Effectiveness of disinfection methods for reducing the spread of invasive snails and zooplankton

Background

Aquatic ecosystems can experience significant negative effects from aquatic invasive species (AIS) and are continually threatened by new invasions. While studies have been conducted to determine best preventative practices for minimizing the spread of many AIS, data is currently lacking on small-bodied AIS such as non-native snails and zooplankton. This project studied the efficacy of various disinfection methods to determine the most effective way to disinfect equipment to prevent the spread of small invasive invertebrates.

Research Methods

- Trials were conducted on the efficacy of Virkon Aquatic (2%), bleach (500 ppm), Formula 409 cleaner, freezing, drying, and hot water on four invasive invertebrate species with limited verified occurrences in Wisconsin (Figure 1).
- Researchers examined both spraying and immersing equipment.
- Equipment tested includes synthetic line, nylon mesh, neoprene, canvas, rubber, and felt sole.

Figure 1. Four small aquatic invasive invertebrate species used in this study. These four species are all listed as prohibited under ch. NR 40.

Table 1. Summary of materials tested and efficacy of decontamination treatment on controlling target organism. (☑) indicates effective and (⊗) indicates not effective. Application technique indicated as (I) = Immersion and (S) = Sprayed. (*) indicates that presence of mud significantly reduced efficacy. (?) indicates that some SWF embryos survived within dead adults. Shaded boxes indicate combinations that were not tested in this study. Decontamination treatments labeled as 'effective' were those in which there was a 95% confidence that the range of survivorship results included complete kill (0% survivorship).

	New Zealand mud Snail			Faucet snail	Spiny water flea (adult)			Bloody-red shrimp			
Material	**Virkon**	**Bleach**	**Formula 409**	**Virkon**	**Virkon**	**Bleach**	**Freezing**	**Virkon**	**Bleach**	**Hot water**	**Drying**
Synthetic Line		⊗ S ☑ I		☑ I & S	☑ I & S	☑ I? & S?	☑ S				
Nylon Mesh		⊗ S ☑ I		⊗ S ☑ I	☑ I & S	☑ I? & S?	☑ S	☑ I & S	☑ I & S	☑ I	☑ I
Neoprene		⊗ S ☑ I			☑ I & S	☑ I? & S?	☑ S				
Canvas	☑ I & S*	⊗ I & S	☑ I & S	☑ I & S	☑ I & S	☑ I & S		☑ I & S	☑ I & S		
Rubber	☑ I & S*	⊗ S ☑ I	☑ I & S								
Felt Sole	☑ I* & S*		☑ I & S								

Future applications:

Results of this and other studies have informed the department's approach to decontaminating field equipment to prevent the spread of AIS during monitoring activities or other projects. These disinfection techniques can also be used by our partners and the public. Information on the department's current rules and best practices for decontamination and disinfection are available at: dnr.wi.gov/topic/Invasives/disinfection.html.

Related Publications and Resources

De Stasio BT, Acy CN, Frankel KE, Fritz GM, Lawhun SD. 2019. Tests of disinfection methods for invasive snails and zooplankton: effects of treatment methods and contaminated material. Lake and Reservoir Management 35:156–166.

Presentation by Bart De Stasio from the 2016 Wisconsin Lakes Partnership Convention, Stevens Point, WI.

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