



Future-proofing endangered species conservation in Anguilla

Host country: Anguilla

Dates of internship: 1 October 2020 – 31 March 2021

Sponsoring institution: Anguilla National Trust

Overall aim: To implement on-the-ground conservation actions based on evidence-based and stakeholder-informed endangered species conservation action plans.

Full name of intern: Marlene Horsford

Full name of Supervisor(s) and their affiliation: Farah Mukhida, Anguilla National Trust; Dr. Jenny Daltry, Fauna & Flora International

Permanent contact address, email and website of the intern: Ashley Brooks St., Rock Farm, The Valley, AI2640, Anguilla; marlene_horsford@hotmail.com

Section 1:

Executive Summary (max 200 words)

From October 2020 through March 2021, I was a Fauna & Flora International Conservation Leadership Programme intern, placed with the Anguilla National Trust (Anguilla, British West Indies). The internship was based on a Darwin Plus-funded project that focused on safeguarding some of Anguilla's most at-risk species and habitats, including Endangered Anguilla Bank racer *Alsophis rijgersmaei*, Critically Endangered Lesser Antillean iguana *Iguana delicatissima*, Critically Endangered Hawksbill sea turtle *Eretmochelys imbricata*, Critically Endangered Anguilla bush *Rondeletia anguillensis*, and Endangered lignum vitae *Guaicum officinale*.

The main aim of the internship was to implement on-the-ground conservation actions based on evidence-based and stakeholder-informed endangered species conservation action plans. The internship objectives were to assist with the implementation and monitoring of priority conservation interventions for Anguilla's terrestrial endangered species, guided by climate change-informed action plans and to assist with the raising of national awareness about Anguilla's terrestrial endangered species.

As part of this internship, Critically Endangered Lesser Antillean iguanas *Iguana delicatissima* were translocated to the Prickly Pear East offshore cay (increasing the translocated population by 50%), Endangered Anguilla Bank racers *Alsophis rijgersmaei* were translocated from at risk areas to protected habitat, the range of Endangered lignum vitae was expanded across the Anguilla mainland, sea turtle nests were excavated and struggling Critically Endangered hawksbill sea turtle *Eretmochelys imbricata* hatchlings were released safely to sea, offshore cays were monitored for the presence of rats and invasive common green iguana *Iguana iguana*, and almost 1300 individuals were directly engaged through outreach activities. In addition to this work, coastal and wetland habitat was reinforced through the planting of mangrove, buttonwood, and seagrape seedlings.

This internship has directly supported work that has increased the resiliency of Anguilla's endangered species and vulnerable habitats to climate change.

Introduction (max 250 words)

Studies show that up to 43% of +-species from across the world could disappear due climate change, with Caribbean islands facing some of the highest species extinction rates.¹ Anguilla, located at the top of the Lesser Antilles island chain, is also at risk.

¹ Malcolm, J.R., Liu, C., Neilson, R.P., Hansen, L., & Hannah, L. (2006). Global warming and extinctions of endemic species from biodiversity hotspots. *Conservation Biology*, 20, 538–548.

Biodiversity-rich but also low-lying, Anguilla is exceptionally vulnerable. Many climate change models predict that Anguilla (and much of the Caribbean) will be affected by more frequent and stronger hurricanes, an extended hurricane season, increased temperatures, and rising sea levels. Impacts of climate change may include species extinctions and even ecosystem collapse. Immediate action to build resilience to climate change amongst species populations is absolutely critical.

This internship, supported by Fauna & Flora International's Conservation Leadership Programme, Fondation Segré, and Darwin Plus focuses on safeguarding some of Anguilla's most at-risk species and habitats, including Endangered Anguilla Bank racer *Alsophis rijgersmaei*, Critically Endangered Lesser Antillean iguana *Iguana delicatissima*, Critically Endangered Hawksbill sea turtle *Eretmochelys imbricata*, Critically Endangered Anguilla bush *Rondeletia anguillensis*, and Endangered lignum vitae *Guaiacum officinale* as well as with beach/sand dune and wetland habitats. More specifically, this project involved implementing conservation actions, as identified within stakeholder-informed species and habitat conservation action plans, that specifically focussed on increasing species and habitat resiliency to climate change on the Anguilla mainland and Prickly Pear offshore cays.

