

Section 8

Waterflea Monitoring Protocol

Citizen Lake Monitoring Network

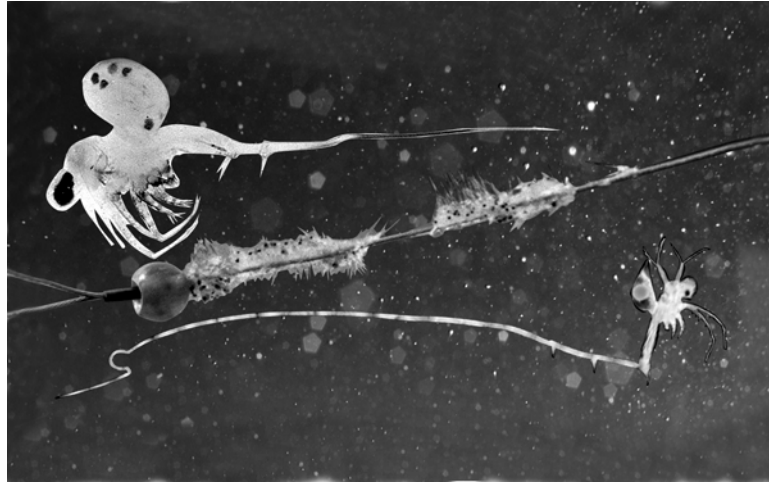


Photo from: University of Minnesota Sea Grant Program.

Spiny waterflea - upper left, actual size on downrigger cable - center, fishhook waterflea - bottom right



Waterflea Background

Spiny waterfleas (*Bythotrephes longimanus*) and fish hook waterfleas (*Cercopagis* sp.) are large (up to ¾ inch), predatory crustacean zooplankton native to parts of Europe and Asia. Both species of waterfleas entered the Great Lakes in ship ballast water from Europe. The spiny waterflea arrived in the 1980's, followed in the 1990's by the fishhook waterflea. One or both species are now found in all of the Great Lakes. Spiny Waterfleas were found in the Gile Flowage, a lake in Iron County near Lake Superior, in September 2003. This is the only invasive waterflea that has been found in an inland Wisconsin Lake. Both the spiny and fish hook waterfleas can be transported from an infested waterbody to another lake if they are attached to fishing gear and boating equipment.

Outside of *Mysis* shrimp, spiny waterfleas are considerably larger than any naturally occurring lake zooplankton. Spiny waterfleas are readily distinguished by their long tail spines, which generally support between one and three barbs. Fishhook waterfleas have smaller barbs on their tails and the end of tail has a “fishhook” shape. Both spiny and fish hook waterfleas are often first noticed by anglers and recreational lake users. These invasive waterfleas have a tendency to become entangled on fish lines, anchors, downrigger cables, and other types of gear used in boating activities. Masses of waterfleas can clog the first eyelet of rods, damaging a reel's drag system. Extreme care should be exercised to avoid transporting these organisms between lakes.

Spiny and fishhook waterfleas are predators – they eat smaller zooplankton (planktonic animals), including *Daphnia* (native waterfleas). This puts them in direct competition with juvenile fish for food. Additionally, young fish have trouble eating these waterfleas due to their long, spiny tails. Therefore, invasive waterfleas have the potential to disrupt food webs.

The spiny and fishhook waterfleas reproduce rapidly sexually and asexually. This means that no males are required and a single female can start a new population. Fishing, boating and other water recreational equipment can transport waterfleas and their eggs to new water bodies. Their resting eggs can survive long after the adults are dead, so care must be taken not to transport water between an infested lake and a non-infested lake. Drain all water from the boat and equipment to make sure all waterfleas and eggs are removed.

Monitoring Background

Spiny waterfleas (*Bythotrephes longimanus*) and fish hook waterfleas (*Cercopagis* sp.) are large (up to ¾ inch) and can be seen by the naked eye. Lake residents could be the first ones to find the waterfleas on a lake. It all depends upon how close you look at your lake and the water in your lake. Some lake groups collect algae and zooplankton samples on their lakes. These folks will probably be the ones that find the waterfleas in their lake tows.

DNR staff annually selects water bodies to sample for waterfleas. The monitoring equipment (zooplankton tow net) is too expensive to distribute to individual lake volunteers. One of the goals of our network is to have the volunteers provide a boat and assistance to DNR staff. Since the volunteer's boat stays on the lake, the DNR staff does not have to disinfect boats before and after the collection and they do not have to trailer boats to the lakes they are

monitoring. Since the volunteer would be assisting in the monitoring, only one DNR staff would be required to do the sampling safely and efficiently.

Volunteer Monitoring

Some lake groups are monitoring algae and zooplankton on their lakes. These folks could look for spiny and fish hook waterfleas in the samples they collect. For groups that have monies for monitoring equipment, zooplankton nets can be used to sample the lake water column for these waterfleas. These nets do not have to be the same net size (circumference or length) that the DNR uses; you can use a smaller version. For those without a net, you can Google search on “make your own plankton net” to find directions to making a plankton net. One site that seemed to be detailed yet easy to understand is <http://archive.orr.noaa.gov/living/watercolumn/plankton.html>. You should follow the other protocols that the DNR uses (listed below). Please note on your data sheet what type of net you used in the collection. By using the smaller net size, you will not be sampling as much water volume as the DNR staff. You may want to take additional samples to increase the amount of water sampled.

