

# AIS

## Aquatic Invasive Species

### SPINY AND FISHHOOK WATER FLEAS



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**COMMON NAMES:** Spiny Water Flea or Bythotrephes (left), Fishhook Water Flea or Cercopagis (right)

**SCIENTIFIC NAME:** *Bythotrephes* spp and *Cercopagis pengoi*

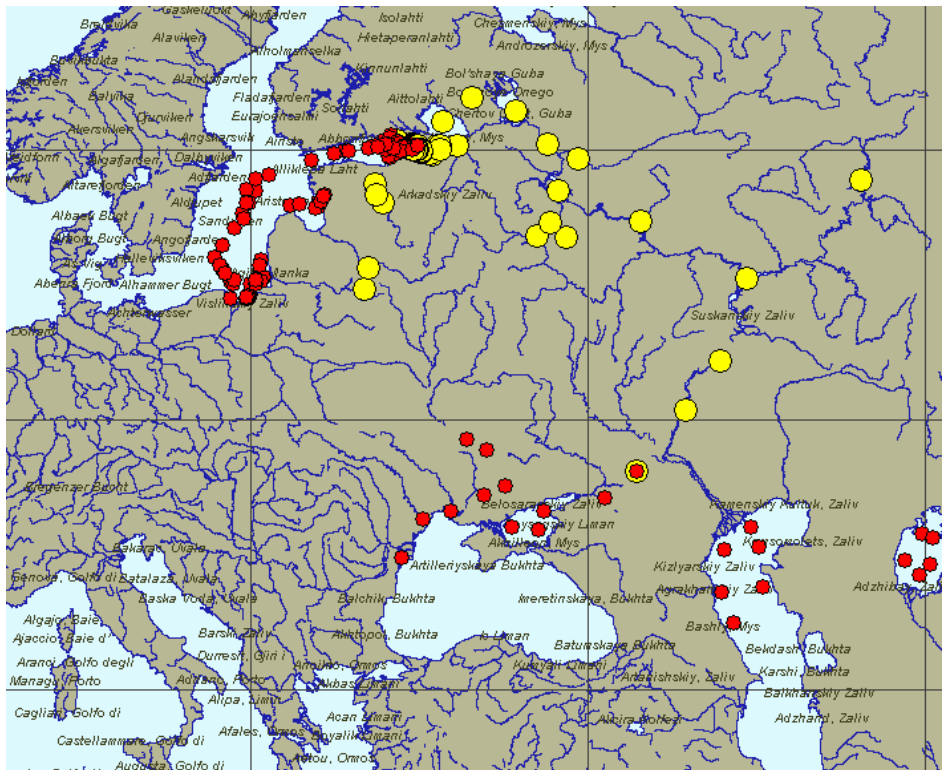
Both water fleas are in the family Cercopagididae. Some use *Bythotrephes longimanus* as the scientific name for the spiny water flea while others refer to it as *Bythotrephes cederstroemi*.

**NATIVE DISTRIBUTION:**

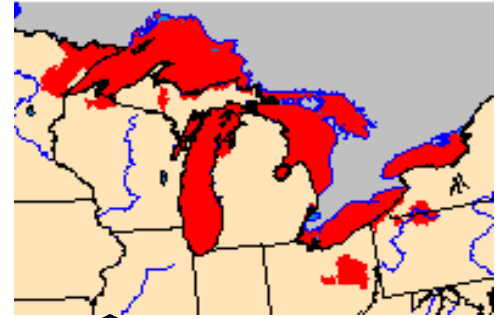
Bythotrephes is native to Europe and northern Asia. Cercopagis is native to the Ponto-Caspian Basin in Southwest Asia., and introduced to the north into the Baltic Sea region.

*Bythotrephes* spp. ●

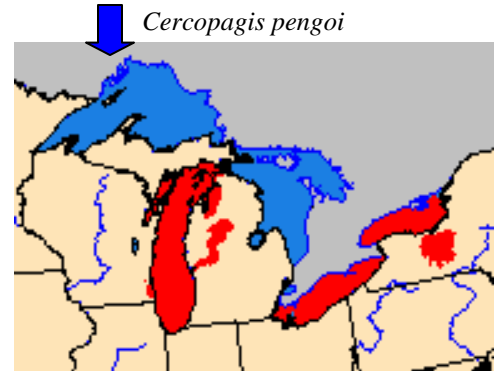
*Cercopagis pengoi* ●



**Great Lakes Distribution:** The spiny water flea is found in all of the Great Lakes and a number of inland waters. Fishhook water flea has been found in Lake Ontario, Erie, and Michigan, and the Finger Lakes Region of New York. While both species are found in southern Lake Michigan, neither has been found in inland waters of Indiana.