This work has been conducted in partnership with Fauna & Flora International, Durrell Wildlife Conservation Trust, Royal Society for the Protection of Birds, and the Departments of Disaster Management and Natural Resources (Government of Anguilla).

Section 2:

Aim and objectives (max 100 words)

The main aim of the internship was to implement on-the-ground conservation actions based on evidence-based and stakeholder-informed endangered species conservation action plans.

Internship objectives included: assisting with the implementation and monitoring of priority conservation interventions for Anguilla's terrestrial endangered species, guided by climate change-informed action plans; and assisting with the raising of national awareness about Anguilla's terrestrial endangered species.

Activities and Methodology (max 500 words)

Objective 1. Assisting with the implementation and monitoring of priority conservation interventions for Anguilla's terrestrial endangered species, guided by climate change-informed action plans

Over the last six months, major project activities related to the implementation and monitoring of endangered species priority conservation interventions included:



1. *Implementation of biosecurity surveillance and rapid response protocols to prevent further incursions by harmful alien species on Dog Island and Prickly Pear cays*

Between October 2020 through March 2021, Prickly Pear East and West were visited six times to conduct biosecurity monitoring. Brown rats *Rattus norvegicus* were eradicated from the offshore cays in 2018 and, since their removal, the Anguilla National Trust conducts site visits to the islands to ensure that rats (or other invasive species including the common green iguana *Iguana iguana*) have not (re)invaded.

As part of the biosecurity monitoring protocol, 54 bait stations have been placed along the perimeter of Prickly Pear East while 57 have been placed around the perimeter of Prickly Pear West. Each bait station contains 60g of bait containing brodifacoum. The bait is checked at each station for signs of rodent bites/markings. Bait uptake is recorded, both in terms of amount taken and what has taken the bait (rat, mouse, crab, cricket, ant, etc.). Between stations, signs of rodent presence are also monitored (tracks, droppings). Data is inputted into a central database upon return to the mainland.

Fortunately, both Prickly Pear East and West have remained rodent-free since the initial 2018 eradication effort.

Due to poor sea conditions and dangerous landing conditions, no biosecurity monitoring was conducted on Dog Island between October 2020 and March 2021. The ANT hopes to return to the island at the of April when sea conditions are expected to improve.

In 2016, the Anguilla National Trust reintroduced the Critically Endangered Lesser Antillean iguana to Prickly Pear East (which is free of the invasive common green iguana). Signs of Lesser Antillean iguana (individuals, tracks, droppings) were also monitored and recorded. Two juvenile and one adult iguana were observed during the internship period. In addition, eleven Lesser Antillean iguanas (one from the Anguilla mainland and ten from Dominica) were reintroduced to Prickly Pear East. ANT will continue to monitor the island/animals for survival and reproduction). All observations are recorded and inputted into a central database.

2. *Translocation of lignum vitae and Anguilla bush seeds and seedlings from high density sites and/or sites at risk of development to suitable habitats in low-risk areas, including offshore cays*

Over the last six months, we have sprouted and potted over 300 Endangered lignum vitae seeds collected from the Anguilla mainland and Prickly Pear cays as well as from St. Barthelemy. As a slow-growing plant, most are still too small for planting in the wild/backyards. We expect the plants to be ready for transplanting within by the end of August/September 2021.

Over 100 Critically Endangered *Anguilla* bush seeds were collected from the wild. We are currently researching best practice for sprouting these seeds and are working with a local gardener to trial different methods as previous trials have proven unsuccessful.

Objective 2. Assisting with the raising of national awareness about *Anguilla*'s terrestrial endangered species

Raising public awareness about *Anguilla*'s terrestrial endangered species has been an important aspect of internship work. Over the last six months, we have reached over NUMBER individuals through endangered species "pop-ups" at 14 schools and public buildings and meeting spaces. Pop-ups were opportunistic and were organised and conducted whenever the ANT were in possession of an endangered species that was rescued and needed to be released. Focal species included the Endangered *Anguilla* Bank racer, Critically Endangered hawksbill sea turtle hatchlings, *lignum vitae*, and *Anguilla* bush.

An Endangered Species Festival was held on Saturday 28 November 2020. The Festival included a morning hike through *Anguilla* Bank racer, Lesser Antillean iguana, and *lignum vitae* habitat followed by an afternoon of information sessions, arts and craft activities, *lignum vitae* seedling potting (for later planting at home), and games.

