



# Dreissenid (Zebra and Quagga) Mussel Monitoring Protocol

Annually the DNR staff selects over 100 water bodies to sample for zebra and quagga mussel infestations. This protocol is designed to assist DNR staff in collecting samples for adult and veliger (larval form) Dreissenid mussels. Additionally, this protocol provides guidelines on how the zebra and quagga mussel information is reported and how the information is released for public knowledge. Using this protocol will standardize the collection techniques, improve the quality of collected samples, limit the number of contaminated samples and ensure an accurate zebra mussels infestation database.

The Department updates the zebra mussels listing annually after sampling results are compiled and then issues a press release listing those waters infested with zebra mussels and other invasive species (including quagga mussels). The Department issues a second press release and list prior to the opening of the fishing season reminding boaters to take precautions to avoid spreading zebra mussels and other invasive species. In addition, a list and a map showing the infested waters are included on the DNR web page:

<http://dnr.wi.gov/org/water/wm/GLWSP/exotics/zebra.html>

## Veliger Monitoring

### Sampling Equipment:

- Boat
- Anchor
- 50-cm diameter, 64-micron mesh plankton net, 5:1 length:diameter ratio
- Rope on net with the meter increments marked
- Chlorine bleach
- Large container to hold plankton net for bleach solution
- 250 ml plastic bottles
- 1-liter plastic bottles
- Alcohol, 95% alcohol (190 proof ethyl alcohol)
- Lake Maps
- Labels for Bottles (contact Scott Van Egeren for labels)
- Sharpie
- Zebra mussel veliger data form (see appendix 1)

- Cooler with ice
- Change for car wash (you may want to make a map of the car wash stations in your area)
- GPS unit - optional

### Ordering Information:

#### Nets

If you need a sampling net, please contact Scott Van Egeren. He has catalogs and information on how to order nets, or sampling nets can be ordered from:

Research Nets Incorporated  
14207 100th Ave. NE  
Bothell, WA  
(425) 821-7345

The standard net specifications are:

0.5 meter mouth (for 2 meter tows) or  
0.3 meter mouth (for 5 meter tows)



- 5 to 1 length to diameter ratio
- 64 micron mesh size
- 0.5 meter towing ring with a single point bridle
- 3.5" PVC 2 piece collecting bucket

## Ethyl Alcohol

Ethyl alcohol is available from the University of Wisconsin Madison at Materials Distribution Services (MDS). You can place your order by phone or via their web page. However, MDS will only ship the alcohol to Madison by common carrier (UPS, US Postal, etc.) because 190 proof ethyl alcohol is a hazardous material. You must also purchase it by the case (4 gallons) because they will not break up a case. You will have to pick up the alcohol in person or arrange delivery with traveling DNR staff from Madison.

One case (4 gallons) of 95% alcohol (190 proof ethyl) costs \$51.14, (2010 costs). For ease in ordering, an account number (MD13912) has been set up with MDS. The catalog number is 2293-CASE. Please specify both account and catalog numbers when placing an order.

The address for MDS is:  
Material Distribution Services  
1061 Thousand Oaks Trail  
Verona, WI 53593  
Phone # 608-497-4400  
<http://www.bussvc.wisc.edu/mds/mds.html>

For directions on how to get to MDS to pick up your alcohol, go to: <http://www.bussvc.wisc.edu/mds/location.html>

## Pre-sampling Preparation:

### Contact Lab

Prior to sending samples, notify the DNR Southeast Region analytical lab, (Jim

Steinke, via e-mail at [james.steinke@wisconsin.gov](mailto:james.steinke@wisconsin.gov) or 920-892-8756 ext. 3035) with specifics on the number of samples, collector, sample sites and dates. Provide your contact information as well so that the lab can get in contact with you. The analytical lab will e-mail back to you a receipt of the samples and the results when they are completed.

### Sampling:

#### Sample Frequency

Three samples should be collected from a particular lake on three dates between June and September (for a total of nine samples per lake). Ideally, samples should be collected at monthly intervals after the water temperatures reach 54 degrees. The first collection dates will vary from early to late June. If you choose not to sample

the same lakes on each of the three sample periods, please contact the analytical lab so that they can make the appropriate changes to the database.

