Wildlife Survey & Photo Service
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Report 2651
(Decontaminate)

February 15, 2008

To: Mr. Chris Lee
Solano County Water Agency

Purpose: Review of current procedures used to decontaminate wading boot and equipment:

Background:
Decontaminating wading and other angling gear used in waterways is a complex subject. It has become highly political by groups and individuals that apparently want credit for recommending certain products or income from those products. One California fly-fishing guide used his angling reputation to recommend obscure products such as Grapefruit Seed Extract (GSE) for killing New Zealand Mudsnails. Laboratory studies by the California Department Fish and Game showed that GSE has the effectiveness of plain water. Unfortunately, the unfounded recommendation to use GSE on wading boots was carried on the web sites of two popular angling-boot manufacturers.

The myriad of recommendations has further complicated the issue as anglers have become confused, disenchanted, and admit noncompliance with cleaning protocols. Misinterpretation of ecological facts about mudsnails is also spread by well-meaning angling groups. Even the landmark study by the CDFG which has become the standard for boot treatment is flawed. When Formula 409 was tested, the CDFG researcher assumed there was only one type of Formula 409. Unfortunately, at the time, Clorox produced eleven different formulations of the Formula 409 product line. The Formula 409 product tested was not readily available and continues to confuse anglers. During the CDFG field studies, the mudsnails were removed from treated boots and placed in plastic containers. The containers were taken to the CDFG facility and placed in an incubator. Unfortunately, the snails were not observed for 48 hours when they were all deemed dead. Follow up studies showed that many of the treated snails temporarily recover and move normally for up to one hour. Even though the snails were dead in 48 hours, questions remain if they were capable of discharging young during their recovery period.

Never-the-less, the DFG Boot Treatment Study remains the standard for boot treatment despite the documented protocol flaws. Recently the State of Colorado attempted to repeat the DFG Boot Study and determined the DFG recommendations were flawed. Colorado has since recommitted that boots be treated for a MINIMUM of ten minutes as opposed to the five minute treatment recommended by DFG.

As of this date, the recommended chemical treatments remain problematic as they are unreasonable. Recommendations include that anglers carry several gallons of Formula 409 in their vehicle that can be used to dip and soak angling boots and other equipment. The vast majority of anglers (or biologists) are not going to carry several gallons of Formula 409 or copper sulfate in the vehicle. In addition, the copper sulfate recommended by DFG is only readily available to the public as an agricultural product which must be mixed according to a certain formula.

Importance of Education
It's well documented that the primary vector for most aquatic nuisance species are wading boots and other angling and recreational equipment. Rapid geographic dispersal of some invasive species is primarily due to the fishing habits and movement by anglers and their

equipment. Education is crucial to preventing the introduction of invasive aquatic species and the inherent cost for control and management. Misunderstandings frequently result in noncompliance. For example, when Winter-time anglers fail to see mudsnails on the top of cobble in Putah Creek they tend to think the mudsnails are gone and underestimate the value of cleaning their boots. A quick look under most cobble in the popular angling areas will reveal that the snails are congregated on the underside. An aggressive educational program aimed at anglers is imperative to preventing the translocation of aquatic nuisance species.

Damage to Boots and Equipment:
Many of the recommended products and "treatments" damage boots and have the potential to pollute waterways. Even exposure to direct sunlight for several days destroyed two pairs of my felt-soled wading boots. All recommendations must consider products and treatments that:

1. Do not pollute
2. Are effective in removing mudsnails
3. Easy to store and use
4. Do not damage boots and equipment
5. Cost effective.

Decontamination Methodologies		
Treatment	**Usage**	**Problems**
Dedicated equipment	Highly Recommended	Possibly causes complacency and ineffective decontamination.
Sunlight	Recommended with caution	Can cause glue failure in some wading boots
Hot water	Not recommended for wading boots with glued soles. Option: Cabela's has boots that have glued and stitched soles.	Boot manufactures have demonstrated that hot water can cause failure of glued seams in wading boots.
Deep Freezing	Recommended as possibly the most effective control for NZMS.	Initial cost and space requirements.
Copper sulfate	Recommended by CDFG Study.	• Product not readily available • Must mix product • Not approved for boot treatment. • Disposal of used chemical

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Formula 409	Erroneously recommended by CDFG in boot study	Control lab studies have confirmed that NZMS treated with Formula 409 soaks recover at least temporarily. DO NOT assume that Formula 409 kills NZMS after 10 minute soak.
Clorox	Not recommended	Solution unstable / ineffective

Current Recommendations to Remove New Zealand Mudsnails

General Guidelines:

1. Treat all water as if it is infested. Juvenile New Zealand Mudsnails, Didymo (algae), and Dreissenid mussel larvae are microscopic. They are not visible to the naked eye.
2. Use rubber boots when safely allows. They are easier to clean and generally do not carry mudsnails or other organism like the lace-up boots popular with fly fishers.
3. Use dedicated lace-up boots and other equipment when possible. Clean as recommended below.
4. Use several pairs of boots and rotate through cleaning and drying cycle.

Decontaminating wading boots (in a perfect world):

a. Visually inspect boots and other equipment.
b. Remove all mud and plant material
c. Soak (if possible) or spray inside and outside of boots with copper sulfate as recommended by California Department of Fish & Game.
d. Increase soak or spray time to a minimum of ten minutes.
e. If near a body of water, rinse the boots completely. DO NOT allow the rinseate to reach any body of water.
f. **If possible:** After a minimum of ten minutes completely spray the inside and outside of the boots with a garden hose. If near a storm drain, DO NOT allow the rinseate to enter the drain.
g. Hang the boots upside down using boot hangers to allow all water to completely drain.
h. Allow boots to drain for 2 -3 days before reentering another body of water.
i. Examine boots for remaining material or damage that might impair safe wading

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Submitted 2/29/08 by Ken W. Davis, aquatic biologist