With a primary focus on experiential learning, public awareness activities have also included providing opportunities to explore endangered species habitat to children enrolled in the ANT's two after school programmes, Young Explorers and Outdoor Adventure Camp, and to adults and families through the ANT end-of-the-month public hikes, the focus of which in 2021 is endangered and rare species. January's hike focused on the *Anguilla* bush, February's on *Mamillaria novosa* cacti, and March's on the *Anguilla* Bank skink *Spondylurus powelli*.

A logo for the ANT's Wildlife Friendly Certified initiative was also developed. Wildlife Friendly Certified is initially focusing on hotels and villas that are taking steps to protect endangered and/or endemic species that can be found on or around their properties and to reduce their environmental impact footprint. At the moment, one hotel has been certified and a second a hotel is in the process of becoming certified.

Other activities

Other activities that were conducted primarily focused on building coastal habitat resilience to climate change through the planting of coastal and wetland vegetation (red mangrove *Rhizophora mangle*, black mangrove *Avicennia germinans*, white mangrove *Laguncularia racemosa*, buttonwood *Conocarpus erectus*, and seagrape *Coccoloba uvifera* seedlings) across six different locations (Cove Bay and Pond, Forest Bay and Pond, Long Salt Pond and Bay, East End Pond Conservation Area, Road Salt Pond, Meads Bay Pond). GPS points of all seedlings

planted were taken and survival was monitored and recorded. Maps of all plantings have been generated for each site using ArcView.

Outputs and results (max 250 words)

Objective 1. Assisting with the implementation and monitoring of priority conservation interventions for Anguilla's terrestrial endangered species, guided by climate change-informed action plans

Key outputs:

- 6 biosecurity monitoring activities to Prickly Pear cays conducted, with no rats (or other invasive animals) observed
- 11 Lesser Antillean iguanas released onto Prickly Pear East
- 150 lignum vitae seed sprouted and potted
- 1 hawksbill sea turtle nest and 1 green sea turtle nest excavated with 41 hatchlings released to the sea
- 3 Anguilla Bank racer snakes rescued and relocated to safe, forested habitat

Objective 2. Assisting with the raising of national awareness about Anguilla's terrestrial endangered species

- 1299 individuals engaged through outreach activities

Other

- 528 red mangrove *Rhizophora mangle*, 122 black mangrove *Avicennia germinans*, 97 white mangrove *Laguncularia racemosa*, 87 buttonwood *Conocarpus erectus*, and 59 seagrape *Coccoloba uvifera* seedlings planted across six locations (including three beaches and six wetlands).

Key ecological output: Three priority interventions as outlined within the climate change-informed action plans have been implemented with monitoring, on-going. Implementation of priority interventions has directly increased the resiliency of at least two endangered species (Lesser Antillean iguana and lignum vitae) by increasing population numbers and genetic diversity. We have also taken steps to increase the resiliency of coastal and wetland habitats through the application of nature-based solutions (reforestation) which will help protect shorelines, habitat, communities, and infrastructure from erosion, storm surge, and flooding.

Key social sciences output: By implementing actions that raise public awareness, we believe that there has been increased support for endangered species conservation. The Anguilla National Trust often receives phone calls about common green iguana sightings, have been asked to remove Anguilla Bank racers from private property (where before property owners would have

killed the snakes), and there have been many requests for lignum vitae seedlings for people to plant on their properties.

Achievements and impacts (max 500 words)

This internship supported on-going work of the Anguilla National Trust. More specifically, it involved implementing evidence-based conservation actions that would contribute to the safeguarding of Anguilla's most endangered terrestrial fauna and flora and vulnerable coastal and wetland habitats.

Tangible internship results and short-term impacts have included:

1. Increased genetic diversity of the Lesser Antillean iguana population on Prickly Pear East through the translocation of additional individuals;
2. Increased protection of Anguilla Bank racers through the translocation of individuals from sites where they were at risk to more an area where they are better protected;
3. Range expansion of the lignum vitae on the Anguilla mainland through the planting of over 100 seedlings in backyard gardens;
4. The formal protection of the Anguilla Bank racer, the Anguilla Bank skink, the Critically Endangered Sombrero ground lizard *Pholidoscelis corvinus*, and the Little Scrub ground lizard *Pholidoscelis corax* through the listing of these species on Schedule 1 of the Biodiversity and Heritage Conservation Act (which lists species of concern and that are now formally protected);
5. Continued protection of biodiversity on the Prickly Pear cays and Dog Island through biosecurity monitoring and the prevention of invasive species (re)invasion;
6. Restoration of coastal and wetland habitats through the planting of mangrove, buttonwood, and seagrape seedlings.

