

Tracking Invasive Central American Boas: Testing New Tools at Salt River Bay

[Salt River Bay National Historical Park and Ecological Preserve](#)

Salt River Bay National Historical Park and Ecological Preserve on St. Croix supports diverse native wildlife. But hidden among the island's forests lurks a growing threat: the invasive Central American boa (*Boa imperator*). These large snakes are not native to the U.S. Virgin Islands and likely first entered the ecosystem as released pets. Since then, they have spread across St. Croix and now pose a serious risk to native species.



A boa curled up in a tree.

USGS/Robert Reed

The endangered hawksbill sea turtle and St. Croix ground lizard, along with the protected least tern seabird, are just a few of the animals vulnerable to boa predation at Salt River Bay. These species already face many challenges, and the spread of boas could make their survival even harder. Removing invasive snakes becomes more difficult and costly once populations are established, so park staff wanted to test new ways to detect boas early.



Hawksbill sea turtles



St. Croix ground lizard



Least terns

NPS photos

Building a Toolkit

Salt River Bay partnered with the National Park Service [Inventory and Monitoring Program](#), the U.S. Department of Agriculture (USDA), and the U.S. Geological Survey to explore methods for boa detection. The Inventory and Monitoring Program helped lead the project, coordinating study design, compliance, logistics, and data management to support park decision-making.

Central American boas are quiet and well camouflaged, which makes them difficult to find across large areas. To improve detection, the research team tested two tools: detector dogs and environmental DNA analysis. Both approaches offer new ways to locate snakes in St. Croix's unique landscapes.

Canine Detectives

Snakes can be hard for humans to spot, but dogs have over 300 million scent receptors to sniff them out—about 50 times more than people! That super-sense gives them a powerful advantage when searching for these hidden predators.

At the [USDA-APHIS National Detector Dog Training Center](#), detector dogs learn to recognize the scent of specific targets. After two dogs were trained to locate boas, their handlers brought them to Salt River Bay to assist with surveys.



A handler carefully places a live boa into a secure tube used for training detector dogs (left). A detector dog hard at work (right).

Photo courtesy of Trevor Michaels, USDA (left), USDA/Pamela J. Boehland (right)

In June 2023, the detector dogs surveyed over 33 miles, facing challenges like intense heat and thick vegetation. No boas were detected in the park. However, the dogs consistently found caged boas placed by handlers along survey routes, demonstrating reliable detection when snakes were present.

The team learned that surveys may be more efficient during cooler months, when conditions are safer for fieldwork. They also recommended focusing future surveys on prime boa habitats, such as mangrove forests and wet low-lying areas.



