



Red-tailed Boa (*Boa constrictor*) Surveys at Salt River Bay National Park, St. Croix U.S. Virgin Islands

2023 Report of Activities



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UNITED STATES DEPARTMENT OF AGRICULTURE (USDA)

Red-tailed boa (*Boa constrictor*) surveys at Salt River Bay National Park, St. Croix U.S. Virgin Islands: 2023 report of activities

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Abstract

St. Croix is home to a variety of threatened and endangered (T&E) species that are at risk for predation by the invasive red-tailed boa (*Boa constrictor*), such as the St. Croix ground lizard (*Ameiva polyps*), the ground-nesting least tern (*Sterna antillarum*), and the hawksbill sea turtle (*Eretmochelys imbricata*). Genetic analysis determined the original red-tailed boa population on St. Croix sourced from a single female released by a pet owner (Angeli et al. 2019) and its range expands every year. Presently, the main population of red-tailed boa is established on the west end of St. Croix and extends as far east as Salt River. One individual was found in Salt River Marina and additional sightings have occurred in Salt River Bay National Historical Park and Ecological Preserve (SARI) more recently. This inventory aims to search for red-tailed boas in two focal areas that park staff are actively restoring. The park will use information from this inventory to develop a boa removal program and protect sensitive native species like the ground-nesting least tern, the St. Croix ground lizard and the hawksbill sea turtle nests and increase the success of restoration.

Snakes are cryptic species, often occurring in low density, and utilize complex habitat patterns. To increase the likelihood of detecting red-tailed boa, the Maryland/Delaware/D.C. Wildlife Services detector dog handling team partnered with the USDA-APHIS National Detector Dog Training Center to train and develop detector dogs to assist in determining the presence/absence of red-tailed boa for this project. Canines were trained to locate red-tailed boa and indicate its presence to the handler via barking three times near the identified target.

Two dog detector teams traveled to Salt River Bay National Park (SARI) in St. Croix to conduct surveys for red-tailed boa in habitats likely to contain red-tailed boa in June 2023. Habitat varied throughout the surveys. Close to the bay, mangrove forests dominated and, as elevation increased, transects took place in almost exclusively dry tropical shrub forest. Each transect was surveyed by one dog team. The canine teams had no red-tailed boa detections within SARI.

Canines showed proficiency at surveying for red-tailed boa populations in SARI. Given the proximity of confirmed detections to SARI, it is likely red-tailed boa will be in the park in the future, if they are not already. Additional surveys, whether by humans, canines, or both, are recommended in areas of the park that have not been previously surveyed.

Acknowledgements

This project was made possible through the support from the National Park Service Inventory and Monitoring Division.

Background

The Chesapeake Bay Nutria Eradication Project (CBNEP; Maryland/Delaware/D.C. Wildlife Services, MD/DE/DC WS) was formed in 2002 to eradicate nutria from the Delmarva Peninsula (made up of Delaware and parts of Maryland and Virginia). As nutria removal decreased densities on Delmarva, MD WS developed a suite of monitoring techniques to increase detection of nutria, including the use of detector dogs. Detector dogs are those trained to find a target odor (such as nutria scat or red-tailed boa constrictor).

MD/DE/DC WS partnered with the USDA-APHIS National Detector Dog Training Center (NDDTC) to train and develop detector dogs to assist in determining the presence/absence of nutria (*Myocastor coypus*) and later feral swine (*Sus scrofa*), small whorled pogonia (*Isotria medeoloides*) and red-tailed boa (*Boa constrictor*). The NDDTC trains detector canines for various agencies including U.S. Customs and Border Protection and the U.S. Fish and Wildlife Service (USFWS) on targets ranging from agricultural products to contraband wildlife items. Dogs have 300 million olfactory receptors compared to humans 6 million, (Williams 2011) making them much more efficient at searching landscapes to find an odor target than when humans visually search comparable areas. In addition, they also tend to cover more ground than the handlers, effectively multiplying an already impressive search area.