Long-term impacts of the work conducted through this internship include increased resiliency to climate change of some of Anguilla's most at-risk terrestrial species and habitats. With the successful translocation of additional Lesser Antillean iguanas to Prickly Pear East, we have increased their genetic diversity, lowered the risk of genetic drift and inbreeding, and have increased the genetic pool which should, in turn, allow for increased ability to adapt to a changing climate. The success of the translocation will be used to inform other translocation/reintroductions which the Anguilla National Trust hopes to engage in, including to a mainland island (an area surrounded by a predator exclusion fence where at risk species can be protected) and hopefully to other offshore cays. Restoring compromised and/or degraded coastal and wetland habitat through the planting of hundreds of seedlings will make these sites more resilient: when the seedlings mature over the next few years, they will provide important protection to more inland areas, acting as barriers to storm surges, minimising the impacts of flooding and erosion. As a nature-based approach to coastal protection, they should also serve



as a clear, visual reminder of the importance of keeping vegetation intact as well as the value of setting back buildings behind the vegetation line. The ultimate long-term impact (and goal) is a more resilient Anguilla where the value of biodiversity is understood, appreciated, and integrated into decision making (at both the personal and political levels).

This internship has helped to advance my career by providing me with an opportunity to be engaged in on-the-ground conservation action both in terms of practical species conservation interventions but also in terms of directly interacting with stakeholders who have a direct impact on the long-term survival of Anguilla's at-risk species. With most of the land being privately owned in Anguilla, the importance of working with stakeholders in species and habitat conservation is critical: we need to build relationships for conservation to work. I have been able to develop practical conservation management, stakeholder engagement, and communication skills. The training and networking opportunities provided through the Conservation Leadership Programme have also allowed me to make connections with others across the world who are committed to and passionate about the environment.

External influences and changes to internship (max 200 words)

Initially, this internship would have involved the translocation of the Little Scrub ground lizard to the privately-owned Prickly Pear West and the eradication of mice from Sombrero Island.

Unfortunately, while most Prickly Pear West landowners were in favour of the translocation, a few were not due to concerns that they may not be able to develop the island in the future because of the presence of an endangered species. These concerns prevented the translocation from happening during the internship period. The Anguilla National Trust will re-engage landowners in discussions about the value of the translocation and to properly address their concerns with the hope that they may change their minds.

Due to COVID-19, the Sombrero Island mouse eradication which was scheduled to take place last summer (May through July 2020) and which would have coincided with the initial dates of my internship has been postponed to end of May through end of July 2021.

Section 3:

Conclusion (max 250 words)

Through this internship I was able to be engaged and assist with the implementation of on-the-ground conservation management interventions that have increased the resiliency of Anguilla's endangered species and vulnerable habitats. While the work that I have been involved with has been project-based, with funding secured to the end of March 2022, much of this work needs to be on-going: monitoring to ensure long-term survival of individuals (including planted seedlings) and to prevent (re)invasion of invasive species, as was conducted throughout the internship period, will continue post-internship and post-project, as will additional translocations and habitat restoration work. Environmental education is also a key work programme of the Anguilla National Trust. Pop-ups, school and public presentations, afterschool programmes and summer camps, and the annual Endangered Species Festival are on-going activities.

This internship reinforced my interest in environmental conservation. I have decided to apply for a Masters programme in natural resources management or environmental technology hopefully starting in September 2022. In the meantime, I will continue to volunteer with the Anguilla National Trust, assisting them in the work with endangered species and coastal and wetland habitats as well as with the Sombrero Island mouse eradication initiative this coming May. The Anguilla National Trust has also applied for additional project funding from the UK-based funding mechanism Darwin Plus, to support projects related to marine parks management, shark conservation, and pollinators. If successful, I will work with them on these projects as an employee.

Acknowledgements

I would like to acknowledge my internship supervisors, Executive Director of the Anguilla National Trust Farah Mukhida and Dr. Jenny Daltry (Fauna & Flora International) for their encouragement and mentoring throughout the internship. I would also like to thank Project Manager Dr. Louise Soanes and the staff of the Anguilla National Trust for being so welcoming and for helping me to develop my environmental conservation knowledge and skills.