#### Sample Location

On each sampling date, veliger samples should be collected from three different locations in a lake. The sites should be in different bays or basins or at several of the more heavily used lake sites. The three sampling sites should be fairly close to hard substrate (i.e. habitat such as rocks or piers) but deep enough to sample, so perhaps in 15 to 20 feet (4 to 6 meters) of water is a good rule of thumb. Avoid collecting the veliger sample from an open-water deep mid-lake site. Additional samples can be taken in bigger bodies of water where there may be multiple fingers, bays, or multiple boat launches. Mark on the lake map where samples were collected and optionally collect GIS coordinates. These same sites should be use for each of the sample periods – if not, then submit a revised map with subsequent samples.



## Sample Collection

The volume of water that you sample can generally be determined by the trophic status of the lake. A highly eutrophic lake will quickly fill the net-bucket with plankton and provide a dense enough sample to examine for veligers. However an oligotrophic lake requires sampling a greater volume of water to collect a sufficient sample. Using the standard plankton net (50-cm diameter\*, 64 micron mesh) the volume of water to collect for the different trophic conditions are:

- Oligotrophic lakes (Secchi > 4m) collect two 2 meter tows from each site. Consolidate to 1 sample for each site. You will have sampled 4-meters of water per site.
- Mesotrophic lakes (Secchi 2-4m) collect one 2 meter tow from each site. You will have sampled 2-meters of water per site.
- Eutrophic lakes - (Secchi < 2m) collect one 1-meter tow from each site. Samples from eutrophic lakes are more difficult to analyze, so reducing the sample volume will facilitate the process. You will have sampled 1-meter of water per site.

*\*note: if using the 30-cm diameter net, you should sample five 2-meter tows for oligotrophic lakes, three 2-meter tows for mesotrophic lakes and three 1-meter tows for eutrophic lakes to obtain relatively the same volume of water as above.*

Lower the net into the water at the first of the three pre-selected sites. Pull the net up vertically. Care should be taken to pull the net up slowly enough so that no pressure wave is created on the surface of the water. If you are creating a pressure wave, you are under-sampling the water column. Be sure to rinse the net from the outside of the net so that all of the material washes into the

plankton collection cup. Record sampling information on the zebra mussel data collection form (see appendix 1).

- Care must be given that the net does not hit the lake bottom. When this happens, the sample is of muddy water, which is very difficult or impossible to analyze. If you hit the lake bottom, rinse out the sampling equipment and try shorter tows (e.g. two 1-meter tows instead of the protocol of one 2-meter tow), or go to a different area of the lake that will provide enough depth for a good tow.
- For shallow lakes where it is impracticable to do a vertical tow, collect a horizontal sample at mid-depth. In shallow lakes, you may split the sampling depth (i.e., two one-meter tows with the 50-cm net or five one-meter tows with the 30-cm net).
- Condense and decant your plankton sample into your bottle after each tow to obtain an accurate enumeration of the larval density in your lake. For example, if you had two 2-meter tows, you would wash down the net from the outside and condense the sample for each of the 2-meter tows. Both samples should be placed into the 250-ml plastic bottle or 1-liter bottle. (Use the smallest bottle size that is practical, but you may need to use a 1-liter bottle due to the sample size).

*Note: If samples are to be shipped by common carrier, size restrictions may apply to the sample containers. The maximum size allowed under the US DOT regulations for plastic containers is 1 liter – check with the shipper for any additional restrictions prior to sampling so that samples are collected in appropriately sized bottles.*



- Condense the size of the sample by filtering out as much water as possible in the field. This helps reduce the amount of alcohol that needs to be added and aids in the analyses as well.
- Preserve the sample using 95% alcohol. The ratio should be 4 parts alcohol to 1 part sample.  
*Note: If the prescribed alcohol to sample ratio (4:1) can not be achieved after repeated condensing and decanting, then the sample should be split between two sample bottles. Label each with the same information (as specified under “Processing the Sample – Field”), and label one as “Split 1 of 2” and the other as “Split 2 of 2”.*
- Repeat the process at the other two pre-selected sites. You will have 3 samples for each lake
- Alternatively, you can composite the samples from the three sites into one 250-ml or larger (1-liter) bottle and receive a single enumeration for the lake. Obviously, with the composite sampling, you lose specific sample location information, but either approach is acceptable.
- Transport the sample bottle(s) on ice in a cooler.