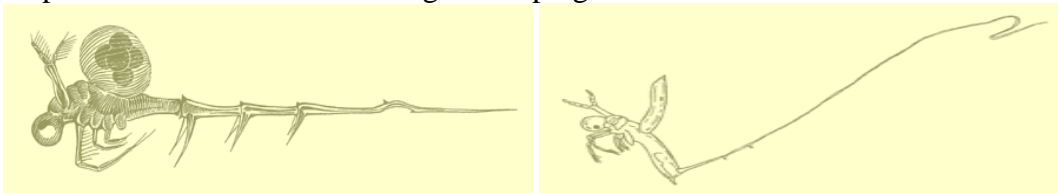


↑ *Bythotrephes* sp.



↓ *Cercopagis pengoi*

**DESCRIPTION:** These water fleas are not insects at all, but small cladocerans related to other crustaceans. The distinguishing characteristic that separates the spiny and fishhook water fleas from all other native zooplankton are their tail spines. Both species reach about ½ inch long but about 70% of the total length is the tail spine. Adult females are larger than adult males. Juvenile spiny water fleas have one pair of barbs on the tail spine and as they grow larger can have up to four pairs of barbs. Adult female fishhook water fleas have three pairs of barbs on the tail spine and the tail spine has a characteristic S-shaped loop at the end. For both species, the body is composed of a head which is dominated by a large black eye, jaws, four pairs of legs and a pair of branched antennae. The first pair of legs is longer than the rest and is used for catching prey. The other pairs of legs are used to hold the prey while it is being consumed. The antennae are used for swimming. Reproducing females will carry a brood pouch on their back containing developing larvae.



Graphics courtesy of the Ontario Federation of Anglers and Hunters

**LIFE CYCLE BIOLOGY:** Both water fleas can be found in freshwater to brackish lakes. These water fleas will appear in late spring and persist in the water until late autumn. The life span of a water flea can be several days up to a week. In the spring, the population emerges from resting eggs that have laid dormant over the winter. During the peak population period from spring through fall, the population is comprised of mostly females. With the absence of males, the females reproduce by a process called parthenogenesis. Parthenogenesis requires no fertilization and the offspring are clones of the mother. When the temperature begins to cool and food is becoming scarce in the fall, both males and females are produced via parthenogenesis. The sex of a spiny water flea is not determined by genetics but by environmental factors. The presence of males allows for sexual reproduction to occur in the fall. The eggs produced by sexual reproduction have a hick coating that allows them to withstand the winter on the lake bottom. These eggs are called resting eggs and can lie dormant for long periods of time. All eggs are carried on the females back in a balloon like pouch. They can have up to a

dozen offspring when reproducing by parthenogenesis. Females producing resting eggs have clutches that range from usually one or two. After reproduction is complete, whether it be by parthenogenesis or sexual reproduction, the adult dies.

The spiny and fishhook water fleas are planktivores. Unlike other zooplankton that feed primarily on planktonic algae, these water fleas feed on other zooplankton which is also the preferred food of juvenile fish. One spiny water flea can eat 20 organisms in a day. While young fish feed on zooplankton, they tend to avoid these two water fleas due to the long tail spine and barbs on the spine. Only larger fish, greater than two inches, are able to eat them.

**PATHWAYS/HISTORY:** The first introductions of the spiny and fishhook water fleas probably came from the ballast water of transoceanic ships originating from the Baltic Sea and the Ponto-Caspian Sea regions. The spiny water flea was first reported in the United States in 1984, specifically in Lake Huron. In 1985, populations were found in Lake Erie and Lake Ontario. Bythotrephes became established in Lake Michigan in 1986 and Lake Superior in 1987. In recent years the spiny water flea has invaded some inland lakes of Michigan, Minnesota, New York, Wisconsin and Ohio.

The fishhook water flea was first found in the United States in 1998 in Lake Erie and Lake Ontario. The following year *Cercopagis pengoi* was found in Lake Michigan. The Finger Lakes region of New York was invaded by the fishhook water flea in 1999, and the pest was found in Muskegon Lake near the eastern shore of Lake Michigan in 2001.

**DISPERSAL/SPREAD:** Originally spiny and fishhook water fleas arrived in the United States via the ballast water of transoceanic vessels coming from Europe. Because of their propensity to attach to fishing lines and downrigger cables water fleas can easily be spread into inland waters. They can also be transferred to new waters as hitchhikers in bilge water, bait buckets, and livewells.

**RISKS/IMPACTS:** Don't be fooled by the water flea's small size, they have the ability to adversely affect biological communities. Both species have high reproductive rates and can build a very large population in a short amount of time. Since water fleas primarily feed on zooplankton, scientists are worried that high populations of these two water fleas will lead to a depletion of the zooplankton population. The appearance of the spiny water flea in Lake Michigan coincided with a dramatic drop in the abundance of the zooplankton *Daphnia*. Zooplankton is also an important food source for nearly all juvenile fish; some fish species rely on zooplankton for food their entire lives. Unfortunately, fish do not tend to feed on these water fleas due to the tail spines. As water fleas compete with fish for zooplankton, it is likely that fish growth and survival will suffer.



