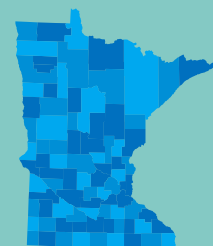


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Standard Operating Procedures

Water Quality Monitoring in Aquatic Invasive Species Infested Locations



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Foreward

This document is specific to the lake, river, stream, and wetland chemistry and bacteria sampling conducted by Minnesota Pollution Control Agency (MPCA) staff and local partners at waterbodies identified with aquatic invasive species (AIS). There are separate Standard Operating Procedures for each MPCA program and this document attempts to dovetail the steps and procedures for the monitoring and sampling at the AIS infested waterbodies. Procedures outlined cover basic MPCA and local partner site management, equipment control, and decontamination procedures to prevent the spread of AIS while conducting surface water quality monitoring activities in Minnesota.

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Executive summary

Scope and application

This Standard Operating Procedure (SOP) describes procedures to be carried out by Minnesota Pollution Control Agency (MPCA) field personnel and contracted local partners when monitoring lake, river, stream, and wetland locations infested with aquatic invasive species (AIS). The procedures seek to reduce or prevent the transport of mature and immature life stages of invasive and/or harmful species or pathogens (hereafter called "invasive species") including: eggs, veligers, pollen, seeds or vegetative propagules of invasive aquatic invertebrates, plants, and pathogens. A guide to aquatic plant, animal, and diseases which are found within Minnesota waterbodies can be found at the Minnesota Department of Natural Resources' (DNR) Guide to Aquatic Invasive Species [website](#).

There are five MPCA programs that will be using this AIS SOP as guidance. Local partners contracted under the MPCA shall also follow this guidance. For more information about the program, please see the following websites:

[Watershed Pollutant Load Monitoring Network \(WPLMN\)](#)

[Surface Water Assessment Grants \(SWAG\)](#)

[Biological Monitoring \(Fish and Invertebrate\)](#)

[Wetland Monitoring](#)

[Lake](#) and [Stream](#) Chemistry Monitoring

Permitting

The MPCA shall obtain a permit from the DNR for staff to appropriate and transport water from [designated infested waters](#). In addition to being applicable to MPCA field staff, all local partners are established as designees under this permit.

At a minimum, the following items must be performed at all monitoring locations for compliance with the permit and the [Minnesota Invasive Species Laws](#).

1. Possess a copy of the current *Permit to Appropriate and Transport Water for Water Quality Sampling* in sampling gear or sampling vehicle.
2. Indicate which water samples were taken from AIS waters.
3. Remove all visible vegetation, animals, or mud from boats, sampling equipment, and clothing. When possible spray down with water and scrub equipment/clothing with a brush.
4. Remove the plug from all boats or live wells.
5. When possible, allow all exposed equipment to completely dry for 24 hours. Equipment utilized at locations with zebra mussels and/or spiny water flea require 48 hours and 5 days respectively.
6. Water taken from AIS infested waters under the permit used only for water quality monitoring.
7. Report any new occurrences of AIS.

Water from AIS infested waterbodies may be transported from source waters in sealed containers and labeled "FROM AIS INFESTED WATERS". The receiving laboratory or anyone else disposing of these water samples must follow one of the following protocols.

- Discharge onto a pervious surface where it will not drain to any waters or storm sewers.
- Boil for 5 minutes and dispose of in the sanitary sewer system.

- Filter to 250 microns or less with the filtrate disposed of in the sanitary sewer system and filtered material heated to at least 140 degrees F for 10 minutes. This is the DNR preferred method.

http://www.dnr.state.mn.us/waters/watermgmt_section/appropriations/permits.html#infested

Summary of method

The preferred method for preventing the spread of invasive species is to plan for the sampling of AIS infested waterbodies last during each monitoring trip. Following each trip, careful equipment decontamination followed by an appropriate amount of drying time shall be completed.

Decontamination procedures must be thorough enough to remove all seeds, veliger, and plant material from equipment and field gear. No single procedure can be applicable to all sampling situations, but thoroughly decontaminating field clothing and equipment after monitoring must be a standard practice. In certain situations, it may be appropriate to have designated equipment or eliminate some of the field measurements at AIS infested waterbodies.

