3. If weather conditions (e.g., wind/waves) or water quality (e.g. algae blooms or high turbidity) significantly impair visibility, note this on the field data sheet. Rake samples should still be collected (recommend to do more than 20 rake samples) in order to assess for AIS presence.

4. Complete field data sheet:
    a. If an AIS is found in the point sample, Record "B" (Boat) + point number under the "Site" column in the field datasheet.
    b. Record the species under the "AIS Found" column.
    c. Provide an estimate of density by ranking each species on a scale of 1-4. See field datasheet for density rankings.
    d. Record if a specimen was collected and other observations about the site.
    e. Each boat meander point location with AIS should be documented by GPS. If no AIS found, a GPS point does not need to be recorded.

BOAT AND EQUIPMENT DECONTAMINATION:

1. Remove drain plug and all water from watercraft.
2. Remove all vegetation/debris from boats, trailers, and equipment before leaving lake.
3. Upon completion of the monitoring event, boat, trailer, and field gear should be cleaned to prevent the spread of AIS AFTER EACH WATERBODY. Decontamination is recommended if appropriate decontamination units are available. Here are some resources for decontamination and gear cleaning best practices:
    a. *MNDNR Aquatic Invasive Species (AIS) Watercraft Inspection Handbook*: http://www.dnr.state.mn.us/invasives/watercraft_inspect.html
    b. When boating and recreating in Minnesota, protect our waters by following state aquatic invasive species laws (Minnesota DNR): http://www.dnr.state.mn.us/invasives/preventspread_watercraft.html
    c. A list of Minnesota businesses trained in decontamination: http://www.dnr.state.mn.us/lsp/decontamination.html.
    d. The Aquatic Nuisance Species Task Force's *Voluntary Guidelines To Prevent The Introduction And Spread Of Aquatic Invasive Species: Recreational Activities*: http://www.anstaskforce.gov/Documents/AIS_Recreation_Guidelines_Final_8-29-13.pdf

NEW DETECTIONS AND SAMPLE TRANSPORT PROCEDURES:

- All aquatic organisms which need further identification must be brought directly to a local DNR Invasive Species Specialist in a closed container and labeled (Lake name, sample ID (location), date collected). If a local DNR Invasive Species Specialist is unavailable, sample(s) should be refrigerated until delivered.
- Please notify a DNR Invasive Species Specialist immediately if AIS is positively identified. A copy of the field data sheet and GPS location may be requested by the Specialist.

Appendix A: Recommended Equipment List

__Lake Access point / Map
__Bathymetric map of lake
__Data Sheets on waterproof paper
__Pencils
__Double sided rake
__Plant ID books/ AIS identification sheets

__Polarized sunglasses
__Ziploc bags/collection containers
__Sharpie marker
__Sorting trays for plants and invertebrates (white or light color)
__Hand lens
__Digital camera
__Stopwatch/watch
__Depth Pole
__Transect measuring tape

__Boat / Canoe
__Life Jackets [1 each wearable (USCG Type 1, 2, 3, or 5) and 1 throwable (USCG Type IV)]
__Whistle
__GPS Unit & Depth Finder
__Boat ladder (for entering and exiting a boat in deep water)

__Snorkeling gear (mask, snorkel, fins)
__Hi-viz snorkel vest
__Dive warning flag
__Snorkel mask defog solution
__Wetsuit/swimsuit
__Waders

Appendix B: Example of a Completed Field Datasheet

SAMPLE DATASHEET

AIS Early Detection and Baseline Monitoring Datasheet

Field Preparation: Review AIS infested waters list. **Only collect a specimen if the species is not listed as being present in the waterbody. Review specimen collection procedures for proper collection methods. Record location during each search (via. GPS unit) is recommended. **Providing the location of newly discovered AIS is required.****

End of Survey: CLEAN YOUR GEAR TO PREVENT THE SPREAD OF AIS. If specimen(s) collected, notify a local Invasive Species Specialist immediately. Coordinate a drop off time or submit data via e-mail.

Location

Lake Name: Linwood Lake | County: Anoka | DOW#: 02002600

AIS listed as present in the lake (see infested waters list): none

Data Collector

Primary Data Collector Name: Conservation Corps MN | Phone Number or Email: (651) 209-9900

Date(s): August 14th 2014 | Start Time: 9:17am | End Time: 2:00pm

What Species did you Search For? (list all) Animals: ALL AIS Plants: Other:

