



Preventing Accidental Introductions of Freshwater Invasive Species



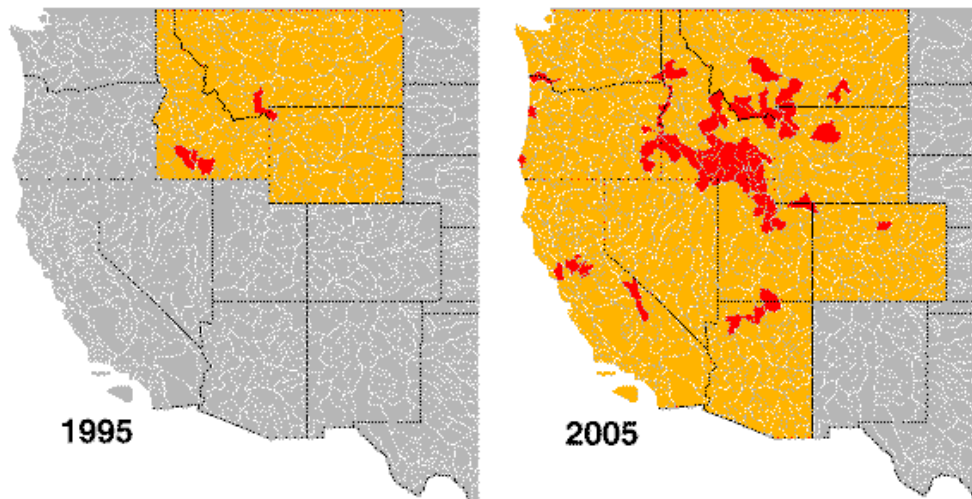
As stream surveyors, native species and their habitat are the object of our efforts. We share the responsibility to “do no harm” to these critters and their ecosystem. Many of the invasive aquatic species that have recently arrived in the Pacific Northwest have become persistent challenges to the waters of our region. We must educate ourselves about this expanding threat and develop appropriate “gear-hygiene” so that we do not contribute to the problem.

Presently, there is not a standard sterilization technique that is effective against all three water-borne invaders. You can find more information about fresh water invasive species at these three web sites:

- <http://nas.er.usgs.gov/>
- <http://www.protectyourwaters.net/hitchhikers/>
- <http://www.nemw.org/biopollute.htm/>

New Zealand Mudsail

The figure below illustrates the expanding range of non-native mudsnails into the Pacific Northwest and the Southwest during the past ten years.



As with most aquatic nuisance species, management options are greatly reduced once the invasive species becomes firmly established. In Washington and Oregon, we have seen increasing numbers of infested watersheds following the accidental introductions of New Zealand mudsnail (*Potamopyrgus antipodarum*). **Education and dedication to sterilization measures are the keys to preventing the mudsnail from invading new**

watersheds. The goal of management is to prevent and delay the spread of New Zealand mudsnail to new areas and to reduce the impact of this species where present.

The prevention goal is simple: people should learn not to intentionally or accidentally spread any species (native or non-native) from one place to another. Avoiding the accidental spread of diseases and parasites is much more effective than attempting to eradicate an invader after it has become established in a river system. Organisms may contain diseases and parasites, so they should never be moved. Releasing or consuming all fish when and where you caught them is always the best policy. It is also generally illegal to knowingly move organisms between different water bodies.

Large populations at many sites, their small body size and their broad environmental tolerance, make the New Zealand mudsnails well adapted to accidental transport by humans. As an asexual live-bearer, a single individual can start a new population. However, there is no life stage of mudsnails that is resistant to sterilization efforts, nor does the species possess any attachment mechanism that would thwart sterilization. Therefore, fairly simple precautions should prevent accidental transport.

Mudsnail Prevention Steps

Always exit a water body clean: rinse and brush anywhere the snails might be lodged. Never move any water from one water body to another since this can easily contain small snails and other harmful species. Heat or dry any gear that might contain snails before entering another water body. While these snails can live for weeks if wet and cold, they are quickly killed by heat or through drying.

1. Rinse boots and waders thoroughly before leaving the stream or lake.
2. Bathe boots in 140°F (60°C) bath of water for 3 minutes; a brief immersion for 3 minutes is sufficient to kill all life stages, and works well for leather, cotton, and synthetics (neoprene and nylon), but hot water will delaminate Gortex™ **...do not bathe Gortex™ in hot water!**
3. An alternative method that works well for Gortex™ is to store your boots in a freezer for 2 days to rupture and kill all snails. Freezing works for waders as well.
4. 48 hr drying at less than 70% relative humidity will also kill all snails attached to waders. **Drying for 48 hours is usually inadequate for boots since they rarely dry completely in that amount of time.**

Whirling Disease

What is Whirling Disease?