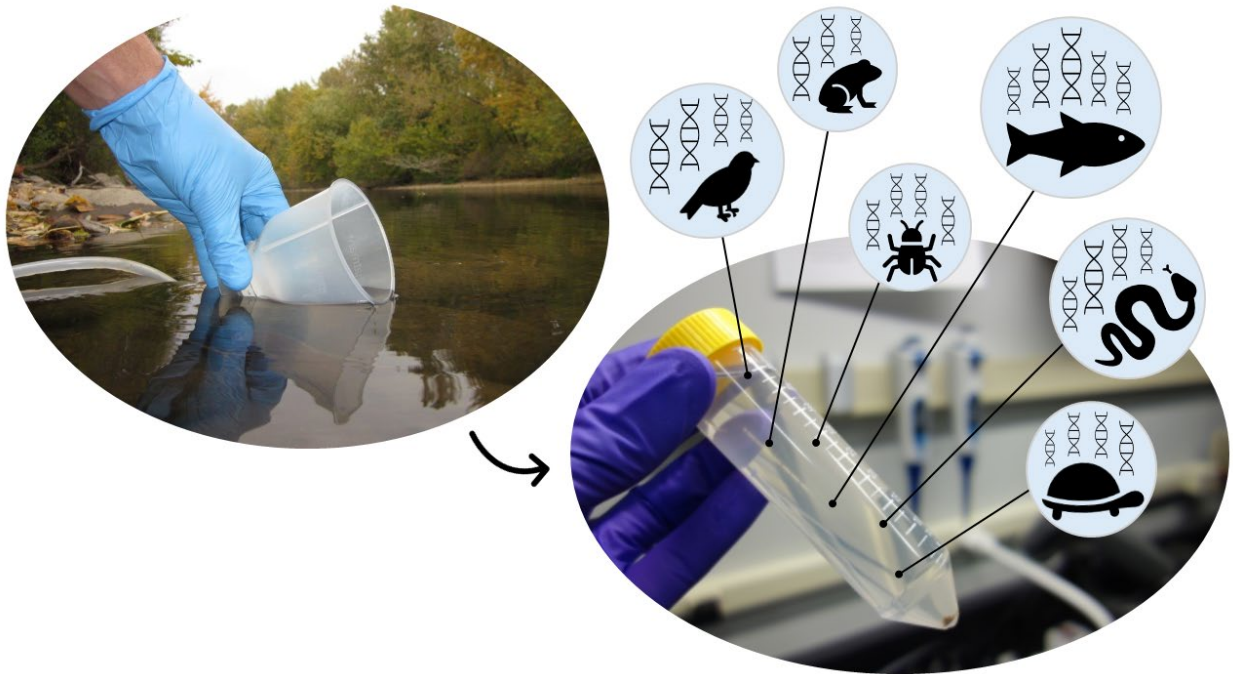
Detector dog Encore and his handler search carefully along a transect line (left). Survey transects included stretches of forest so dense they were nearly impassable, even with a machete (right).

Photos courtesy of Trevor Michaels, USDA

DNA Clues in the Bay

The research team also tested another approach: analyzing environmental DNA (eDNA). Animals shed tiny fragments of DNA—through skin cells, waste, or saliva—into their surroundings. By filtering water or soil samples and analyzing the DNA they contain, researchers can sometimes detect hard-to-find species like the Central American boa. Unlike detector dogs, which only locate snakes they encounter directly, eDNA can capture biological traces left behind in the environment after an animal has moved on.

However, detecting boas using eDNA analysis can be difficult. Boas shed little DNA, and warm tropical waters break it down quickly. Their time spent in trees may also limit the amount of DNA reaching water sources on the ground.



By filtering and analyzing DNA in water samples, scientists can detect the presence of species that might otherwise go unnoticed.

NPS graphic, USGS and USFWS photos

In July 2024, water samples from Salt River Bay and nearby forests revealed trace Central American boa DNA at 11 of 15 sites, but levels were too low for reliable detection. These weak signals suggest that boas may have been present, but this analysis alone could not confirm their presence. Low DNA levels encouraged researchers to explore ways to improve detection in future surveys. Filtering more water, sampling during wetter seasons, and testing soil or tree bark for DNA could help improve the chances of detecting boas if they are present.

Preparing for the Future

This project sowed the seeds for a reliable toolkit for the future. Both dog detection and eDNA analysis showed promise, and each method can be improved further. Together, these tools give park managers greater confidence in detecting and removing boas before they threaten Salt River Bay's vulnerable wildlife. Thanks to sharp noses, smart science, and strong partnerships, the park is better prepared to meet the challenge.

Want to learn more? Visit the final reports from this project:

- [Red-tailed Boa \(*Boa constrictor*\) Surveys at Salt River Bay National Park, St. Croix U.S. Virgin Islands](#)
 - *Note: After publication, the invasive boa targeted in this study at Salt River Bay was identified as the Central American boa (*Boa imperator*), not the red-tailed boa (*Boa constrictor*). These species are very closely related, and the Central American boa was long considered a subspecies of the red-tailed boa. Because of their similarity, their scent profiles are expected to overlap substantially, making it likely that the detector dogs used in this study would have located Central American boas if encountered during surveys.*
- [Environmental DNA Monitoring of Invasive Central American Boas in St. Croix at Salt River Bay National Historical Park and Ecological Preserve \(SARI\)](#)

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