All MD/DE/DC WS detector dog/handler teams are trained and certified by NDDTC. Canines are trained to locate red-tailed boa and indicate its presence to the handler via barking three times near the identified target (i.e., a bark response). Canines are not permitted to interact with wildlife or other animals. The NDDTC tests MD/DE/DC WS canine teams annually to ensure proficiency with both target detection and obedience. In addition, canine teams are evaluated every two weeks during routine training days throughout the year.

In the spring of 2022, Shane McKinley, then district supervisor of the USDA WS Caribbean district, contacted MD/DE/DC WS to help determine feasibility of detector dogs surveying for red-tailed boas (RTB). Live RTB were purchased in December of 2022 to begin introduction and training. Snakes were housed live on site in terrariums. Specimen tubes were built to hold the RTBs for training purposes (Figure 1). These tubes held both target odor and no odor (i.e., blanks). These tubes served to both protect and contain the snakes as well as limit interaction with the canines. Three tubes were made as blanks, which never contained a snake but were used during training exercises to ensure dogs did not key in on the tube itself. When placed in the environment, tubes were disguised with local vegetation so canines could not easily visually detect them. If the outside temperature was below 55°F, an air activated hand warmer was included in the tube for the snakes to maintain body temperature. Hand warmers were also included in the blank tubes to ensure canines did not key in on any scent associated with the warmers.

In the winter of 2023, canines were trained on RTB in multiple habitat types and validated on snakes by March 2023. A trip to Salt River Bay National Park (SARI) in St. Croix was tentatively scheduled for April 2023. Ultimately, logistics delayed this trip to June of 2023. The trip was scheduled for June 19th to June 30th, 2023. The 19th of June and 30th were travel days.



Figure 1. Trevor Michaels inserts a live red-tailed boa into a specially made tube for detector dog training.

Management Area

Surveys were conducted in Salt River Bay National Park located centrally on the northern end of St. Croix, USVI. The park is managed by the NPS. Transect locations were provided by the NPS. These locations were chosen based on habitat as well as RTB sightings. Although there have been no confirmed RTB in SARI, sightings had occurred within the previous 6 months of the visit. In addition, a confirmed RTB had been discovered as close as Salt River Marina (Angeli et al. 2019). One RTB was captured in a boat moored in Salt River Bay in January of 2023 (Fuentes Santos personal communication October 2023). Habitat varied throughout the surveys. Close to the bay, mangrove forests dominated. As elevation increased, transects took place in almost exclusively dry tropical shrub forest.

Methods

Two detector dog teams conducted surveys with one local USDA employee, Wilfre Fuentes Santos. June 19th was the scheduled travel day to St. Croix; however, flight delays resulted in the teams having to spend a night in Miami, FL before arriving in St. Croix on June 20th around noon. After meeting with local USDA personnel, the teams acclimated the canines to the island for the remainder of the day on Tuesday. On Wednesday, June 21st, surveys were started on the transects at the northern end of SARI. Although numbered, the transects were broken into different sections and were renumbered by USDA staff with a secondary letter to indicate segment section. For example, transect 22 was in four segments. These were labeled as 22A, 22B, 22C, and 22D. Transects were surveyed moving south through June 25th. June 26th was an off day to allow the dogs to rest. Surveys continued moving south from June 27th to June 29th. Teams traveled back to MD on June 30th, 2023.

Each transect was surveyed by one dog team (handler and canine; Figure 2). The handler stayed as true to the transect as possible. In some instances, such as where the transect intersected a body of water, the handler walked around the obstruction and continued to the same transect. Canines quartered the handler and transect by an average of 40 yds to either side of the transect. Wilfre joined a single team and rotated between the two teams. For example, some transects he walked with Carl Dunnock and canine Grand and some transects he walked with Trevor Michaels and canine Del. He attempted to split this 50/50. Each transect, with the exception of transect #14 (see results), was surveyed one time by a dog team. Transect 23C and 22 were surveyed by two dog teams since Del had a response nearby. Kristen Ewen and interns joined Trevor Michaels and canine Del. As time allowed, teams also conducted surveys for feral swine in tropical rainforest habitat on the western side of the island. These surveys occurred in the afternoon on June 21st and June 22nd.



Figure 2. Carl Dunnock and canine Encore working a transect in SARI.

