

Jamaican Iguana Research Opportunities 2023-2025

Background:

Caribbean Rock Iguanas are the most imperiled group of lizards in the world, and the endemic Jamaican Rock Iguana (*Cyclura collei*) is arguably the most endangered among them, listed as Critically Endangered on the IUCN Red List. Considered extinct by the 1940s, largely due to habitat conversion and Invasive Alien Species (IAS), the Jamaican Rock Iguana was re-discovered in 1990, in the Hellshire Hills tropical dry forest, a remote ecosystem along Jamaica's southeast coast. This galvanized the conservation community to rally in support, spawning a successful international recovery effort.

Early surveys identified two communal nesting areas that served the relictual population. In 1993, a Population Viability Assessment was conducted, providing the blueprint for subsequent interventions including nest site protection, habitat and iguana monitoring, and a headstart program at the Hope Zoo. In 1997, the group started controlling invasive species, creating a core protected zone for the iguanas. As a result of these efforts this species was brought back from the brink of extinction and currently has a population estimated at ~600 individuals.

Despite intensive efforts within the iguana's core area, IAS incursions were still common, and the natural recruitment rate for the iguanas was very low. Through intensive research we were able to develop plans for a more effective protection scheme and have now greatly increased the protected area for the iguanas by implementing a buffer zone surrounding the core iguana zone in 2021. This should result in decreased IAS activity within the core iguana zone, an overall larger range for the iguanas, and increased natural recruitment. Thus, creating a self-sustaining population; the overarching aim for this recovery effort.

Two projects are available to aid in our understanding of the impacts of the buffer zone on the iguanas, other native species, and invasive species. These positions are ideal for those looking for a master's project but we will consider internship positions. Those interested in participating in these projects must be in the excellent physical and mental condition, be interested in living in remote conditions with very few daily comforts (no running water, no electricity), and be comfortable traveling internationally without extensive contact with family and friends. Experience camping, hiking, living remotely, and traveling internationally is strongly preferred.

Project 1. Hatchling radio tracking (opportunities available for Fall 2023 and Fall 2024)

This project focuses on understanding survival, dispersal, and habitat use of Jamaican Iguana hatchlings, the most vulnerable age class. Hatchlings will be tracked during two consecutive years using standard VHF radio telemetry and well-established methods. Approximately 20 hatchlings will be tracked each year for two years. Hatchlings will be tracked daily, as possible, for three months. Several spatial analyses will be performed to identify the most appropriate and useful, depending on the data collected. We will evaluate the Minimum Convex Polygon, Kernel Density Estimation, and dynamic Brownian Bridge Movement Models to assess spatial use. Survival, movement variables, and settlement will be determined. Behavioral and habitat data will be summarized. These data will aid in determining the impacts of implementing a buffer zone to improve protection within the core iguana area. This will be used as an indicator of the effectiveness of the newly constructed buffer zone and used to adjust the buffer zone management strategy.

Project 2. Camera trap and tracking tunnel monitoring (flexible timeframe but cannot start before Fall 2023)

This project focuses on assessing the presence of invasive and native species within the core iguana zone, the newly constructed buffer zone, and the greater Hellshire Hills area. Elucidating the presence and relative density of IAS and native species within these three areas will allow for an understanding of the impact of the new buffer zone, provide direction for additional control measures, and direct the development of an updated IAS control protocol. Monitoring stations, equipped with tracking tunnels and camera traps, will be placed along a structured grid covering the core iguana zone, buffer zone, and greater Hellshire Hills. Live trap data, where available (core and

buffer only), will also be incorporated into the assessment. These density and distribution data can then be analyzed across the three zones to determine the degree of IAS reduction and continued threats by zone.

Location: These projects will occur within the Hellshire Hills of Jamaica, a tropical dry forest, primarily made up of karst limestone terrain. This is an extremely remote location. Reaching base camp will require a 1-2 hour car ride, a one hour boat ride, and a one hour hike into the forest. All materials (camping equipment, food, etc) must be carried to the field site on foot.

General Schedule: The research projects typically last three months however additional time may be considered and will be discussed on an individual basis with students. While on site in Jamaica the typical schedule is three weeks at the remote field site within the Hellshire Hills, one weekend in Kingston, then back to the field for three weeks.

Accommodation: The base camp within the Hellshire Hills has no running water or electricity, aside from a small solar power station. There is no formal toilet, only a very primitive long drop. There is no shower and water is extremely limited. All water available is from rainwater collection. Each person is allowed a quick bath with 1 liter of water each week. There are four permanent, male, rangers on site at all times as well as Dr Pasachnik at times. Everyone sleeps in tents on cement platforms. A tent will be provided but all items needed inside the tent must be brought by the student (sleeping pad, sleeping mat, pillow, headlamp, etc). While in Kingston on weekend students will stay in a small studio apartment.

Food: While in the Hellshire Hills, dinners will be made by the rangers and enjoyed communally. Everyone is on their own for breakfast and lunch. There is a small kitchen area with a propane stovetop to prepare food but there is no refrigeration available. In Kingston there is a kitchen within the studio apartment to prepare food and ample restaurants to go out and enjoy.

Medical Considerations: Medical care is available in Jamaica but not at the remote field site. Any injury that occurs within Hellshire Hills will require transport to Kingston which will take at least three hours. Extreme emergencies may require a helicopter evacuation. Students are required to have international travel insurance that covers medical evacuation in case of an emergency. It is also the student's responsibility to discuss with their doctor any inoculations they may feel is necessary for this location and to ensure they have any medications with them in excess of what they will require for the time period.

Funding: All research equipment costs will be covered. All basic accommodation and food costs will be covered. Going out to eat while in Kingston and extraordinary (expensive specialty items) food costs will be the student's responsibility. One round trip flight will be covered. All personal items must be covered by the student (toiletries, clothes, boots, backpacks, etc). A cellphone SIM card for Jamaica will be provided but cell phone plans will need to be purchased by the student. This is typically \$20 USD per month but depends on how much data is used.

Expectations: In the months leading up to the field project start date students will be expected to meet with Dr. Pasachnik at least twice per month to develop the project proposal and discuss the details of living and working at the field site. Prior to departure a completed proposal will need to be submitted to Dr. Pasachnik (this can often be the same proposal submitted to your university). Students will be responsible for all data collection, storage, and management. In the months following the field work it is expected that the student will work with Dr. Pasachnik to analyze and publish a manuscript in a peer-reviewed journal covering the topic studied. At times projects will run for multiple seasons/years and thus the work of more than one student will be combined for publication.

Packing list

Required:

Small day pack for use during research

Large pack for carrying supplies to and from base camp

Two pairs of hiking boots (the terrain is extreme rough so two pairs are absolutely necessary)

Camp/water sandals (all boat trips will have wet landing so water sandals will be necessary)

Long pants and long sleeve shirt for research

Lounge clothes for time at camp

Clothes for weekends in Kingston

Hat

Water bottle

Sunscreen

Sleeping bag

Sleeping pad

Headlamp

Toiletries

Computer (there is a camp computer than can be used but it is best for students to have their own as well as an additional data storage device)

Highly recommended:

Rain gear

Water bladder for day pack

Multi tool/Knife

Hammock

Solar charging power bank