Myxobolus cerebralis (Mc) is a parasite that infiltrates the head and spinal cartilage of fingerling trout where it multiplies rapidly, causing the fish to swim erratically and, in severe cases, die. When an infected fish dies, millions of tiny indestructible Mc spores (each about the size of a red blood cell) are released to the water where they can survive in this “dormant” form for up to 30 years. When Mc spores are ingested by Tubifex worms, the spore changes inside the worm and is released from the worm in a highly infective form, the Triactinomyxon (Tam). Tams are free-floating in the water until they infect trout, causing spinal deformities and decreased abilities for feed. Whirling disease is most infective to rainbow and cutthroat trout, but can infect all salmonid species.

What does an infected fish look like?

Typical signs of whirling disease include a darkened tail, twisted spine and deformed head (shortened, twisted jaw). Young fish may also swim erratically (whirl). However, other diseases and even genetic conditions can cause these signs as well. If you see fish with these signs in an area where whirling disease has not been reported, you should contact your state fisheries agency.

How has whirling disease spread?

Stocking or natural movement of live, infected fish is the primary route by which whirling disease is disseminated. However, there are other ways that the parasite can be spread, including by birds and humans – particularly boaters and anglers.

Anglers, boaters, and others can make a difference in reducing the chances of spreading whirling disease. Distribution of the parasite is expanding rapidly in some areas, so you should assume its presence if you don't know otherwise. Recommended precautions that will help prevent not only the spread of whirling disease, but also other disease-causing organisms and aquatic pests include:

1. **Never transport live fish from one water body to another.** (This is illegal in many states.)
2. **Do not use trout, whitefish, or salmon parts as cut bait.**
3. **Dispose of fish entrails and skeletal parts properly.** Never discard fish parts in or near streams or rivers. Because an infected fish may harbor tens of thousands of myxospores, simply disposing of infected fish parts in a clean drainage could provide enough spores to start an infection. Do not discard fish parts in a kitchen disposal. **Whirling disease** myxospores can survive most

wastewater treatment systems. Instead, discard in dry waste that would go to a landfill.

4. **Rinse all mud and debris from equipment and wading gear, and drain water from boats** before leaving an infected drainage. This is good practice for preventing transfer of other aquatic hitchhikers as well.

Disinfecting your Gear

Although the above precautions will remove most spores from your gear, these measures cannot guarantee your gear is free of hitch-hikers:

- **Rinse, then thoroughly dry** your boots, waders and other fishing equipment for a minimum of 48 hours. This is generally sufficient to kill the resting or cyst stage (TAM stage) of the parasite.
- **Chlorine** (regular household bleach) is a very effective disinfectant, and one of the few that can kill all stages of the parasite if used at the proper concentration. However, chlorine is a very strong chemical and can harm your equipment with prolonged exposure, so make sure you rinse the chlorine off your waders and other equipment after you disinfect, and dry in the shade.
 - To kill the TAM stage, use 1 part chlorine to 32 parts water. It must stay in contact for about 10 minutes to assure disinfection.
 - To kill the mature myxospore that may be found in the mud from an infected stream is much more difficult and hard on equipment. These are alternatives for treatment of gear:
 - ▲ Use a 50% solution (1 part chlorine to 1 part water) - dip waders into a solution of the bleach or wipe or spray it on.
 - ▲ Use a 10% solution (1 part chlorine to 9 parts water) and soak your equipment for 10 minutes.
 - ▲ Use Quaternary ammonium compounds are also effective in killing both parasite stages.

These disinfectants are commercially available for disinfecting fishing equipment (**Bright Water™**) or for the pet/veterinary trade (Roccal-D™, Parvosol™). Equally effective is water heated to nearly boiling (200°F) poured over your gear, and your gear is allowed to cool.

Web address:

http://66.102.7.104/search?q=cache:JZndh_U3lJMJ:www.whirlin-g-disease.org/prevention.pdf+whirling+disease+and+prevention&hl=en

The Chytrid Fungus

The greatest concern for amphibian populations at this point involves the chytrid fungus. A large amount of research and resources has been dedicated to understanding why and how this fungus is responsible for the decline of the wild boreal toad. Until we can easily detect, treat, and/or prevent this pathogen from causing irreparable mortality to the wild populations, we must prepare for the worst case scenario. This fungus was observed in a wide range of the amphibian population, with die-offs in Panama and Australia. The fungus has also been identified in some amphibian populations in Arizona and has caused the death of many zoo amphibians in the United States.