I would also like to thank the Conservation Leadership Programme Executive Manager Stuart Paterson and Program Officer Henry Rees for giving me this opportunity to participate in this internship as well as for their support.

Section 4:

Appendices

Appendix 1. Coastal and wetland vegetation replanting maps



Figure 1A. Map of wetland vegetation replanting Forest Pond, Anguilla.

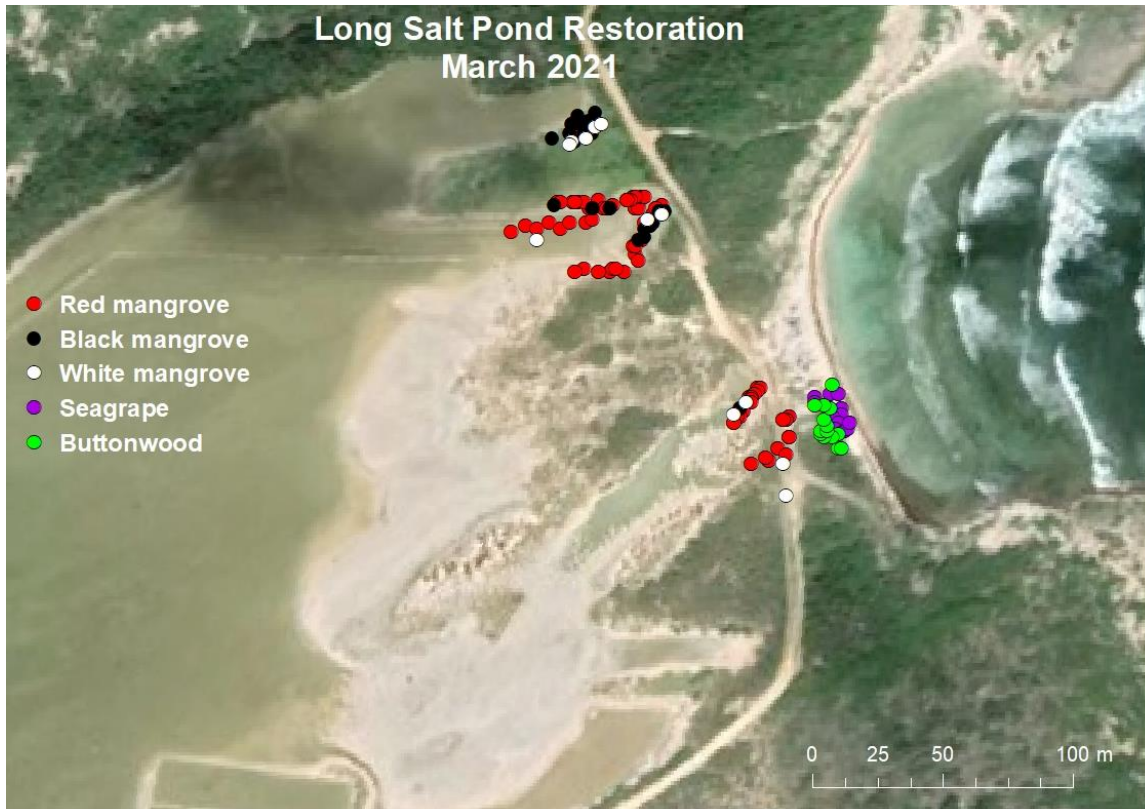


Figure 1B. Map of coastal and wetland vegetation replanting at Long Salt Pond and Long Salt Pond Bay, Anguilla.



Figure 1C. Map of wetland vegetation replanting at Meads Bay Pond, Anguilla.

