

# Investigation Into Detection Dogs Finding Invasive Round Goby In Field Conditions

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## Introduction

The round goby (*Meogobius melanostomus*), a small, bottom-dwelling fish native to the Black and Caspian seas, has posed significant ecological challenges in New York State since the accidental introduction to the great lakes in the 1990s. This invasive species, characterized by its aggressive behavior and rapid reproduction, competes fiercely with native fish for food and habitat, often outcompeting them and disrupting local ecosystems. The round goby is particularly problematic because it preys on eggs and young of native fish species.<sup>1</sup> The challenge remains significant due to the fish's adaptability and interconnected waterways that facilitate its spread. Addressing this issue requires a coordinated approach involving local communities, researchers, and government agencies to protect New York's aquatic biodiversity. Conservation dogs have emerged as a highly effective tool in the fight against invasive species, offering numerous benefits in environmental protection efforts.<sup>2</sup> These specially trained dogs possess an extraordinary sense of smell, allowing them to detect even the faintest traces of invasive species, often more accurately and swiftly than human research teams or technological equipment. This heightened detection capability enables early intervention which is crucial in preventing the spread of the round goby and minimize their impact on native ecosystems.

## Purpose

The purpose of this research study is twofold. First, the primary focus is on the dog's ability to detect the round goby in water, which can present different dynamics compared to land due to factors like wind direction, water currents, and odor dispersion. Secondly, the assessment of the canine handler's ability to interpret their dog's behavior and the understanding on how environmental conditions influence odor patterns. The ultimate goal is to enhance the operational efficiency of the canines in the field, ensuring they can reliably perform their duties in an aquatic environment.

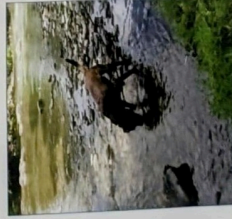


Photo 2 (right) Photograph of round goby



Round goby have bulging eyes and puffy cheeks, giving them a frog-like appearance. David Lutz, School of Environment and the Environment, University of Michigan

## Methods

This study was approved by the SUNY Cobleskill IACUC (Protocol #012024).

Two dogs were chosen for this study: one was a 3 year old Labrador Retriever named Arlo, and the second was a 4 year old German Shorthair Pointer named Cedar. The training sessions were broken into to 4 phases. Training samples (live round goby fish) and controls (live rainbow darter [*Etheostoma caeruleum*] and spotfin shiner [*Cyprinella spiloptera*]) were collected by the Fisheries & Wildlife Department and stored in isolated holding tanks at their facilities on the SUNY Cobleskill Campus. All Federal and State guidelines were followed when handling and storing invasive fish species.

The first 3 phases were to focus on odor recognition and odor discrimination. Phase 4 would be the actual deployment of the detection teams in the field. During the odor recognition stage, glass container drills were used to teach the dogs to associate the target odor with play or food rewards. To begin, each dog was led along several containers with ventilated plastic covers (Photo 3) Eventually containers were changed to plastic buckets (Photo 4) and then to larger troughs (Photo 5).



Photo 3 (above). Container drill with Arlo



Photo 4 (above). Container drill with Cedar

Photo 5 (left). Represents trough containers used to transition dogs from buckets used earlier in training. The picture also shows early construction of several of the containers connected to simulate a running stream. The containers will be fed by a pond with a shut off valve will be attached to regulate the flow of water. This allows for easy transition into actual streams. Added benefit of this construction will allow the use of actual goby fish in a controlled environment.

## Results

One of the goals of this study was to establish innovative techniques to reach main goal of going from a research setting to the field, where the dogs can be used to detect the round goby in their environment. The idea of establishing a simulated stream in (Photo 5) is an example of one of these techniques. Unlike other types of detection, placing "hides" was limited due to the nature of the sample. To utilize the actual odor of the round goby, Gebext tubes were impregnated with round goby odor and placed in a TADD® container.<sup>3,4</sup> The container was then placed in actual stream. Photo 6 shows student handler team searching for targeted "odor" using this technique. The results of this project showed that this method of imprinting showed promise, but further scientific research and usage in training sessions was needed. Simulating actual field stream conditions was also an important aspect of this study. Photo 7 shows a dog handler team searching for odor on raised platform to generalize dog to different surfaces while placing the goby fish in a non-accessible and non-visible location. The rainbow darter and spotfin shiner were placed in the search areas to ensure that the dog was discriminating to specific species of fish (round goby) as found in natural habitat.

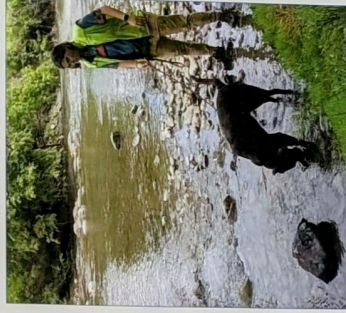


Photo 6 (left). Student-handler team searching for odor in natural stream.

Photo 7 (right). Student-handler team searching for non-visible, non-accessible odor on raised platform.

## Discussion

Both dogs were able to learn to alert to the target odor of round goby while ignoring non-target fish, both within containers and in initial field training scenarios. The goal of this work supports conservationists in developing a more targeted and strategic management plans, ultimately leading to more successful tracking of the spread of round goby. Utilizing detection dogs for detecting the round goby will have its limitations due to the depth of water. The deeper the water (over three feet) required the dogs to swim which shifted the focus from odor work to swimming. Wind and water currents will also have an impact on the search. Clearly defining these parameters with technically specific assessment devices will be utilized in future training.

## Acknowledgments

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## References

- <sup>1</sup>Department of Environmental Conservation - Round Goby (<https://dec.ny.gov/nature/animals-fish-plants/round-goby>)
- <sup>2</sup>McKeague, B., Finlay, C., & Rooney, N. (2024). Conservation detection dogs: A critical review of efficacy and methodology. *Ecology and Evolution*, 14, e10866. <https://doi.org/10.1002/ece3.10866>
- <sup>3</sup>Gebext Tubes - (<https://gebext.com/>)
- <sup>4</sup>TADDs - (<https://www.sei93.com/>)