### Processing the Sample - Field

Attach a State Lab of Hygiene, or comparable, label to each sample bottle and include the following information. Be sure to write legibly and with indelible ink (e.g. Sharpie) – do not use a ball point pen, as the ink is soluble in alcohol. Additional labels may be obtained by contacting Scott Van Egeren.

Label sample bottles with the following information:

- Collector's name
- Collector's phone number - important, as the analytical lab may need to contact you regarding the sample
- Lake name
- WBIC
- County
- TRS
- Sample site Latitude/Longitude locational data using a GPS unit (*optional*)
- Site number
- Net opening diameter (0.5m or 0.3m)
- Sample date
- Number of tows
- Depth of the tows
- Preservatives added

### Shipping/Delivering Samples:

Please deliver the veliger samples to:

Jim Steinke  
Plymouth Service Center  
1155 Pilgrim Road  
Plymouth, WI 53073  
Phone # 920-892-8756 ext. 3035

### Shipping Samples Containing Ethanol

Veliger samples, preserved with ethanol (4 parts ethanol: 1 part sample), are hazardous materials because of their flammability (the flash point of a 4:1 ethanol/water solution is approximately 72° F). Ethanol solutions are classified as flammable liquids by the US Department of Transportation and the shipment of such materials is governed by US DOT's regulations - with a couple of exceptions, as listed below.

#### Transport in State Vehicles

Hazardous materials, including ethanol solutions, can be transported in State of Wisconsin vehicles, without the need to comply with any US DOT regulations. Thus, it is permissible to ship these samples by state vehicle. The hazardous nature of the



samples is not diminished simply because no shipping requirements pertain to this mode of transport, and some common sense precautions should be taken when using this means of shipping:

- Samples should be transported on ice to keep them below their flash point temperature.
- Samples should not be kept where hazardous materials would otherwise not be permitted, e.g., in an office.
- Samples should not be transported in the passenger compartment of a vehicle.
- All employees involved in transporting ethanol-containing samples in a state vehicle should be made aware of the hazard that these samples pose and the precautions that should be taken to minimize those hazards.

regulations begin with training requirements for those who offer hazardous materials for shipping via a common carrier.

Therefore, any staff member who prepares ethanol-containing samples for shipment via a common carrier must be trained in accordance with the requirements of the US DOT regulations. Additional requirements apply to packaging, packing, marking, labeling and documentation. The regulations are available at: <http://www.myregs.com/dotrspa/>. Some shipping companies have additional requirements, or more restrictive requirements than the US DOT regulations. Table 1 summarizes some of the basic information about shipping hazardous materials with some of the common shipping companies.

#### US Postal Service

The US Postal Service has its own set of requirements for shipping hazardous materials, and therefore it is not subject to the US DOT hazardous materials regulations. Guidance for shipping ethanol solutions via the USPS is available on the Intranet at: [http://intranet.dnr.state.wi.us/int/es/science/ls/fpm/EtOH\\_usps.pdf](http://intranet.dnr.state.wi.us/int/es/science/ls/fpm/EtOH_usps.pdf) and also on the USPS website at: <http://www.usps.com/cpim/ftp/pubs/pub52.pdf>. The USPS regulations provide a limit of one container (not to exceed 1 pint for a non-metal container) per mail-piece. Given this limitation, the USPS will generally not be a practical alternative for shipping these samples.

#### Common Carriers

The US DOT regulations (49 CFR, Parts 171 – 180) apply when shipping samples via common carrier. Many of the familiar shipping companies provide hazardous material shipping service. The US DOT



**Table 1 - Shipping Hazardous Materials via Common Carrier**

Shipping Company	Ship Hazardous Materials?	Website	Service Restrictions
DHL	No		
Dunham Express	Yes	<a href="http://www.dunhamexpress.com/index.html">http://www.dunhamexpress.com/index.html</a>	
FedEx	Yes	<a href="http://www.fedex.com/us/services/options/ground/hazmat/">http://www.fedex.com/us/services/options/ground/hazmat/</a>	Must be qualified before shipping. Packaging must be approved. Maximum volume per package = 16 L. Not accepted at all offices. Pick up service may not be available.
Spee-Dee Delivery	Yes	<a href="http://www.speedeedelivery.com/faqs.html">http://www.speedeedelivery.com/faqs.html</a>	
UPS	Yes	<a href="http://www.ups.com/content/us/en/resources/prepare/hazardous/index.html">http://www.ups.com/content/us/en/resources/prepare/hazardous/index.html</a>	Service only on contract basis. Must use UPS compliant software. Packaging must meet specifications. Not accepted at all offices.