Agency Monitoring

Monitoring protocols may be modified once we learn more about the life cycle of waterfleas and infestation rates of inland lakes. **These protocols are included so that you know what will be expected of you and what the DNR staff will be doing on the lake.**

Agency Sampling equipment (other than the boat & anchor, equipment will be provided by DNR)

Boat/Anchor

0.5-1 meter diameter, 250-micron mesh plankton net

Rope on net with the meter increments marked

Vinegar/Large container to hold plankton net for vinegar bath

250 ml plastic bottles

1-liter plastic bottles

Alcohol, 95% alcohol (190 proof ethyl alcohol)

Lake Maps

Water flea data collection sheet (appendix 5)

Cooler with ice

GPS unit – *optional*

Target Sampling

- **Frequency**

Ideally, three samples should be collected from a particular lake on three dates between June and September (for a total of nine samples per lake). 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.

When time and staff constraints exist, sampling can be downsized to three samples per lake for one sample period during mid-summer.

- **Sample Location**

On each sampling date, Waterflea 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 deep enough to sample, so 15 to 20 feet of water is a good rule of thumb. The deepest point of the lake and areas near boat landings (sites of boat traffic) or lake's outlet are the best locations to sample. Mark on the lake map where samples were collected. These same sites should be used for each of the sample periods – if not, then submit a revised map with subsequent samples.

- **Collection**

1. Collect sample with a large diameter (0.5-1 meter opening) zooplankton net with a mesh size of 250 microns. Smaller nets can easily clog with small forms of phytoplankton and zooplankton and can allow spiny waterfleas to elude capture.
2. A 100 meter horizontal tow is best suited for capturing Waterfleas. You can use a GPS unit to measure distance and/or rate of travel or you can tow the net for 120 seconds at a low boat speed ($\sim 3 \text{ km hr}^{-1}$) that prevents the net from surfacing (horizontal tows are facilitated by adding weight to the zooplankton net; tie a loop in the rope approximately 0.5-1 meter in front of the net and attach a weight [e.g., a brick with a hole in it] using an additional piece of rope or cable tie). Ideally, horizontal tows should be oblique, sampling from the top of the thermocline to just below the water's surface. Care must be given that the net does not hit the lake bottom. When the net hits the lake bottom, 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 go to a different area of the lake that will provide enough depth for a good tow.
3. Be sure to rinse the net from the outside of the net so that all of the material washes into the plankton collection cup. Since waterfleas are large, you will likely, but not always, see them in the collection cup if they are present.
4. Record sampling information on the waterflea collection data sheet (appendix 5).
5. Condense the size of the sample by filtering out as much water as possible in the field. You should “swirl” the sample, so that the excess water drains out the screens. If you plan to look through the sample yourself, please skip to #9. Swirling the sample helps reduce the amount of alcohol that needs to be added and aids in the analyses as well.
6. Preserve the sample using 95% alcohol. Rubbing alcohol can be used if you have it. Larger size bottles of alcohol can be purchased at hardware stores in the paint / refinishing sections of the stores. 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”.

7. Repeat the process at the other two pre-selected sites. Composite the samples from the three sites into one 250-ml or larger (1-liter) bottle and receive a single enumeration for the lake.
8. Transport the sample bottle(s) on ice in a cooler.
9. Identification of waterfleas can be conducted by the region water quality biologist or you can look through the sample yourself. Place sample in a white cake pan style dish. Make sure there is enough water so the sample floats. Then look for the waterfleas. Spiny and Fishhook Waterflea Watch and Wild cards are excellent resources for identification. If you find anything that you think are spiny or fish hook waterfleas, the samples should be preserved in alcohol and driven to your local CLMN contact (page vii). **It is illegal to mail samples that contain alcohol.** Make sure you fill out the data form and bring it with the sample. 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. If no spiny or fish hook waterfleas are found, please send in your data form showing that you sampled and no waterfleas were found.

Label sample bottles with the following information:

- Sampler’s name
- Sampler’s phone number - lab may need to contact you regarding the sample
- Lake name
- WBIC
- County
- TRS
- *optional* - Sample site Latitude/Longitude locational data using a GPS unit
- Site number
- Net opening diameter
- Sample date
- Number of tows
- Depth of the tows
- Preservatives added

Shipping Samples

Waterflea samples will not be shipped by volunteers as ethanol (4 parts ethanol: 1 part sample), is a hazardous materials because of its flammability (the flash point of a 4:1 ethanol/water solution is approximately 72° F). **Any staff preparing specimens for shipment MUST attend a hazardous training workshop and ship through certified carriers.**

Decontamination Procedures

When sampling multiple lakes 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 invasive species from lake to lake. You do not have to decontaminate equipment between sample sites on the same lake. 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.

- The net and sample equipment can be decontaminated using regular household vinegar. The acidity of the vinegar may kill living adults; but it is not known if it will kill resting eggs, which could remain viable within dead adults. If waterfleas are observed, extreme care should be taken to avoid transporting individuals to a “clean” lake. For cleaning the net, an easy method of vinegar decontamination is to use a large, round rubber storage container that will fit the outside diameter of the net. Put in enough vinegar to cover the net. Keep the storage container in the truck rather than in the boat. Every time you take your boat out of a lake, place the net in the vinegar. Dip equipment into 100% vinegar for at least 20 minutes. Take the net out at the next lake and let it rinse in the water a minute or so before taking your first sample. Rinse the net without dipping the ring below the surface, so that the vinegar is rinsed from the outside of the net. There is no need to change vinegar between lakes, just add more vinegar when the level gets low. Be aware that vinegar attracts wasps, bees and hornets. It is a good idea to rinse your equipment in hot water and let the net and cup dry thoroughly for at least 24-48 hrs after a day of sampling, both to preserve the integrity of the net and reduce the risk of any resting eggs remaining viable.