Scientists don't know how this fungus is transmitted from one area to another, let alone why the fungus is affecting amphibian populations around the world. Whether the chytrid fungus is responsible for the frog or toad mortality or the declines of frogs and toads in many western states is still unknown. Because fungal infections are considered secondary infections in other vertebrates, USGS is completing further tests for viruses, parasites and bacteria to rule out other factors that could predispose the animals' susceptibility to the fungus.

Sick and dying toads in the Colorado population were first discovered in May of 1999. Live toads show few clinical signs of the disease, but some may appear weak, lethargic and reluctant to flee at the approach of humans. Upon being examined microscopically many of the dead toads showed a myriad of minute chytrid fungi in the skin of the abdomen and toes.

Where did the chytrid fungus come from? We know that there are about 80 species of chytrid fungus world wide, which feed on algae, plant material, keratin, etc. But how did the amphibian chytrid come to be toxic to the boreal toad? Did it mutate from another chytrid? Was it altered by environmental conditions to become toxic? How does chytrid kill amphibians? Does it suffocate them? Does it poison them? Does it alone kill the toad or does it cause something else to happen which kills the toad? Why does chytrid kill all the toads in a specific area and not another? Has chytrid fungus always been around but not active all the time, or has it come from somewhere else and is being spread by something such as another host, weather patterns, people, etc.? Or is this a new disease which is being spread? Much research needs to be done needless to say.

Disinfecting your Gear

- Heat to 140°F (60°C) for 5 minutes...or 117°F (47°C) for 30 minutes.
- Dry for 48 hrs at less than 70% relative humidity.
- Chlorine bleach (4% solution) for 3 minutes.

Web address:

http://66.102.7.104/search?q=cache:HZxSluZRxTYJ:www.azadocents.org/boreal_toad.pdf+chytrid+fungus+prevention&hl=en

General Prevention Procedures for All Invasive Species

From: www.protectyourwaters.net

Remove all visible mud, plants, fish/animals.
Before leaving any body of water, it is important to examine all your equipment, boats, trailers, clothing, boots, buckets etc and:

- Remove any visible plants, fish or animals.
- Remove mud and dirt since it too may contain a hitchhiker.*
- Remove even plant fragments as they may contain a hitchhiker.*
- Do not transport any potential hitchhiker, even back to your home. Remove and leave them at the site you visited.

*The larvae (immature form) of an animal can be so tiny that you cannot see it. However, it can live in mud, dirt, sand, and on plant fragments.

Eliminate water from all equipment before transporting anywhere.
Much of the recreational equipment used in water contains many spots where water can collect and potentially harbor these aquatic hitchhikers. Thus, make sure that you:

- Eliminate all water from every conceivable item before you leave the area you are visiting.
- Remove water from motors, jet drives, live wells, boat hulls, scuba tanks and regulators, boots, waders, bait buckets, seaplane floats, swimming floats.
- Once water is eliminated, follow the cleaning instructions listed below.

Clean and dry anything that came in contact with the water.
(boats, trailers, equipment, dogs, boots, clothing, etc.).

- Use hot (< 40° C or 104° F) or salt water to clean your equipment.
- Wash your dog with water as warm as possible and brush its coat.
- The following recipes are recommended for

Basic procedures include:

cleaning hard-to-treat equipment that cannot be exposed to hot water:

- Dipping equipment into 100% vinegar for 20 minutes will kill harmful aquatic hitchhiker species.
- A 1 % table salt solution for 24 hours can replace the vinegar dip. The table below provides correct mixtures for the 1 % salt solution in water:

(continued)

Clean and dry anything that came in contact with the water.

(boats, trailers, equipment, dogs, boots, clothing, etc.).

Basic procedures include:

Gallons of Water	Cups of Salt
5	2/3
10	1 1/4
25	3
50	6 1/4
100	12 2/3

- If hot water is not available, **spray** equipment such as boats, motors, trailers, anchors, decoys, floats, nets, **with high-pressure water**.
- **DRY Equipment.** If possible, allow for 5 days of drying time before entering new waters.

Web address:

http://www.protectyourwaters.net/prevention/prevention_generic.php