As time allowed, teams also conducted surveys for feral swine in tropical rainforest habitat on the western side of the island. These surveys occurred in the afternoon on June 21st and June 22nd.

Results

MD WS canine teams had no RTB detections within SARI. Canines worked very well throughout all days of surveys. Frozen snakes were saved for use by USDA staff as target for canines while on the island. This target was deployed periodically during the surveys. The dogs did excellent responding to placed target during surveys. This target also kept the dogs engaged.

During feral swine surveys on the western side of the island, Encore and Del both indicated on a location near the Creque dam. Handlers were not able to confirm a snake present. The following day canine Encore indicated on an old, dilapidated building while conducting surveys in the same area. Within 20 yds of the building canine Del showed change and a RTB was spotted about 25 feet up a tree (Figure 3). Later, on the same survey, canine Del responded on a RTB that was spotted by Wilfre Fuentes Santos. Canine Del had a strong response near transect 23 C when working between that transect and transect 22. No snake was found. Trevor Michaels and canine Del returned the following day and Del responded again in the same location. It may have been residual odor or a snake underground or in a tree. Trevor, Carl, and Wilfre all searched for a RTB but could not locate one.



Figure 3. Red-tailed boa coiled in a tree discovered during a survey outside SARI. Snake was captured after photo.

Due to the heat and humidity, canines had to be rested between each transect segment. For longer segments and as the heat got worse during midday, canines were rested for longer periods. This usually consisted of putting both canines in the vehicle with the AC on and running for 30-45 minutes. Water was carried for the dogs on transects and cooling jackets were used. One transect (#14) could not be completed due to a ground nesting Africanized beehive. Both handler teams, canines and local USDA employee attempted to survey the transect but all individuals, including dogs, were stung multiple times up to 100 meters from the hive.

Tracks were recorded for both handlers and canines (Figure 4, Figure 5, Figure 6, and Figure 7). Canine tracks are recorded with a Garmin collar and handheld unit. Handler's tracks are recorded using FieldMaps app. Unfortunately, one Garmin was lost mid survey in the dense forest and was not able to be recovered. This was canine Encore's Garmin. Since it records the tracks to the unit, the first two days of canine Encore's tracks are missing. Handlers had a backup Garmin to use the remainder of the trip. Canines and Handlers surveyed a total of 52.23 miles with the canines covering a combined 32.63 (not including Encore's first two days) miles (Table 1). Handlers totaled 19.6 miles of surveys (Table 2). These numbers do not include survey miles conducted by Wilfre Fuentes Santos.

Table 1. Summary of effort from 21 June to 29 June 2023 for MD/DE/DC WS canines conducting detector dog (with canine) surveys.