Health and safety

Please refer to the Health and Safety sections of each MPCA programs' SOP for specific details.

Specifically for sampling AIS infested waterbodies, care should be given when using decontamination solutions. Vinegar and Virkon is corrosive and should be used appropriately. Please read and follow directions when using. Personnel protection gear should be used when handling Virkon powder.

High power pressure washers may be used for rinsing and cleaning equipment. Please read and review all instructions before using this equipment to ensure safe operation.

Personnel qualifications/responsibilities

MPCA field crews commonly have designated positions each with their own responsibilities.

Field crew leader

The field crew leader is responsible for implementing the action steps of this protocol and ensuring that this and other protocols are followed during all sampling activities. It is primarily the field crew leader's responsibility to determine the proper level of concern, and the extent to which decontamination practices in accordance with this protocol must be used.

Field assistant or intern/student worker

When applicable, the field assistant or intern/student worker is responsible for implementing the action steps of this procedure including the maintenance, stocking, and storage of sampling equipment; data collection; and data recording. The field assistant or intern/student worker is encouraged to use his/her judgment and discretion in recommending to the field crew leader whether decontamination following a site visit is warranted.

Designated MPCA or local partner field staff must be familiar with proper basic sampling techniques, sample handling, safety procedures, and record keeping. New field staff must be trained and accompanied in the field by experienced staff until competence is assured. Permanent field staff should prioritize attendance at refresher training events. Student workers and interns will be provided written SOPs/instruction and be trained in the field.

Procedures

This section details the steps necessary to properly prepare for sampling an AIS infested waterbody, decontaminating field equipment and field gear after sampling, and preparing samples from AIS infested waterbodies for shipping or delivering to the certified analyzing laboratory.

Pre-trip requirements

Field planning

MPCA and local partner field crew leads must consult the most current [Infested Waters List](#) or DNR mapping resources to determine if the sites they will be monitoring are located in AIS infested waterbodies. Additionally, it is recommended that MPCA staff coordinate activities with the DNR Regional Invasive Species Specialist to ensure accurate planning. AIS infested waterbodies should be sampled after non-infested sites, whenever practical. This may mean visiting the AIS infested waterbody at the end of the day or schedule a separate sampling trip for the AIS infested waterbodies.

During reconnaissance field visits, field crews should note whether proposed waterbodies support known or newly-observed populations of AIS. The MPCA and local partner crew leads are responsible for [reporting](#) any new populations of AIS to the DNR.

Equipment preparation

A variety of sampling equipment is needed for surface water sample collection. Please refer to the program specific SOP for basic equipment usage and monitoring procedures. This list entails items that may be needed when sampling AIS infested waters:

- Designated* samplers for a specific AIS (integrated sampler, weighted bucket, Kemmerer/Van Dorn sampler, extendable rod, plankton tow net, kick nets, or ice sampling rod)
- Fish sampling equipment for a specific AIS
- Invert sampling equipment for a specific AIS
- Designated* sonde or field meter for a specific AIS
- Designated Secchi disk or 100 cm Secchi tube for a specific AIS
- Rinse water
- Bottle labels for AIS samples
- Alternative decontamination solutions, optional
- Sprayer or spray tank and hose
- Scrub brush

*Local partners must communicate their concerns and designated equipment needs with their MPCA project manager.

Before departure, confirm that all equipment necessary to complete decontamination procedures is present and in proper working condition. Ensure that an adequate amount of water is in the spray tank or sprayer. Also, assure that an adequate supply of decontamination chemicals is in the field equipment and supply inventory.

Onsite procedures

Field staff conduct sampling in a variety of habitats (e.g. lakes, rivers, streams, wetlands, and shore line/stream bank surveys) while using numerous types of sampling gear. The steps below describe the procedures for arriving and leaving the site, walking or wading through habitats, the use of boats and canoes/kayaks, and bridge sampling.

Site approach

All field crews shall take care when approaching sites through vegetated areas to avoid contact with invasive terrestrial plants whenever possible. Stream banks should be carefully examined to determine if invasive species are present. Alternate approaches should be taken if invasive species are present. At no time should felt bottom waders be worn when approaching sites through vegetated areas.