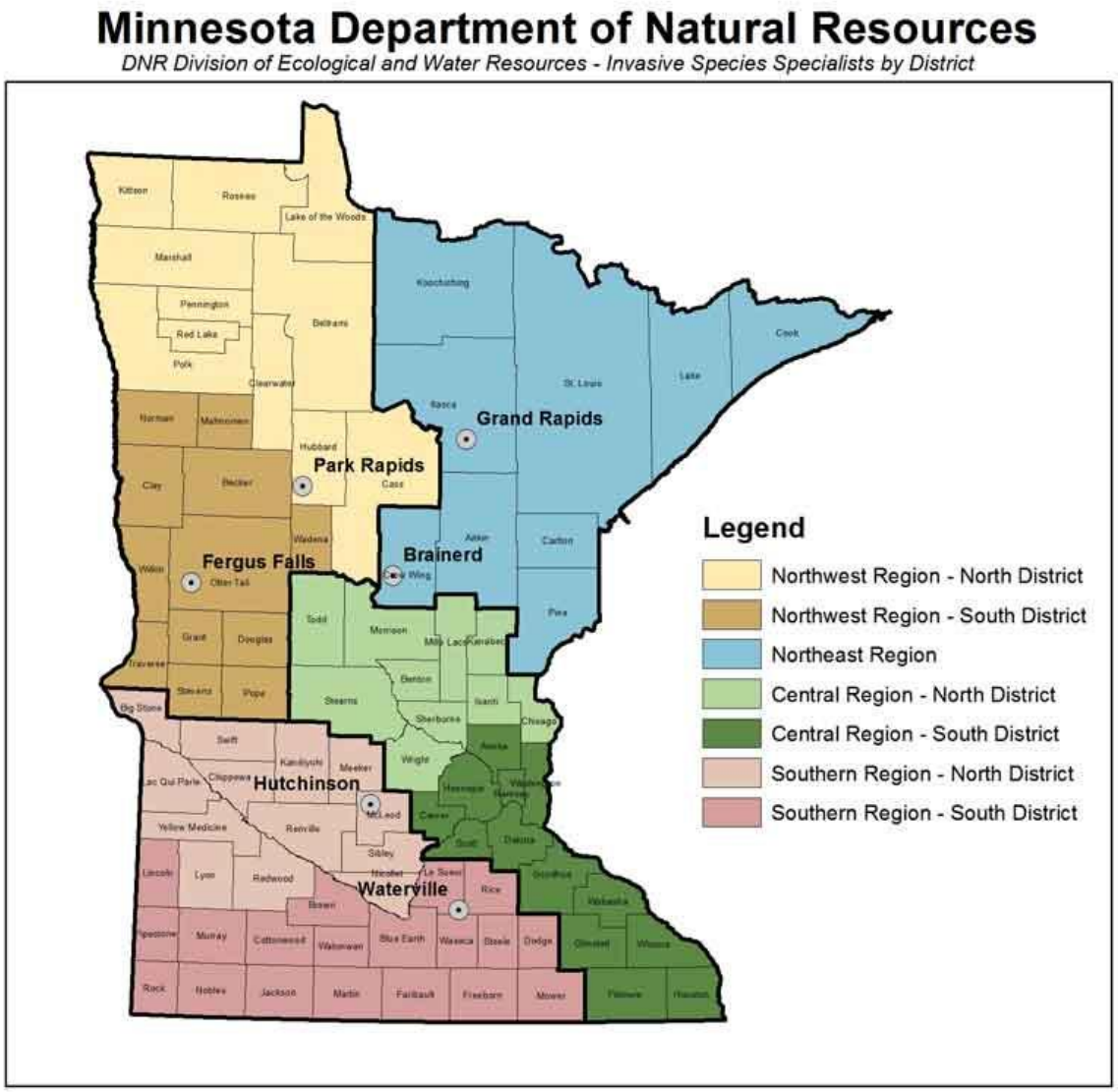
Field Data

Site (WA/TS/B +site number) e.g. WA#001	AIS Found (List Species)	Depth (ft)	Density Ranking (1-4)	Specimen Collected? (Y/N)	Observation Notes
WA# 227	—	—	—	—	WATER MUCKY/difficult to
TS# 228	EWM	>6	3	Y	lots floating stuff
TS# 229	EWM & PLS (shore)	>6	2	N/Y(PLS)	
TS# 230	EWM	>6	3	N	lots natives
B# 231	—	—	—	—	
B# 232	—	—	—	—	
B# 233	—	—	—	—	
B# 234	EWM	2.5	1	N	
B# 235	—	—	—	—	
B# 236	EWM	3	2	N	
B# 237	EWM	5.5	4	N	large patch (start)
B# 238	EWM	6	4	N	large patch (end)
B# 239	—	—	—	—	

List of ALL AIS discovered:

X New AIS detection?- CONTACT AIS SPECIALIST

Appendix C: DNR Invasive Species Specialists by Region



Northwest (Park Rapids): Nicole Kovar, 218-699-7293, Nicole.Kovar@state.mn.us

Northwest (Fergus Falls): Mark Ranweiler, 218-739-7576 ext. 254, Mark.Ranweiler@state.mn.us

Northeast (Grand Rapids): Richard Rezanka, 218-999-7805, Richard.Rezanka@state.mn.us

Northeast (Brainerd): Dan Swanson, 218-203-4354, Dan.Swanson@state.mn.us

Central (St. Cloud): Christine Jurek, 320-223-7847, Christine.Jurek@state.mn.us

Central (St. Paul): Keegan Lund 651-259-5828, Keegan.Lund@state.mn.us

Southern (New Ulm): Allison Gamble, 507-362-8786, Allison.Gamble@state.mn.us

For a full list of MN DNR AIS contacts, click here: http://www.dnr.state.mn.us/invasives/ais/contacts.html