## Decontamination Procedures:

When multiple lakes are sampled on the same day, the net, boat and all other sampling equipment must be decontaminated between lakes. Decontaminating will eliminate cross contamination and reduce the risk of transporting veligers from lake to lake. You do not have to decontaminate equipment between sample sites on the same lake.

Remove any organic material from sampling gear. There are several options for disinfecting smaller gear. *Dissolved oxygen probes and other sensitive electronic sampling gear may be damaged by disinfection solution and should only be rinsed with clean water.* For other gear used in water choose one of the following options:

- Option one: The gear can be sprayed with the disinfection solution and a wet surface maintained for the appropriate contact time. The gear should be rinsed with clean water or water from the next waterbody before it is used again.
- Option two: Fill a tub with disinfection solution and place all equipment in the tub for the appropriate contact time. The gear should be rinsed with clean water or water from the next waterbody before it is used again.
- Option three: Use a completely new set of gear for each waterbody during the work day and disinfect all gear at the end of the day using option one or two.



You should wash the boat between lakes following the DNR boat cleaning procedures. Please refer to the agency guidelines at the beginning of this Section of the handbook.

Another approach that has been quite effective in some areas is to benefit from citizens that offer to take our technical staff onto the lake with their boats. This saves time because we don't have to launch and then decontaminate the trailer and boat upon departure.

If multiple lakes are sampled in one day, it is recommended to sample any lakes that are not on the watch or infestation lists before sampling lakes on those lists, to minimize the potential for transport.

## Adult Zebra and Quagga Mussel Monitoring

The adult monitoring serves several purposes:

- to verify a reproducing population if veligers have been identified as being present in a water sample,
- to determine the population densities of mussels after an infestation has occurred,
- to track the spread by collecting additional data on lakes where veliger monitoring is not being conducted, and
- to monitor for the quagga mussel.

Adult *Dreissena* (zebra and quagga) mussel monitoring for inland waters is accomplished using one of two methods:

1. Shoreline surveys and regular inspections of structures in the water to determine the presence/absence of zebra and/or quagga mussels.
2. Substrate sampler monitoring (substrate refers to any substance in the water that zebra or quagga mussels may attach to) to estimate population densities.

### Sampling Equipment:

- Substrate samplers
- Rope
- Buoy float
- Anchor (e.g. concrete block)

- Rubbing alcohol
- Zebra mussel data sheets, Method A and Method B (see appendices 2 & 3)
  - quagga mussel reporting is discussed below and requires lab verification
- Hand lens 30X

### Method A: Shoreline Surveys

Shoreline surveys and inspections of structures in the water are conducted to identify the presence or absence of adult *Dreissena* mussels. A single observer can monitor thousands of square meters of substrate at a given location in a short period of time – covering a larger surface area than a set of substrate samplers. Monitoring for the presence or absence of adult zebra or quagga mussels will address two important objectives: 1) document the presence of adult *Dreissena* mussels when veligers have been found during the veliger monitoring, and 2) document multiple year classes of zebra or quagga mussels. These data provide important information regarding the viability of the population of zebra or quagga mussels in that waterbody.

### Collecting Samples

- Conduct shoreline surveys about once every two weeks from ice out to ice on.



- Target areas around public boat ramps or areas that are likely to have a lot of boating traffic in the vicinity (for example, fishing hot spots, resorts, campgrounds, etc.).
- Any solid surface is a suitable substrate to observe. Rub your hands along some of the submerged surfaces. Zebra mussels on the surface will feel like sandpaper.
- Zebra mussels are often found in cracks and crevices of rocks and structures. Small zebra mussels can be attached to plants as well (Figure 1).

*NOTE: It is especially important to pay attention to structures removed from the water in the fall of the year or before winter ice forms (for example, docks, piers, boats, buoys, etc.)*

Figure 1. Zebra mussels attached to native water-milfoil.