The long tail spines of these water fleas are a nuisance to anglers because they tend to accumulate on fishing line and nets. Some anglers have reported needing to cut their fishing lines because there were so many water fleas attached they could not reel in their lines.

**MANAGEMENT/PREVENTION:** The reproductive strategy of the fishhook water flea makes this crustacean a formidable foe. Females can reproduce via parthenogenesis so only one individual is needed to infest a body of water. Their resting eggs also give them an advantage over management techniques by lying dormant and resisting inhospitable conditions only to hatch years later. Once spiny water fleas are established they are almost impossible to eradicate.

Preventing the spread of spiny and fishhook water fleas to other bodies of water not yet infested is the most realistic strategy in dealing with these invasive species. Signs to alert boaters and anglers of the threat of the fleas are already posted at boat launches in many areas. Educating water users about the threats of aquatic nuisance species is critical to encourage the implementation of prevention strategies. There are a number of things that can be done by boaters and anglers to reduce the chance of infesting other bodies of water with water fleas. These same techniques can also be effective in eliminating other hitchhikers.

- ✓ Remove all visible plants and animals from your boat, trailer, and accessory equipment before leaving the access area.
- ✓ Drain live wells and bilge water before you leave the access site.
- ✓ Empty bait buckets on land rather than in the water.
- ✓ Wash your boat, tackle, downriggers, trailer, waders, etc. with hot water (above 104°F) when you get home. Flush your motor's cooling system, live wells, bilge and other boat parts that get wet. Let all equipment dry for at least five days before using your boat or fishing equipment in a new body of water. If planning to move to another body of water sooner, you should disinfect everything that came into contact with water using a 5% bleach solution.
- ✓ Learn to identify spiny and fishhook water fleas so you can report new sightings. If you find what you feel is a spiny or fishhook water flea in a body of water other than Lake Michigan, preserve the specimen in rubbing alcohol and contact the Indiana Department of Natural Resources, Division of Fish and Wildlife for positive identification.
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#### **REFERENCES:**

- Liebig, J. and A. Benson. 2005. *Bythotrephes longimanus*. U.S. Geological Survey. <http://nas.er.usgs.gov/queries/FactSheet.asp?speciesID=162>
- Benson, A., E. Maynard, D. Raikow. 2005. *Cercopagis pengoi*. U.S. Geological Survey. <http://nas.er.usgs.gov/queries/FactSheet.asp?speciesID=163>

- Berg, David J. 1992. The spiny water flea, *Bythotrephes cederstroemi*: Another unwelcome newcomer to the Great Lakes. Ohio Sea Grant College Program. Publication FS-049. 2pp.
- Caceres, Carla E. and John T. Lehman. Life History and Effects on the Great Lakes of the Spiny Tailed Bythotrephes. Michigan Sea Grant College Program.  
<http://www.seagrant.umn.edu/exotics/spiny.html>
- Domonkos, Vicki. Spiny Water Flea (*Bythotrephes cederstroemi*). 1999. National Sea Grant Network. [http://www.iisgcp.org/EXOTICSP/spiny\\_water\\_flea.htm](http://www.iisgcp.org/EXOTICSP/spiny_water_flea.htm)
- Garton, David W. and David J. Berg. 1990. Occurrence of *Bythotrephes cederstroemi* (Schoedker 1877) in Lake Superior, with Evidence of Demographic Variation Within the Great Lakes. The Ohio State University Department of Zoology.  
[http://www.sgnis.org/publicat/papers/16\\_1.pdf](http://www.sgnis.org/publicat/papers/16_1.pdf)
- Sikes, B.A. 2002. Invader of the Month June 2002: Spiny Water Flea. Institute for Biological Invasions.  
<http://invasions.bio.utk.edu/invaders/flea.html#Native%20Range%20&%20Biology>
- Matthews, Susan. Fishhook Waterflea (*Cercopagis pengoi*). 1999. Exotic Aquatics On The Move. <http://www.iisgcp.org/EXOTICSP/fishhook.html>
- Crosier, D.M., D.P. Molloy, I.A. Grigorovich. *Cercopagis pengoi* - Fishhook Waterflea.  
[http://el.ercd.usace.army.mil/ansrp/cercopagis\\_pengoi.htm](http://el.ercd.usace.army.mil/ansrp/cercopagis_pengoi.htm)
- Moen, Sharon. Our Lake has Fleas. Minnesota Sea Grant College Program.  
<http://www.seagrant.umn.edu/seiche/jun.00/art02.html>
- Rivier, I.K. et. al. *Cercopagis pengoi*.  
<http://www.caspianenvironment.org/biodb/eng/zooplankton/Cercopagis%20pengoi/main.htm>