Sampling requirements

Where possible, a separate set of equipment should be maintained solely for use on AIS infested waterbodies. This is especially important for waterbodies infested with spiny water flea (*Bythotrephes cederstroemi*) or zebra mussels (*Dreissena polymorpha*).

Dedicated sampling gear must be used for each type of AIS present or combination thereof. This equipment must be decontaminated after sampling each site by rinsing or spraying.

Since it is not always practical to purchase multiple sondes or field meters, one sonde or field meter may be used between non-AIS and AIS infested waterbodies but must be decontaminated between sites. Depending on the program requirements, sonde or field meter measurements may not be collected at AIS infested waterbodies. Consult your MPCA project manager or field crew leader for guidance. Due to their tolerance to decontamination methods, additional caution and dry time considerations should be made when using Sondes and field meters on waterbodies containing viral hemorrhagic septicemia or spiny water flea.

Post-sampling requirements

Decontamination should begin immediately upon returning to the field vehicle after accessing/sampling a stream, river, lake or wetland, and should be completed before leaving for the next site. Whenever possible, it is suggested to use hot water to spray and rinse equipment and gear. Hot water sprays have been shown to cause 100% mortality of zebra and quagga mussels when sprayed for 10 seconds and 5 seconds, respectively, at 140°F/60°C (Morse, 2009; and Comeau et al., 2011).

Decontamination protocols for waders, boots, and raingear

1. Before leaving the river, stream or wetland site, field crew members must rinse and scrub all field equipment and personal protective equipment that has been in contact with aquatic habitats. This must include raingear, waders and wading boots. It is recommended that field crews be equipped with and use brushes and low pressure spray equipment described in Appendix A. It is recommended that local partners discuss the best option with their MPCA project manager to determine adequate decontamination equipment needs.
2. Raingear, waders and wading boots are best decontaminated while being worn. Field crewmembers should cooperatively spray each other's waders and wading boots, including lug soles. Decontamination spraying is considered complete when all visible debris, mud, invertebrates, pollen, and seeds are removed from waders, wading boots and field equipment.

Typically, this will take three – five minutes to fully decontaminate individual waders, boots, and field equipment.

3. Whenever possible, waders and wading boots should be positioned in the field vehicle to allow water to run off during transit between study sites; ideally, they will dry between sites.

Decontamination protocols for sampling equipment

1. Rinse samplers thoroughly with sprayer. Open and invert between sites to drain and allow to dry.
2. Visually check sondes and field meters (including cables) and remove foreign matter. Spray (low pressure) or rinse with water and wipe dry. Sondes that have been deployed for over one week will require thorough scrubbing upon return to home office using mild phosphate free soap and scrub brush to remove algae that has grown onto equipment. After scrubbing, a low-pressure rinse is required. Sonde guards need to be inspected and rinsed with ethyl alcohol and then sprayed with sprayer to remove any foreign material.
3. Visually check Secchi disks and tubes for foreign matter. Rinse or spray with water and invert between sites to drain and allow to dry.
4. Visually check trays, tables, or other working surfaces and remove foreign matter. Spray or rinse with water and wipe dry.
5. During winter months, visually inspect ice augers and remove foreign matter. Spray or rinse with water and wipe dry.
6. Rinse kick nets or D nets thoroughly with sprayer (low pressure). Lay nets in boat or vehicle to allow drying between monitoring sites. Separate nets are required if monitoring in an area known to have spiny water flea or zebra mussels.
7. Rinse plankton nets thoroughly with sprayer (low pressure). Spread the net out in boat as space allows to allow drying between monitoring sites. Separate nets are required if monitoring in an area known to have spiny water flea or zebra mussels.

