



CASE STUDY: WATERFLEAS—FISHHOOK WATERFLEA AND SPINY WATERFLEA (*Bythotrephes longimanus*, *Cercopagis pengoi*)

The introduction and spread of aquatic invasive species (AIS) poses a threat to lakes, rivers, and other water bodies throughout North America. One pathway that has been shown to contribute to AIS spread is seaplanes. This case study illustrates the role seaplanes can play in the spread of AIS and the negative impacts AIS establishment can have on the environment as well as seaplane safety and operations. These case studies also illustrate the important role seaplane pilots can play to prevent the spread of AIS.

FAA Geographic Region: Great Lakes

Waterfleas are widespread and well-established in the Great Lakes. Likely introduced in the ballast water of large ships in the 1980s and 1990s, fishhook and spiny waterfleas are a concern to the region. Efforts to reduce their spread are focused on preventing their unintentional movement into and between inland lakes by human activities. Of particular concern are lake-hopping excursions that include visits to one or more lakes containing waterfleas.

What are Waterfleas?

Misleadingly named, waterfleas are not aquatic insects, but rather tiny crustaceans that swim in the water columns of lakes with other organisms (collectively called zooplankton). Nearly invisible to the human eye, these tiny translucent animals can dominate native zooplankton communities. The spiny tails of waterfleas, making up more than 2/3 of their total length, can have one to four pairs of thorn-shaped barbs, often making them inedible. Female waterfleas produce offspring rapidly during the summer months but, in early fall, switch to producing eggs that can remain dormant, surviving the colder winter months on lake bottoms or being transported long distances on damp equipment.

Why are Waterfleas a problem?

Although small, waterfleas can have a profound effect on waterbodies, out-competing native zooplankton species, disrupting food chains, and negatively impacting recreational fishing. Waterfleas cause a significant decline in zooplankton, leading to less food for small native fish, including young sport fish, such as bass, walleye, and yellow perch. Because waterfleas are largely inedible, reproduce rapidly, and consume native zooplankton, the more abundant waterfleas become in a waterbody, the less food there is for fish. In addition, the presence of waterfleas impacts both recreational angling and commercial fishing (including fish farms). Their tail spines get snagged on fishing equipment, such as lines, nets, and cables. The value of lakes known for recreational fishing can decline sharply with the establishment of waterfleas. Once introduced, there are no known techniques for controlling or eliminating them from an infested lake.

How can Waterfleas be spread by seaplanes?

Waterfleas, snagged by their barbed tails, can easily be transported on seaplane floats, mooring lines, wires and cables, and rudders. Although adult waterfleas may not survive for long out of water, their dormant eggs are resilient, particularly if they remain in the female waterflea's body (the barbed tail spine staying attached to ropes, lines, vegetation, and mud), and can hatch whether or not the carrier waterflea is alive. If introduced to a new water body, the eggs can hatch and quickly multiply into a large population. Both live waterfleas and dormant eggs may also be successfully transported in trapped standing water.

Seaplane pilots that lake-hop can unintentionally spread both entrained live waterfleas or dormant eggs from lake to lake and facilitate the rapid expansion of these species.

Seaplane pilots can help prevent the spread of aquatic invasive species.

Examples of other aquatic invasive species you may encounter in your region:

- a microsporidian parasite (*Heterosporis sutherlandae*)
- Brittle Waternymph (*Najas minor*)
- Curly-leaf Pondweed (*Potamogeton crispus*)
- Largemouth Bass Virus (LMBV) (*Ranavirus* [LMBV])
- Lyngbya (*Lyngbya wollei*)
- New Zealand Mudsnail (*Potamopyrgus antipodarum*)
- Red-rim Melania (*Melanoides tuberculata*)
- Water Lettuce (*Pistia stratiotes*)
- Whirling Disease (*Myxobolus cerebralis*)
- Yellow Floating-heart (*Nymphoides peltata*)

SEAPLANE PILOT BEST PRACTICES TO REDUCE THE SPREAD OF AQUATIC INVASIVE SPECIES

Follow these steps to improve your flying safety while preventing the spread of aquatic invasive species (AIS).

Why? AIS can take over waterbodies and crowd out native species, harming native fish and wildlife populations and potentially reducing seaplane access.

Planning a Flight

Familiarize yourself with AIS at destination water bodies, but recognize that not all water bodies are monitored for AIS—always assume a waterbody has AIS.

If you are departing from a waterbody that has confirmed high-risk AIS, before landing at another water body, consider landing at an airport first to fully inspect and clean your aircraft.

Before Entering the Aircraft

Inspect and remove any visible vegetation or other debris from the aircraft. Remove any plant growth on mooring lines and dispose of any plants or identified AIS in a container, which can then be disposed of properly upon returning to the base location. Inspect the following for AIS:

- Floats
- Hulls
- Rudders
- Wires and Cables
- Mooring lines
- Wheel Wells
- Crossmembers
- Exterior paddle
- Your footwear and gear

Visually inspect submerged parts of the aircraft and run your hands, or use a brush, along the surfaces to check for any AIS that may be attached, especially if the aircraft has been moored on a waterbody for more than a few hours.

Pump as much water as possible out of bilge compartments using a pump with an invasive species filter (e.g., [Turbo Pump](#)) to limit the possibility of transporting microscopic AIS.

Before Takeoff

Just prior to takeoff, **raise and lower your water rudders several times to remove aquatic hitchhikers**, which can cause cable stretch and affect steering.

Avoid taxiing through aquatic plants. If you must taxi through aquatic plants, stop once in open water and manually clear vegetation from floats, hull, and rudders.

After Takeoff

After takeoff at a safe altitude, if conditions permit, **raise and lower your water rudders numerous times while flying over the water body you are departing** to clear aquatic plants from the water rudders and cables. If aquatic plants remain visible on the plane, return and remove them.



Storage and Mooring

Thoroughly *Clean, Drain, Dry* the aircraft prior to flying to another waterbody. If the aircraft floats take on water, completely drain and dry if possible, and flush the floats with hot water. Allow to dry completely.

Report Invasive Species

Report any invasive species you see to your state AIS reporting system.

Spread the Word about Clean, Drain, Dry

Informed seaplane pilots can make a difference in preventing the spread of AIS. Talk with your colleagues and spread the word about the importance of *Clean, Drain, Dry* and the steps pilots can take to minimize the spread of AIS.

Expand your understanding of the types of AIS you might encounter in local and regional waterbodies by visiting <https://nas.er.usgs.gov>.



Become a Certified AIS-Trained Seaplane Pilot!

Click on the QR code to watch a video created by the Washington Seaplane Pilot Association. After watching the video, take a short test, and earn your annual certificate to become an AIS-trained seaplane pilot. This certificate is recognized by all of the Pacific Northwest states.