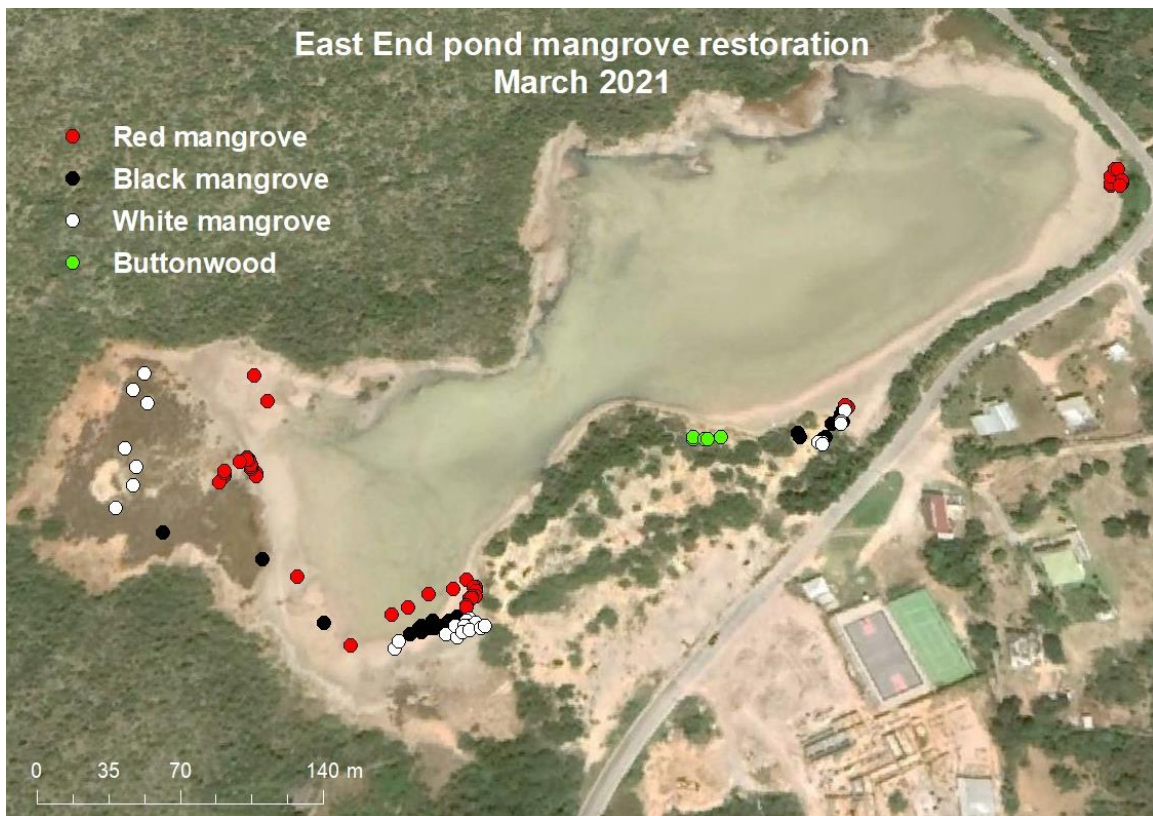


Figure 1D. Map of wetland vegetation replanting at East End Pond Conservation Area, Anguilla.



Figure 1E. Map of wetland vegetation replanting at Road Salt Pond, Anguilla.