Watercraft decontamination protocols

1. Once trailered, move vehicle/boat away from access.
2. Inspect the entire boat (boat, motor, and trailer) and remove any visible aquatic plant material or animals.
3. Complete a thorough inspection of the anchor rope and remove any foreign material. Use sprayer to wash and lay within the boat to dry. If monitoring in an area known to have spiny water flea, a separate rope is required for non-infested locations.
4. Complete a thorough inspection of oars and paddles and remove any foreign material. Use sprayer to wash and lay within the boat to dry.
5. Spray boat, if plant residue remains after initial cleaning.
6. Remove boat plug and allow water to drain from the bilge after each lake. Run bilge pump if equipped. Boat plug must be removed at all times when traveling to ensure complete draining.
7. The outboard motor should be fully lowered to allow all cooling water to completely drain. Once draining has finished return the outboard motor to the raised position and secure for travel.
8. If necessary, stop at a car wash and spray down the boat to minimize the possibility of transferring species between lakes.

9. It is recommended that boats are thoroughly sprayed after each sampling trip within infested waters. A hot water pressure washer capable of maintaining 140° F water temperature shall be used. Follow manufacturer's guidelines for safe operation of any hot water pressure washer. In the event that spraying equipment is not readily available, the MDNR [List of Permitted Lake Service Providers](#) lists facilities (by county) approved for decontamination. It is recommended that these resources be utilized.
10. Thoroughly spray boats down after each sampling trip, using a hot water pressure washer capable of maintaining 140° F water temperature. Follow manufacturer's guidelines for safe operation of any hot water pressure washer. Car wash sprayers may be used as a substitute.

Decontamination alternatives

Vinegar

1. Rinse equipment and bilge with water.
2. Submerge equipment into 100% vinegar solution for 20 minutes. This solution can be reused, if needed.
3. Replace bilge drain plug and disinfect the bilge by pouring at least one gallon of vinegar. Let sit for 20 minutes.
4. Thoroughly rinse with tap water and ensure that the solution does not run-off directly into waterways.

Note: Vinegar is corrosive to metal and toxic to fish.

Virkon

Virkon Aquatic is labeled as a contact disinfectant and comes in a powder form that is 99.9% biodegradable. It breaks down to water and oxygen and is not corrosive at the working dilution. Virkon can be utilized for the removal of zebra mussels using a 2% solution per 2 gallons of cold water.

1. Follow label instructions to make solution. Unused solution is good 5 days.
2. Spray gear and equipment with water.
3. Submerge or spray equipment and gear with two percent Virkon solution.
4. Thoroughly rinse with tap water. Using a car wash sprayer is encouraged for large equipment.

Note: Virkon powder is corrosive, wear protective equipment when preparing the solution.

Sodium chloride

Simple table salt (sodium chloride) may be used to decontaminate certain species such as zebra or quagga mussels veligers. Care must be taken to ensure that no sodium chloride reaches lakes or streams.

1. Submerge contaminated monitoring equipment or personal gear within a salt solution of a half-cup salt per gallon of water for 30 minutes.
2. Rinse well with tap water.

Sample processing

Chlorophyll-a

Chlorophyll-a sample filtration should be done while on (or at) the AIS infested waterbody. If this is not an option, filtering should be done in a location that eliminates the movement the AIS. Filtrate should be discarded in a grassy area and kept off paved surfaces and out of stormwater drainage systems. Filtering the sample should not be done at a boat landing or in the parking lot of a boat landing.

Sample labeling

All sample bottles containing water from AIS infested waterbodies must be labeled with the letters AIS preferably in permanent marker or use labels provided by the lab. Samples labeled 'AIS' shall be autoclaved or boiled by designated labs once analysis has been completed.

Appendix A

Suggested water sprayers



Model 14011 features a multi-purpose #30L low-pressure Gunjet with nylon housing, trigger lock, and an 18" brass lance. Maximum spray throw is 17' to 20'. Dimensions 31"L x 14"W x 14"H tanks – 15 gallons or 25-gallon, 18"W x 17"H x 36"L

Additional power option - 12V DC Cigarette Lighter Plug Adapter

Approximate cost (04/2008) \$245.



Common bug sprayer designed for the purpose of dispensing pesticides and available at numerous retail stores. Available in 1 or 2 gallon tank sizes with translucent poly tank, pump handle, and a flow control wand. Typical weight between 2-5 pounds when empty.

Approximate cost: \$5.00-\$20.00