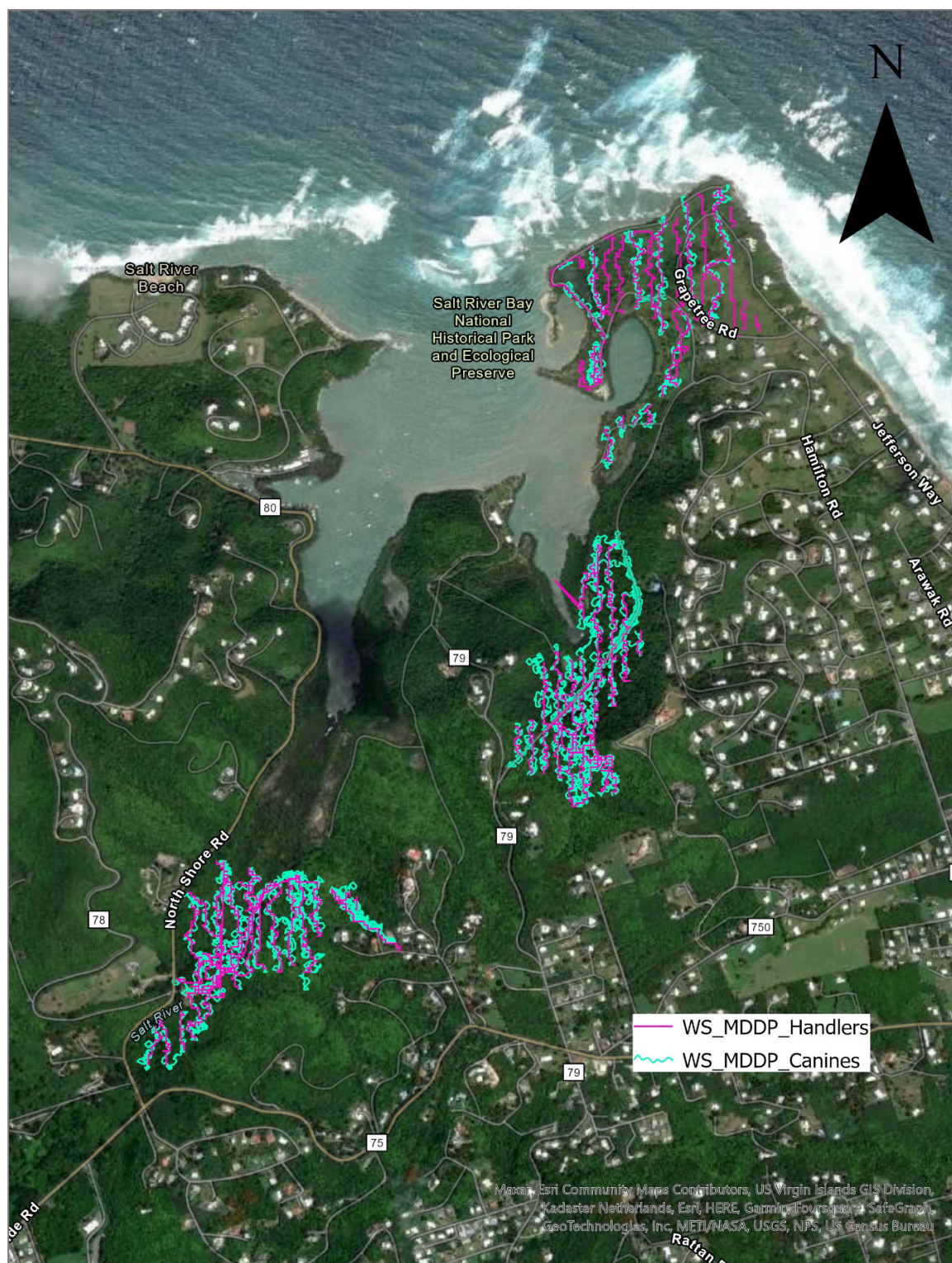
Canines	Number of Surveys	Detector Dog Survey Miles	Total Mileage
Del	43	22.62	–
Encore*	16	10.02	32.63

*Missing first two days

Table 2. Summary of effort from 21 June to 29 June 2023 for MD/DE/DC WS canine handlers conducting detector dog surveys.

Handler	Number of surveys	Survey Miles	Total mileage
Trevor Michaels	41	13.4	–
Carl Dunnock	25	6.62	19.6

On 28 June, Kristen Ewen (NPS) and summer interns joined Trevor Michaels and canine Del for a transect and target demonstration.