## Reporting Zebra Mussel Monitoring Results

Collect any mussels that you believe are zebra mussels, place them in rubbing alcohol and send it to the zebra mussel regional coordinator for confirmation. See zebra mussel contact list in watercraft inspector handbook. If you find what you believe are zebra mussels and note various shapes of mussels of similar size, collect those as well for evaluation of whether or not quagga mussels may also be present.

For tracking the movement of zebra or quagga mussel infestations, a negative report is as important as finding *Dreissena* mussels at a location. All monitoring efforts should be reported on the zebra mussel datasheets and submitted to Ron Martin at 101 South Webster St., Madison, WI 53707. Complete the zebra mussels reporting form Method A, electronically available as form 3200-122 A at <http://intranet.dnr.state.wi.us/itworks/forms/eforms.asp> or a paper copy in Appendix 2.

## Method B: Substrate Monitoring

Substrate samplers can be used to determine if zebra mussels or quagga mussels are present. When placed in waterbodies without known populations of *Dreissena* mussels, substrate sampler monitoring documents the arrival of zebra or quagga mussels and tracks the spread of these mussels. Substrate samplers can also be useful on lakes with known zebra mussel populations for determining zebra mussel population growth and seasonal abundance, and also for monitoring for the presence of zebra mussels and quagga mussel.

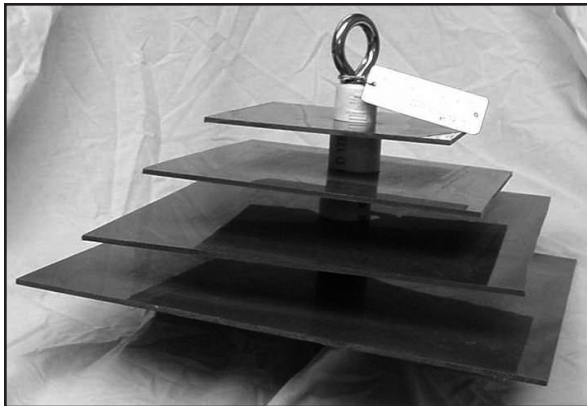




## Substrate Sampler Materials

The sampler is a series of four square-plates that are 6, 8, 10 and 12 inches in size, pyramiding from smaller plates at the top down to larger plates at the bottom (Figure 2). The plates are made of  $\frac{1}{8}$  inch grey plastic PVC stock with  $\frac{3}{4}$ -inch CPVC grey pipe for spacers (1-inch sections) between the plates. The sampler is held together with an 8 inch long  $\frac{3}{8}$  inch diameter stainless steel eyebolt, plus washers and a wing nut. Each sampler has a DNR tag attached that provides a phone number for further information. Samplers are ordered from Cathy Cleland (Rhinelander, 715-365-8997). Directions to build a substrate sampler are found in Appendix 4. *Note: the substrate samplers are easily disassembled and cleaned for the next sampling season.*

Figure 2. Substrate sampler for zebra mussel monitoring.



### Placement of Substrate Samplers

- Place the substrate sampler in an area where there will be little chance of vandalism.
- Hang the substrate sampler from a dock, pier or other structure found in the water. (A float or buoy may be used to suspend the sampler in the water column. If a float is used, a waterway marker application and permit form is necessary before the substrate sampler is placed in the water).
- Put two samplers at each location chosen for monitoring. The top sampler is removed and analyzed every four weeks, then placed back into the lake for the next sampling period. The second (bottom) sampler remains in the water for the entire monitoring season. Securing the two samplers on the same line with clips makes it easy to replace the top one every four weeks.
- A small concrete block anchor works to hold the sampler(s) in place (and provides an additional substrate sampler to examine). Rope can be used to suspend the sampler, but sometimes wildlife will sever the rope. Chains work well to better secure the samplers in those locations.
- Suspend substrate samplers in water, preferably where the water is at least 6 feet deep, but shallower is acceptable. Samplers should be placed at a depth of 6 feet or at mid-depth, whichever is less.
- Place samplers in areas where zebra mussels are most likely to be found. Pay special attention to areas in which zebra mussels may have been transported from infested waterways (for example public boat ramps, water access sites, fishing hotspots, resorts, campgrounds or areas where diving ducks tend to reside).
- Avoid placing substrate samplers in areas where there is strong current.

