

## **Don't be a NZMS Vector!**

**Minimize Unintentional Spread of New Zealand Mudsnails (*Potamopyrgus antipodarum*) by fly fishers, field biologists, anglers, hikers, boating, fish stocking and other potential vectors.**

In North America the New Zealand mudsnail (*Potamopyrgus antipodarum*, NZMS) was first discovered in the middle Snake River, Idaho in the mid-1980s and has rapidly spread throughout the western U.S. It is a parthenogenetic (clonal) livebearer with a high reproductive potential. NZMS have been shown to appreciably alter primary production and decrease native macroinvertebrate populations in several streams. There is much concern about the impacts that NZMS may have on native species, fisheries and aquatic ecosystems in the western U.S. Its rapid spread into new systems is considered to be primarily human caused.

Locations of NZMS in California (note: most of CA has not been surveyed for NZMS):

- In January 2004 they were found in the Lower Calaveras River; Mormon Slough in an eleven mile stretch.
- In December 2003 they were found in the Lower Mokelumne River; in a five mile stretch above Woodbridge dam.
- In October 2003 they were found in Lower Putah Creek in a mile-long stretch
- In early 2003 they were found in Hot Creek, just downstream of the Hot Creek Hatchery.
- In 2000 they were discovered in the Owens River

New Zealand mudsnails, in western North America, are thought to reach maturity at 3.5mm in shell length and can grow to 6mm. Due to this small size they can be easily overlooked in the folds of waders, boot laces, in crevices of gear and other areas even by an attentive observer. In addition, NZMS have a specialized plate-like operculum that allows them to seal their shell and prevent drying out. This operculum allows NZMS to survive for long periods of time out of water, when on damp media similar to wet waders or boots. One laboratory study demonstrated that roughly 50% of NZMS could survive 20 days out of water and some could even survive 50 days out of water on damp media (Winterbourn 1970). Their small size and resistance to drying makes it likely that anyone who wades in NZMS infested waters will spread them to new areas, if they do not take adequate precautions.

Since NZMS reproduce asexually it only takes one snail to start a new population when introduced into a wide range of tolerable habitats. While no known control method is likely to be 100% effective, there are methods that will remove or kill NZMS on gear. Some of these methods are more effective than others and combining methods is the safest approach. NZMS have never been eradicated from any stream. If NZMS are introduced to a stream it is likely that they will remain in that stream indefinitely.

## Identification:



Photos by D.L. Gustafson

**Operculum:** The NZMS has an operculum to block the shell aperture which protects the snail from desiccation and predation. This operculum is easily seen on live snails, but the operculum is lost from dead shells and it is normally withdrawn beyond view in shells that are directly preserved in alcohol or formalin.

**Color:** Light to dark brown shell. Encrusted shells can be any color.

**Size:** Almost all western populations can reach up to 6 mm.

**Shape:** The shell is rather elongate compared to most western species and dextral (opening to the mudsnail's right). A full grown shell normally has **5 or 6 whorls**.

**Keel:** A weak keel may be present about mid-whorl, but many populations lack this keel entirely. This keel is not present on any native western snails.

For additional ID information, please visit:

<http://www.esq.montana.edu/aim/mollusca/nzms/id.html>

**If you think that you have found NZMS, contact David Bergendorf [USFWS] (david\_bergendorf@fws.gov), (209) 946-6400 x 342 or call (toll-free) 1-888-321-8913**

# **With some diligence you can help prevent the spread of NZMS. Here are seven things that you can do to prevent the spread of NZMS.**

## **Don't be a NZMS vector!**

### **1. Avoid sites that are known to contain populations of NZMS.**

**Caution:** Surveys have found live NZMS in damp leaf litter as far as 26 feet from a stream edge (Davis 2004). Even hiking near infested waters can spread NZMS.

### **2. Dedicate a set of gear to any NZMS positive area.**

**Caution:** Dedicated gear should only be used in areas with known populations of NZMS. If you travel to other areas the gear should be treated with one of the methods listed below.

### **3. Place gear in a freezer overnight.**

Personal observations suggest that putting gear in a freezer for 6-8 hours will kill all attached NZMS (Medhurst 2003, Richards Unpublished).

**Caution:** Freezing for less than 6-8 hours is not effective if the gear is wet so dry wading gear as much as possible before freezing or freeze gear for 8 hours (Medhurst 2003).

**4. Soak gear in hot water (120°F).** Putting gear in water maintained at 120°F for a few minutes will eliminate NZMS (Medhurst 2003, Dwyer et al. In press). Some home water heaters are set at 130°F, but the hot tap water in your home may not be hot enough to kill NZMS. Taking the temperature of your hot water can quickly determine if your water is hot enough to effectively eliminate NZMS.

**Caution:** Placing cold gear in hot water will cool the water. NZMS placed in water up to 110°F can survive so it is essential that water is actually 120°F (Medhurst 2003).

**5. Dry gear in the sun for 24 hours on a warm day or for a few hours on a very hot day.** To eliminate NZMS dry gear at 84-86°F for at least 24 hours or dry gear at 104°F for at least 2 hours (Richards et al. Unpublished).

**Caution:** Larger NZMSs generally survive desiccation longer than do small NZMS (Richards et al. Unpublished). When using this drying method, it is important to thoroughly brush gear with a stiff bristled brush prior to drying in the sun to remove all larger NZMS.

**6. Soak gear in a 10% bleach solution.** NZMS can be killed by soaking gear in a 10% household bleach solution [approx. 2 cups of bleach in 1 gallon of water] for 1 hour (Medhurst and Herbst 2003).

**Caution:** Bleach loses potency from age, contamination or extreme temperature. It is important to use "fresh bleach" for a solution or to make a stronger solution.

**7. Develop a HACCP plan for your resource management activities.** Developing and implementing a Hazard Analysis & Critical Control Point (HACCP) plan is a method to reduce the risk of spreading NZMS in the course of managing resources. Moving people, fish, gravel, gear, plants and other materials from infested systems can spread NZMS. A HACCP plan systematically analyzes the steps in your operations to identify points where organisms, such as the NZMS, can be controlled to prevent their spread.

**Caution:** A HACCP plan can only be effective if it is implemented. In addition to developing a HACCP plan it is necessary to educate staff about the procedures and require them to implement the identified controls. For more information about how your resource program can develop a HACCP plan visit <http://www.haccp-nrm.org> or contact David Bergendorf (USFWS) at david\_bergendorf@fws.gov, (209) 946-6400 x342.

## References

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