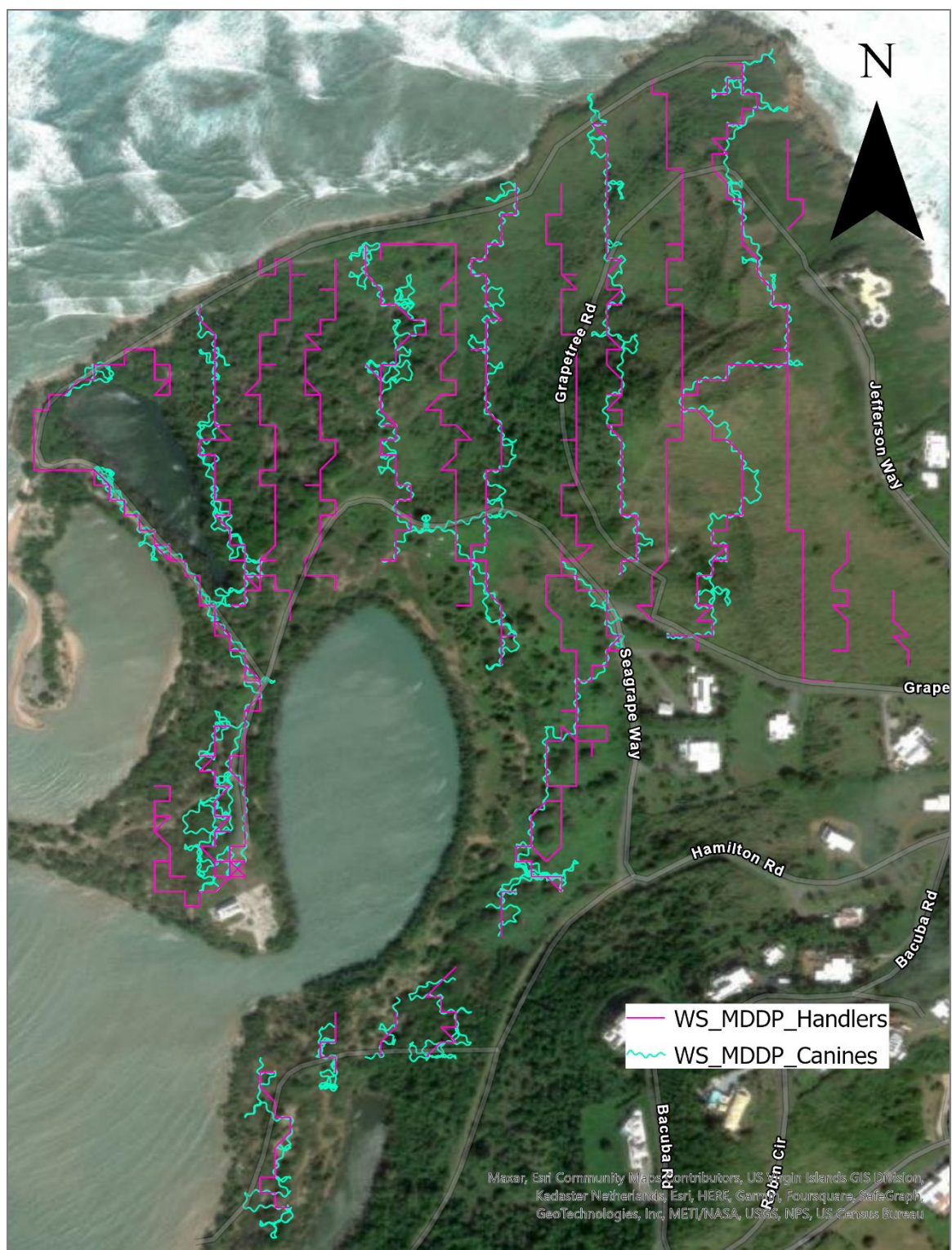


Figure 5. Detector dog surveys conducted on northern section of SARI (Canine Encore's tracks missing on map).