## Analysis of Samples for Quantitative Monitoring of Adults

1. Put the samplers in small white or clear garbage bags when they are removed



from the water.

2. In the lab, disassemble the sampler and examine each plate with a hand lens. Scan the entire plate looking for zebra mussels.
3. Recently settled post-veligers can be very small. If you were to rub your hands along the plate, the surface will feel like sandpaper. If you believe that you have detected post-veligers, please mail them to the Watercraft Inspector to have it examined by the Region Biologist or send it to Jim Steinke following the shipping protocol cited in the veliger monitoring section for verification.
4. Count the number of zebra mussels found on the top and bottom of each plate and record these numbers separately. (use zebra mussel Method B forms, see appendix 3).
5. Report the lengths of the smallest and largest mussels on the plate to the nearest millimeter (1/16-inch). Measure the longest axis of the shell. See diagrams below.



6. For an initial discovery, all zebra mussels collected should be placed in rubbing alcohol for expert verification.
7. For lakes that have zebra mussels and the monitoring is to detect if the quagga mussels are also present:
  - sort the mussels by relative size and shape,
  - compare the shapes
    - ✓ Zebra mussels (*Dreissena polymorpha*) have a flat attachment edge, usually a dark striped shell and are almost as wide as it is tall.
    - ✓ Quagga mussels (*Dreissena bugensis*) have sharp edges on both sides and are fan-shaped. The quagga mussel shell is wider and narrower than the zebra mussel. Coloration may range from nearly all white to coloration similar to the zebra mussel.
8. If you believe that you have two differently shaped mussels of the same relative size, place those mussels in alcohol and send them to the Region biologist or Jim Steinke for verification.
9. If there are a large number of mussels attached to the plate (Figure 3), a subset of the plate can be evaluated and reported. The sub-sampling method used must be reported on the lab reporting form.

*Note: Sampler plates can be thoroughly scrubbed, dried, reassembled and reused next year.*



Figure 3. Substrate sampler from Metonga Lake with attached zebra mussels.



## Reporting

Complete the zebra mussels reporting form Method B, electronically available as form 3200-122 B at <http://intranet.dnr.state.wi.us/itworks/forms/eforms.asp> or a paper copy in Appendix 3 below.

Samples should be clearly labeled with all requested information. Both field staff and volunteers that monitor for adults use the same data sheets. For tracking the movement of zebra mussel infestations, a negative report is as important as finding zebra mussels at a location. All monitoring efforts should be reported on the zebra mussel reporting form and submitted to Scott Van Egeren.

Field staff should also provide Scott Van Egeren with a lake map showing the location of the monitoring sites. The zebra mussel monitoring sites, along with the names and addresses of the monitors, are maintained and updated periodically. Maps showing all the sampling locations (for adults and veligers) are recorded on the GIS network and are available on the DNR web page: <http://dnr.wi.gov/org/water/wm/GLWSP/exotics/zebra.html>.



## Zebra Mussel Listing Guidance

The Wisconsin Department of Natural Resources is monitoring some of our inland waters for the presence of zebra mussel veligers using plankton tows and for the presence of post-veligers and adult zebra mussels using substrate samplers. Occasionally sample results from a lake will detect low numbers of zebra mussel veligers in a sample or very few adult mussels of the same size. In both incidences it is clear that a zebra mussel introduction has occurred, but these data do not substantiate that a reproducing population exists in that waterbody. Quagga mussels are present in Lake Michigan coastal areas but have not been found in Wisconsin's inland lakes at this time.

This guidance document provides listing recommendation criteria for when to place a water body onto a Watch List versus an Infested List (a determination has to be made whether there is an established reproducing population). It also presents criteria for delisting a lake in the event that zebra mussels are no longer detected. A review team consisting of the Exotic Species Statewide Coordinator, Ron Martin, and region representatives make the final determination for listing or de-listing a waterbody.

### Infested List:

DNR lists a waterbody as infested for zebra mussels when we have data indicating that there is an established reproducing population. Generally speaking, that would mean that we detect evidence of in-lake reproduction.

