



MINNESOTA AQUATIC INVASIVE
SPECIES RESEARCH CENTER

UNIVERSITY OF MINNESOTA

IT WORKS! VOLUNTEER SURVEILLANCE OF AIS USING eDNA

Assessing the accuracy of a volunteer monitoring approach for detecting aquatic invasive species using environmental DNA in water samples

BACKGROUND

Aquatic invasive species (AIS) can pose a serious threat to aquatic ecosystems, and their presence usually results in significant ecological and economic damage. Widespread monitoring and early detection of AIS can help assess the efficacy of ongoing prevention efforts and offers an opportunity for early intervention. Minnesota currently samples for aquatic invasive species opportunistically; however, in order to sufficiently monitor for AIS, widespread surveillance **techniques must be developed that are rapidly deployable, cost-effective, accurate, and feasible for non-researchers to use.**

Environmental DNA, or eDNA, is simply DNA left in an **environment** (in this case, lake water) by organisms that live there. eDNA is a powerful tool that can be used to indicate the presence and abundance of organisms. Diffusion of eDNA should allow for detection of AIS with small samples of water collected anywhere within the lake. This project studied the detectability of eDNA of **zebra mussel, common carp, spiny water flea, and rusty crayfish** using small amounts of water collected and filtered by volunteers. Insights gained from these species will enhance understanding of eDNA monitoring for other species in the future.



Photo courtesy of Sarah Strommen

HOW WAS THE RESEARCH CONDUCTED?

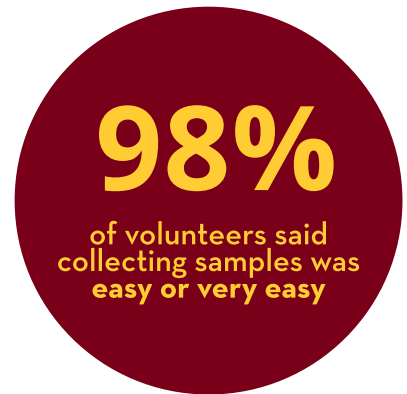
The research team recruited and trained volunteers from around Minnesota, provided sampling equipment, and facilitated volunteer collection of eDNA samples with the goal of volunteers independently collecting water samples and filtering for eDNA. Filters were mailed to the university and analyzed in the lab for the presence of four invasive species with known presence within each lake. Results were compared to eDNA sampling results conducted by University scientists to determine the detection rate of volunteer sampling.



Image from participant training video

RESULTS

The contamination rates in samples collected by volunteers was relatively low, and **the target species were detected** at most lakes where they were known to be present. Zebra mussels were most detectable using eDNA, and spiny water flea was least detectable in the study lakes. Volunteers enjoyed the monitoring process. Overall, **volunteer monitors were successful in completing the sampling with a level of accuracy comparable to that of University scientists.**



POST RESEARCH

Based on the results of this research, the team is assessing the feasibility of a **larger scale monitoring program** designed to use volunteer sampling to collect the eDNA samples. The remaining questions involve determining **how to fund statewide eDNA monitoring**, addressing the follow-up procedures for an eDNA detection such as discerning whether the zebra mussel DNA originates from a thriving population in the lake or from a deceased zebra mussel attached to a boat arriving from another lake, and deciding **which species to target in the eDNA search** (the methods employed have limitations in detecting only the species actively sought.).



Graduate students work in the lab

PROJECT TEAM

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- **Mike Verhoeven**, Research scientist, UMN
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