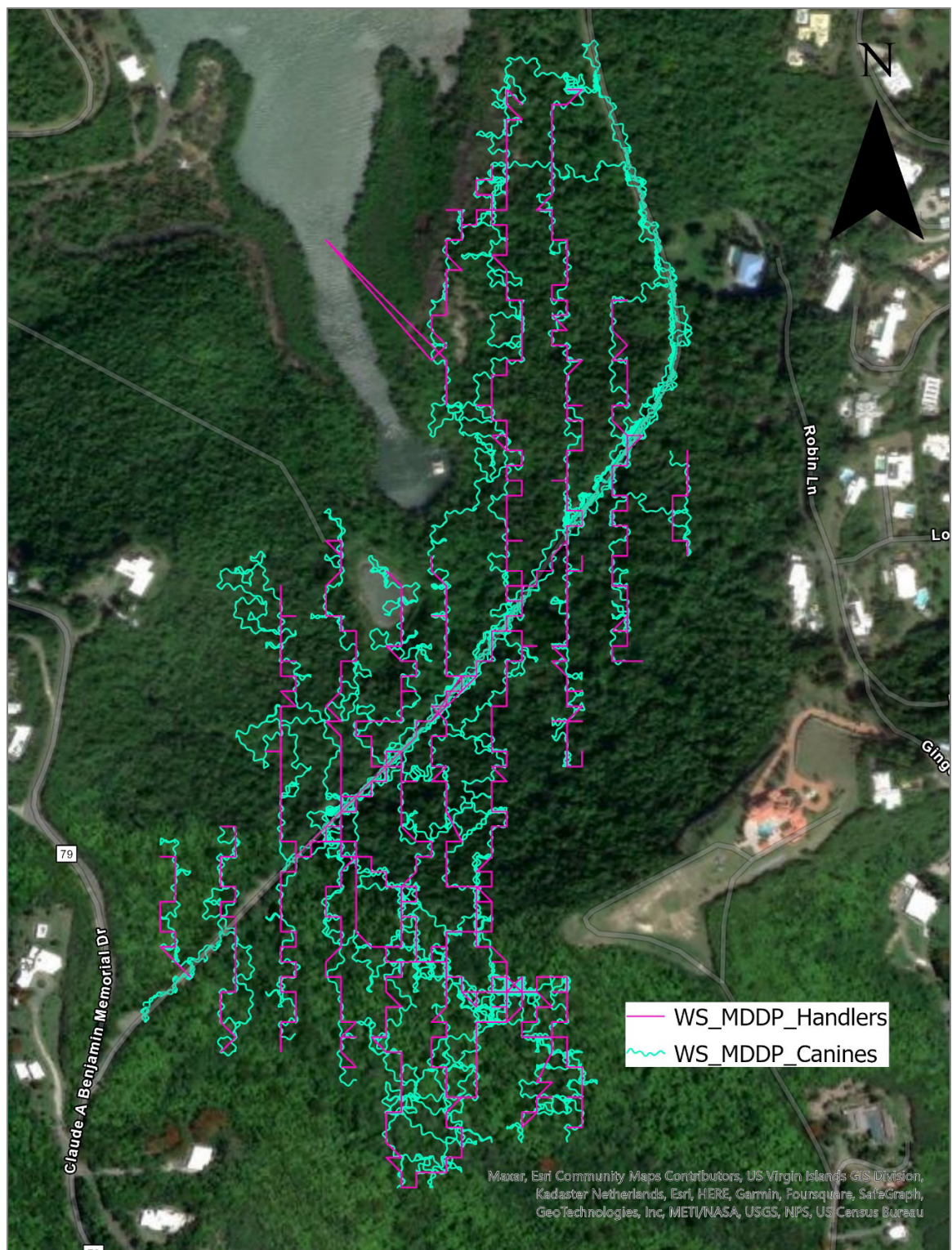


Figure 6. Detector dog surveys conducted on central section of SARI.