### Watch List:

When veligers, post-veligers or adults are detected in a lake sample, the regional biologist and statewide coordinator (Ron Martin) are contacted. The biologist is requested to conduct a lake survey at their earliest opportunity. In general, the survey would include examining shores, piers and other available substrate near where the plankton tow with the veliger was collected. Additional plankton tows and scuba diving or underwater video surveys may be warranted upon the discretion of the biologist. If the veligers, post-veligers and/or adult zebra mussels found are all from the same year class, then the waterbody is placed on the "Watch" list to be targeted for additional follow-up work by DNR staff. Waterbodies on the Watch list are monitored for zebra mussels and usually include increased public information and education efforts.

Table 2 provides the zebra mussel listing recommendation criteria. A water body is recommended to be placed on the "Watch" or "Infested" list based on meeting one or more of the criteria. Ultimately, the Regional resource managers, in consultation with the aquatic invasive species program coordinator, determine the appropriate listing for a waterbody.



**Table 2. Zebra mussel listing recommendation criteria.**

Watch List	Infested List
Adults all of the same size, or post-veligers (from substrate analysis) or veligers all from the same year.	Adults zebra mussels of different sizes.
Low numbers of veligers and a substrate evaluation was negative.	Adult zebra mussels found in more than one location of the waterbody. Veligers need not be found.
	Veligers or post-veligers (from substrate analysis) from consecutive years.
	Veligers and adult zebra mussels present.

*Footnote: Although the listing criteria reflect monitoring for both veligers (larvae) and adults, it should be noted that only lakes are monitored for zebra mussel veligers, not streams or rivers.*

### Delisting Criteria:

Unfortunately, once zebra mussels become established in a waterbody it is unlikely that they will be eradicated. Nonetheless, in the event that a waterbody is listed as infested for zebra mussels, but subsequent information indicate that they are no longer present, we can use the following criteria to delist a waterbody as infested.

All of the following need to occur for **at least two years** to delist a waterbody:

- Based on additional monitoring, no veligers are observed in any of the samples collected from May through September following the standard monitoring protocol.
- Substrate samplers are deployed at three or more locations in the lake from May through September, concurrent with the veliger collections above, and all are negative for zebra mussels.
- A lake survey is conducted and survey results of suitable habitat show no adult zebra mussels are present. (Obviously,

the survey(s) should include the location where zebra mussels had been detected in the past).

- A scuba and/or underwater camera survey is conducted in the area(s) where zebra mussels had been detected in the past (*optional*).

\*When these conditions are met the waterbody may be delisted if regional resource managers recommend delisting and the statewide coordinator concurs.

Delisted waterbodies would be moved to the Watch list and continue to be monitored for zebra mussels. Waterbodies on the Watch List remain on that list unless they are moved to the Infested List or if subsequent long-term sampling results indicate that no veligers or adults are present. Hence, no delisting criteria are recommended for Watch List waterbodies.



**The purpose of this form is to track the presence/absence of zebra or quagga mussel larvae (veligers) collected using a plankton net during AIS surveillance monitoring.**

**Notice:** Information on this voluntary form is collected under ss. 33.02 and 281.11, Wis. Stats. Personally identifiable information collected on this form will be incorporated into the DNR Surface Water Integrated Monitoring System (SWIMS) Database. Personally identifiable information collected on this form will be incorporated into the DNR aquatic invasive species database. It is not intended to be used for any other purposes, but may be made available to requesters under Wisconsin's Open Records laws, ss. 19.32 - 19.39, Wis. Stats.

