Students Engaging the Environment: A Student and Scientist Collaboration to Assess Aquatic Invasive Species
USDA NIFA Federal Capacity Fund Impact Report

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THE NEED: Invasive fish species pose a significant threat to aquaculture, fisheries, the sport fishing industry, water resources, and the environment. Invasive fish are potentially damaging to economically important aquatic ecosystems, interfering with aquatic food webs, community composition, and ecological balance. Invasive fish also contribute to the decline or loss of economically and environmentally important native fish species through predation, consumption of eggs and fry, competition for food and breeding grounds, and introduction and spread of pathogenic microbes, parasites, and viruses. Development of a successful invasive fish species management plan is fundamental to helping to ensure a robust aquaculture industry, healthy fresh water fisheries, and a thriving sport fishing industry. Successful control of invasive fish requires an effective and economical monitoring system for widespread early detection, to guide management so early infestations can be controlled and limited before they become established.

THE APPROACH: We have developed an efficient citizen science-based mechanism for widespread early detection and monitoring of invasive fish. Water samples collected by student citizen scientists across the state are analyzed for environmental DNA (eDNA) from several invasive fish species. We have created easily used collection kits containing everything needed for aquatic eDNA sampling. Using a simple online request system, teachers can reserve kits that provide site identification forms, detailed directions for eDNA sampling, and curriculum materials with background information about the ecological and economic problems associated with invasive fish and the importance of preventing their spread. eDNA samples are analyzed at Cornell University, and results are displayed on interactive Google maps on our website. A summary of the eDNA analysis and test results are returned to the classroom to facilitate learning and further discussion of invasive fish related issues.

IMPACTS: In this pilot program, 100 teachers and over 2,500 students at 87 schools have successfully used project kits to collect eDNA as part of an expandable collaborative model that allows economical statewide monitoring of invasive fish. Curriculum has been designed around kit use to increase student interest in and understanding of the impacts of invasive species on native biodiversity and ecosystem function. It also addresses the resultant impacts on economically important industries like aquaculture, freshwater fisheries, sport fishing, and tourism. Hands-on involvement in monitoring local waters highlights the need for prevention to limit the spread of invasive fish. As part of this new program, 253 sites across NY have been tested for eDNA to determine the presence of invasive round goby, four species of Asian carp, and sea lamprey. Preliminary tests for the presence of snakehead fish have also been successfully carried out. All data is displayed on interactive maps on the program website (see above example of the round goby map), providing a valuable resource that will aid in the development of a broad invasive fish management strategy.

WEB SITE: https://fishtracker.vet.cornell.edu/

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