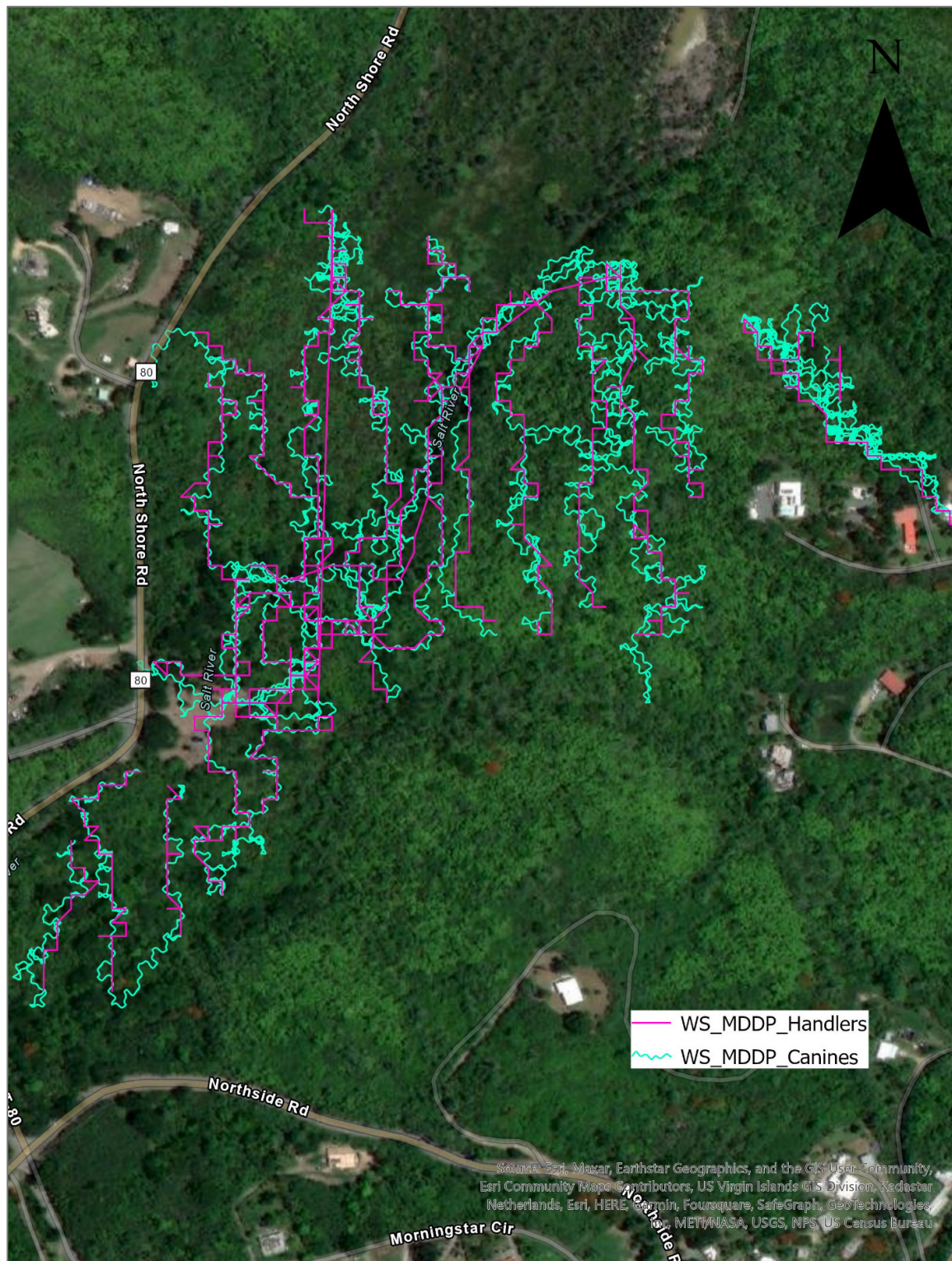


Figure 7. Detector dog surveys conducted on southern section of SARI.

Recommendations

As funding and time permits, future surveys for potential RTB populations should be conducted in areas of potential suitable habitat within CMP. Detector dogs are a valuable tool in conducting these surveys and finding cryptic individuals of this species. The heat and humidity slowed down surveys for both handlers and canines. One handler got heat stroke on June 27th and could not work the final two days. Given the heat index, future surveys may be best suited to the winter months when it is slightly cooler and less humid. With shorter break periods, more could be accomplished in less time.

In addition, focusing on prime RTB habitat such as mangrove forests and wetter bottoms, like the salt river basin on the southern end of SARI, may be a good use of survey time in the future. Some of the transects were through very dry forest habitat and areas that were so impenetrable it took up to 30 minutes to move 20 yards (Figure 8 and Figure 9). Although snakes could have been in these impenetrable areas, more coverage could have been accomplished working through the periphery; therefore, potentially increasing detections.



Figure 8. Some transects had sections that were nearly impenetrable even with a machete.



Figure 9. Additional section that took 30 minutes to travel 20 yards along transect.

Conclusions

The MDDP is grateful for the opportunity to work with NPS and USDA WS AL/PR/VI. Canines showed proficiency at surveying for RTB populations in SARI. Endurance was good but many breaks were needed to keep the dogs at full effort. Given the proximity of confirmed detections to SARI, it is likely RTB will be in the park in the future, if they are not already. Additional surveys, whether by humans, canines, or both, are recommended in areas of the park that have not been previously surveyed. Future surveys may want to focus on areas of prime snake habitat rather than simply transects. Additional questions should be directed to District Supervisor, Trevor Michaels at 443-205-2726 or trevor.a.michaels@usda.gov.

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