Primary Data Collector			
Name		Phone Number	Email
Monitoring Location			
Waterbody Name	WBIC	County	Township Name
Date and Time of Monitoring			
Start Date	Start Time	End Date (= Start Date)	End Time
Monitoring Results			
<b>Guidelines for how many tows to collect:</b> If Secchi depth is >4 m (13 feet) take two 2m deep tows; if Secchi depth is between 2-4 m (6.5-13 feet) take one 2m deep tow; if Secchi depth is <2 m (<6.5 feet) take one 1m tow.			
Diameter of zooplankton net opening 30cm 50cm other_____ (circle one)			
<b>Site 1:</b> Latitude (optional): _____		Longitude (optional): _____	<input type="checkbox"/> Preservative Added
Secchi depth (m) _____		Number of net tows _____	Depth of tows (m) _____
<b>Site 2:</b> Latitude (optional): _____		Longitude (optional): _____	<input type="checkbox"/> Preservative Added
Secchi depth (m) _____		Number of net tows _____	Depth of tows (m) _____
<b>Site 3:</b> Latitude (optional): _____		Longitude (optional): _____	<input type="checkbox"/> Preservative Added
Secchi depth (m) _____		Number of net tows _____	Depth of tows (m) _____
<input type="checkbox"/> Have you consolidated all of your samples into one composite bottle?			
<input type="checkbox"/> Have you sent your samples to the DNR Plymouth Service Center?			
COMMENTS/OBSERVATIONS:			
For DNR staff to fill out			
Volume of sample that was analyzed (ml)		Date analyzed	
Name of plankton sample analyst:			
Name of person or museum who identified the voucher specimen:			
<b>Did the samples contain zebra mussel veligers?</b>		<input type="checkbox"/> Yes	<input type="checkbox"/> No
Have you entered the results of the samples in SWIMS?		<input type="checkbox"/> Yes	<input type="checkbox"/> No
<i>DNR staff: Please enter voucher information for new AIS findings into SWIMS under the Incident Report Project for your county (Choose Incident Report Form in SWIMS). Enter date of sampling for "Start Date", Person who identified specimen as "Data Collector", and Monitoring location as "Station".</i>			

## Zebra/Quagga Mussel (Quantitative) Report

**Requires use of sampler plates**

Form 3200-127 (R 02/10)

**The purpose of this form is to track the abundance of adult zebra or quagga mussels in lakes where larvae or adults have previously been detected during AIS surveillance monitoring.**

**A report should be completed for each sampler deployed.**

**Notice:** Information on this voluntary form is collected under ss. 33.02 and 281.11, Wis. Stats. Personally identifiable information collected on this form will be incorporated into the DNR Surface Water Integrated Monitoring System (SWIMS) Database. It is not intended to be used for any other purposes, but may be made available to requesters under Wisconsin's Open Records laws, ss. 19.32 - 19.39, Wis. Stats.

Primary Data Collector				
Name		Phone Number		Email
Monitoring Location				
Waterbody Name		Township Name	County	Station Name
Latitude (If not at an existing SWIMS monitoring station)			Longitude (If not at an existing SWIMS monitoring station)	
Date and Time of Monitoring				
Start Date	Start Time	End Date	End Time	
<i>Start Date = Date sampler deployed or since you last removed mussels from the plate. End Date = Date you pulled up the sampler.</i>				
Vertical Measurements				
Water Depth at Monitoring Location		Feet/ Meters (circle one)	Depth to Top of Zebra Mussel Sampler	Feet/ Meters (circle one)
Measurements from where the invasive was found				
Water Temperature		Degrees F / Degrees C (circle one)	Dissolved Oxygen (mg/l)	
Estimated percent cover where sampler plates were located				
Substrate cobble, %	Substrate muck, %	Substrate boulders, %	Substrate sand, %	Bottom covered with plants, %
Information about Mussels Found				
Number of Zebra Mussels on Top Side of Plates			Number of Zebra Mussels on Bottom Side of Plates	
Total Number of Zebra Mussels on Sampler			Size of Largest Zebra Mussel (mm)	Size of Smallest Zebra Mussel (mm)
<b>Note: if more than 20 zebra mussels are found, measure 20 mussels chosen randomly from the sample. If less than 20 mussels are found, measure all mussels. Report results in the table on page 2 of this form.</b>				
Additional Comments				

### If you find Zebra Mussels

All initial discoveries should be placed in rubbing alcohol until verification by an expert is obtained. Please collect a sample and bring a copy of this form, along with the sample and a map showing where you found the suspect mussels to your regional Citizen Lake Monitoring Coordinator at the DNR.

### If you don't Find Zebra Mussels

If you submit your data online, that is all you need to do. Otherwise, please mail a copy to your regional DNR Citizen Lake Monitoring coordinator. <http://dnr.wi.gov/lakes/contacts>

**Zebra Mussel (Quantitative) Report**  
**Requires use of sampler plates**

Form 3200-127 (R 02/08)  
Page 2 of 2

**Length of Zebra Mussels from Sample**

*If more than 20 zebra mussels are found, measure 20 mussels chosen randomly from the sample. If less than 20 mussels are*

Number	Length (mm)
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	