

Publication

A tough egg to crack: recreational boats as vectors for invasive goby eggs and transdisciplinary management approaches

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Non-native invasive species are a major threat to biodiversity, especially in freshwater ecosystems. Freshwater ecosystems are naturally rather isolated from one another. Nonetheless, invasive species often spread rapidly across water sheds. This spread is to a large extent realized by human activities that provide vectors. For example, recreational boats can carry invasive species propagules as 'aquatic hitch-hikers' within and across water sheds. We used invasive gobies in Switzerland as a case study to test the plausibility that recreational boats can serve as vectors for invasive fish and that fish eggs can serve as propagules. We found that the peak season of boat movements across Switzerland and the goby spawning season overlap temporally. It is thus plausible that goby eggs attached to boats, anchors or gear may be transported across watersheds. In experimental trials we found that goby eggs show resistance to physical removal (90mN attachment strength of individual eggs) and stay attached if exposed to rapid water flow (2.8m s⁻¹ for 1h). When exposing the eggs to air, we found that hatching success remained high (>95%) even after eggs had been out of water for up to 24h. It is thus plausible that eggs survive during pick up, within water and overland transport by boats. We complemented the experimental plausibility tests with a survey on how decision makers from inside and outside academia rate the feasibility of managing recreational boats as vectors. We found consensus that an installation of a preventive boat vector management is considered an effective and urgent measure. This study advances our understanding of the potential of recreational boats to serve as vectors for invasive vertebrate species, and demonstrates that preventive management of recreational boats is considered feasible by relevant decision makers in- and outside academia.

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