Appendix 2. Anguilla Bank racer relocations

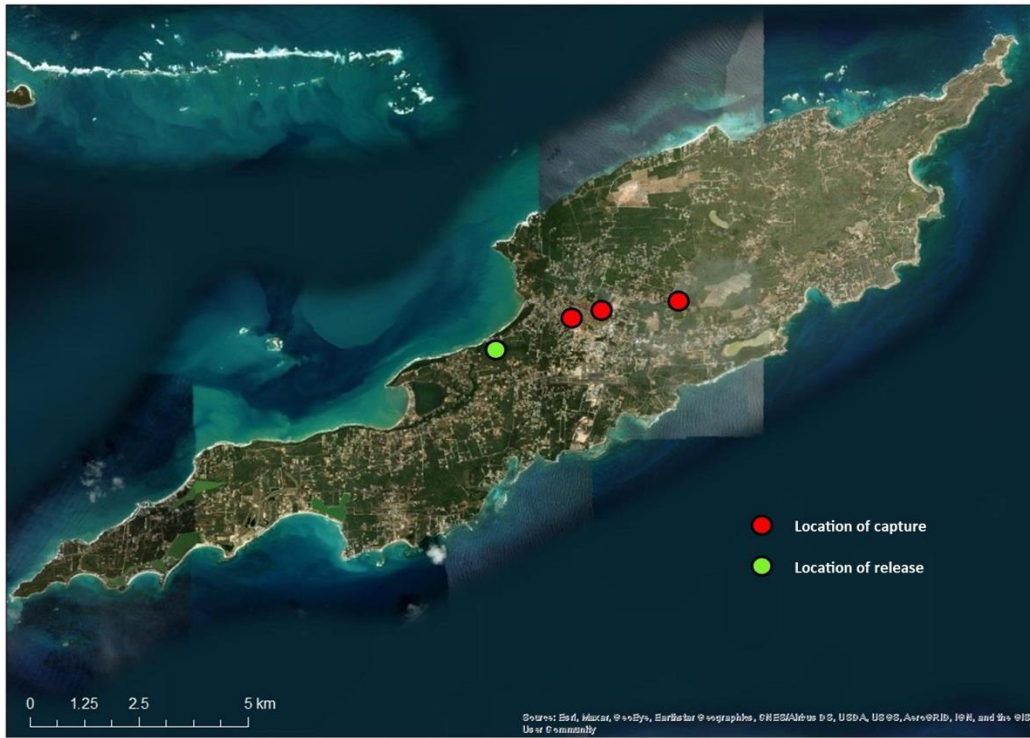


Figure 2A. Map of Anguilla Bank racer capture and release on mainland Anguilla.

Appendix 3. Lesser Antillean iguana translocation



Figure 3A. Map of Lesser Antillean iguana capture and translocation to Prickly Pear East, Anguilla.

Appendix 4. Newspaper and magazine articles

- [Celebrate Anguilla's endangered species with the National Trust](#) (30 November 2020)
- [Anguilla's endangered species recognised and protected by the Government of Anguilla](#) (25 January 2021)

Appendix 5. Manuscripts

- To be drafted: Coastal restoration to increase resiliency (not final title)
- In draft: [Population Viability Assessments inform climate-adaptive conservation of endangered Caribbean reptiles](#)

Appendix 6. Photos



Figure 6A. Anguilla Bank racer



Figure 6B. Conservation Leadership Programme intern, Marlene Horsford, releasing an Anguilla Bank racer.



Figure 6C. Lesser Antillean iguana from Dominica translocated to Prickly Pear East, Anguilla in an effort to increase genetic diversity of the existing founder population.



Figure 6D. Conservation Leadership Programme intern, Marlene Horsford, releasing a Lesser Antillean iguana onto Prickly Pear East, Anguilla, captured on the Anguilla mainland in December 2020.



Figure 6E. Excavating a green sea turtle nest on Blackgardens Bay, Anguilla.



Figure 6F. After struggling with rough sea conditions and being swept to shore by powerful currents, exhausted sea turtle hatchlings were rescued from Road Bay, Anguilla and later released into the calmer waters of Sandy Hill Bay, Anguilla.



Figure 6G. Hawksbill sea turtle hatchling making its way to the ocean at Sandy Hill Bay, Anguilla.



Figure 6H. Filling in the gaps. Restoring coastal vegetation that had been damaged by the powerful Category 5 Hurricane Irma that swept over Anguilla in September 2017.



Figure 6I. Restoring vegetation along East End Pond Conservation Area's pondline.

Bibliography

Malcolm, J.R., Liu, C., Neilson, R.P., Hansen, L., & Hannah, L. (2006). Global warming and extinctions of endemic species from biodiversity hotspots. *Conservation Biology*, 20, 538–548.

Mukhida, F. & Soanes LM. (2020). *Conservation Plan for the Little Scrub ground lizard: An Evaluation of Options for Conserving the Little Scrub Ground Lizard*. Report for the Anguilla National Trust, The Valley, Anguilla, and Fauna & Flora International, Cambridge, UK.

Soanes L.M., Mukhida, F., Daltry, J.C. & Goetz, M. (eds) (2020). *Action Plan for Anguilla’s Terrestrial Endangered Reptiles and Plants*. Report for the Anguilla National Trust, The Valley, Anguilla, and Fauna & Flora International, Cambridge, UK.

Soanes, L.M., Mukhida F., Goetz M. and Daltry, J.C. (2021). *Conservation translocation of the Lesser Antillean Iguana *Iguana delicatissima* to Prickly Pear East, Anguilla*. Report prepared for Fauna & Flora International and the Anguilla National Trust.

Zaluski, S. & Soanes, L.M. (2020). *Guidelines for mangrove nursery establishment in Anguilla*. Report prepared for the Department of Disaster Management and Anguilla National Trust.