A female Andros Iguana protecting the termite mound where she just deposited her eggs. Females may protect the mound for up to 10 weeks and can be extremely aggressive towards other females and even humans.

Working to Save the Andros Iguana

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Photographs by the author unless otherwise indicated.

The Bahamian Andros Iguana (*Cyclura cychlura cychlura*) is the largest native terrestrial vertebrate, and the only iguana (of three species, seven subspecies) in the Bahamas that is not confined presently to small cays. Until recently, it was among the least-studied of the Bahamian species of iguanas and virtually no natural history data were available. In addition, scientists had no indication how many iguanas roamed Andros, and were forced to make arbitrary estimates of between 2500 and 5000 individuals for the International Union for the Conservation of Nature (IUCN) West Indian Iguana Action Plan (Buckner and Blair 2000). Prior to 1999, the only information scientists could garner was that the Andros Iguana faced particularly severe anthropogenic pressures relative to other island-dwelling iguanas in the archipelago. These include habitat loss, illegal hunting, predation by feral animals (e.g., cats, dogs, and hogs), and impact from historic large-scale logging practices for Caribbean Pine (*Pinus caribaea* var. *bahamensis*), which destroyed large tracts of iguana habitat in the 1960s and 70s. Recent anecdotal accounts from the island presented grim scenarios featuring iguanas either already in cooking pots or in cages stoically awaiting that fate. Some individuals were even discovered in a hunting camp with their arms and legs tied behind their backs and their mouths sewn shut.

Andros Island is actually a composite of three main islands and dozens of associated cays. *Graphic by John Binns.*

Little regard was given to the Andros Iguana by international conservation organizations, mainly because reliable natural history and population-trend data were sorely lacking and no scientist was doing the work. The late Walter Auffenberg initiated preliminary field expeditions in the early 1970s, but the surveys were short-lived and generated only cursory observations. The lack of more recent work was not unwarranted. Andros is the fifth largest island (~ 165 km long by 65 km wide) in the West Indies, travel is expensive, and logistics are a nightmare.

Andros actually is a composite of three main inhabited islands (North Andros, Mangrove Cay, and South Andros) and dozens of associated uninhabited cays, separated by saline tidal channels called bights. Much of the low-relief island (~ 90% < 6 m above mean sea level) is punctuated with small cavities and large blue holes. From east to west, a coastal ridge (to 30 m elevation) gives way to a flat and pine-forested interior. Approximately halfway across the island, forest grades into extensive mangroves as the water table reaches the surface, and then is reduced to extensive mud flats.

Except for North Andros, no roads slice beyond the eastern edge of the island making the interior accessible only by shallow-draft boats and hours of trudging through mangrove and poison wood-tangled bush. The labyrinth of waterways crosshatching the island and the quirky tides make reliable navigation difficult. Also, in the 1980s, Andros was a haven for drug-running bandits and interior passage was unsafe.

These logistical hardships for humans actually benefit the iguanas inhabiting the interior of the South Andros area. Access into the interior on North Andros is facilitated by a series of hard-packed logging roads — relics from past timber exploitation. These roads allow hunters and their dogs to gain access to the interior of the island, where few iguanas remain. In contrast, the South Andros area is characterized by large and small isolated cays accessible only by boat. These isolated havens are free from large feral mammals and are not visited as frequently as areas to the north. The waters are teaming with bonefish, eagle rays, sea turtles, and dolphin. On calm, windless days, surface waters settle and return to the clouds a reflection that is so breathtaking, it gives the illusion of flying through the air instead of planing on crystal-clear water. The isolation is raw and real, making it more unsettling when evidence of humans and their illegal activities are uncovered.

In the late 1990s, while the dismal anecdotal iguana accounts were emerging from Andros, I was trying to develop a

field project for my doctoral degree at the University of Florida. The Andros Iguana population apparently was in decline, and I felt that I could make a difference by studying the animal to facilitate initiation of a science-based management plan for the species. However, I did not intend to study only the iguana, make recommendations, and leave the island with a doctorate in tow. I wanted to help with on-the-ground conservation by working with local people, regional organizations, and the national government. If nothing else, I wanted the Andros Iguana to have an advocate for its preservation.

Before I could even initiate fieldwork, I had to uncover iguana populations dense enough for meaningful study. The problem is that finding an iguana on Andros is akin to searching for a needle in a haystack. Hundreds of kilometers of island interior had to be searched. Where to begin? Fortunately, I have been leading "citizen-scientist" research expeditions to the Bahamas since 1995 aboard the John G. Shedd Aquarium's research vessel, R/V *Coral Reef* II. In 1999, we made the decision to cruise the waters of Andros in search of iguanas. We have returned to the island each year (see *Iguana Times* 1(2):17–18, 1(3):4–7, 8(1):7–15, 8(4):8–10, 8(4):12–16) and the field participation from public assistants has been vital in making long-term ecological studies of the iguana a reality (see Knapp 2004). In fact, we return in May 2005 to continue the work, which includes the seventh year of a mark and recapture study, and the investigation of the enigmatic nesting behavior of the Andros Iguana. The Andros Iguana is the only iguana in the world documented to deposit its eggs in termite mounds. Witnessing a female iguana aggressively guarding a nesting mound is still among my favorite sights.

Ray Dean from South Andros island assisting with radio-tracking on Linder Cay, Andros Island in 2002. Ray had a knack for finding lost transmitters during the first unsuccessful season of radio-tracking.

An adult male Andros Iguana moves through the extensive mangrove system. Note the radio transmitter sutured to the dorsal/pelvic crest. This animal was tracked for a total of four months in 2003.

Whereas the ecological studies have been successful and have yielded information that will be used in establishing a management plan (see Knapp and Owens 2004 and other articles in press and in preparation), the opportunity to work with the local people on Andros has been most memorable. For the past few years, I have been trying to raise awareness of iguanas among local settlements by taking advantage of frequent opportunities to get to know people and talk with them about their native iguana.

Sometimes, serendipitous events help spread the word about iguana conservation. In late October 2002, during my water "commute" to one of my study sites, I noticed two men walking the shore of a distant, small cay. It seemed odd to me that two people would be so far from civilization with no apparent boat in sight. I cut a wake in the smooth surface water and veered toward the men to check and make sure that they were OK. I was astonished to discover that they had been stranded for two days because they had run out of fuel. They shared two sandals between them and had to resort to a makeshift second sandal fabricated from snorkel fins. They were without food or water and were attempting to walk and swim across cays and waterways to reach safety. The thought of the men walking through the bush on the jagged limestone with little protection, and their inevitable battle with mosquitoes during the crepuscular hours made me shudder. I took the appreciative men back to their settlement and, from that day forward, I was known as the "iguana man who saved Larry and Luther."

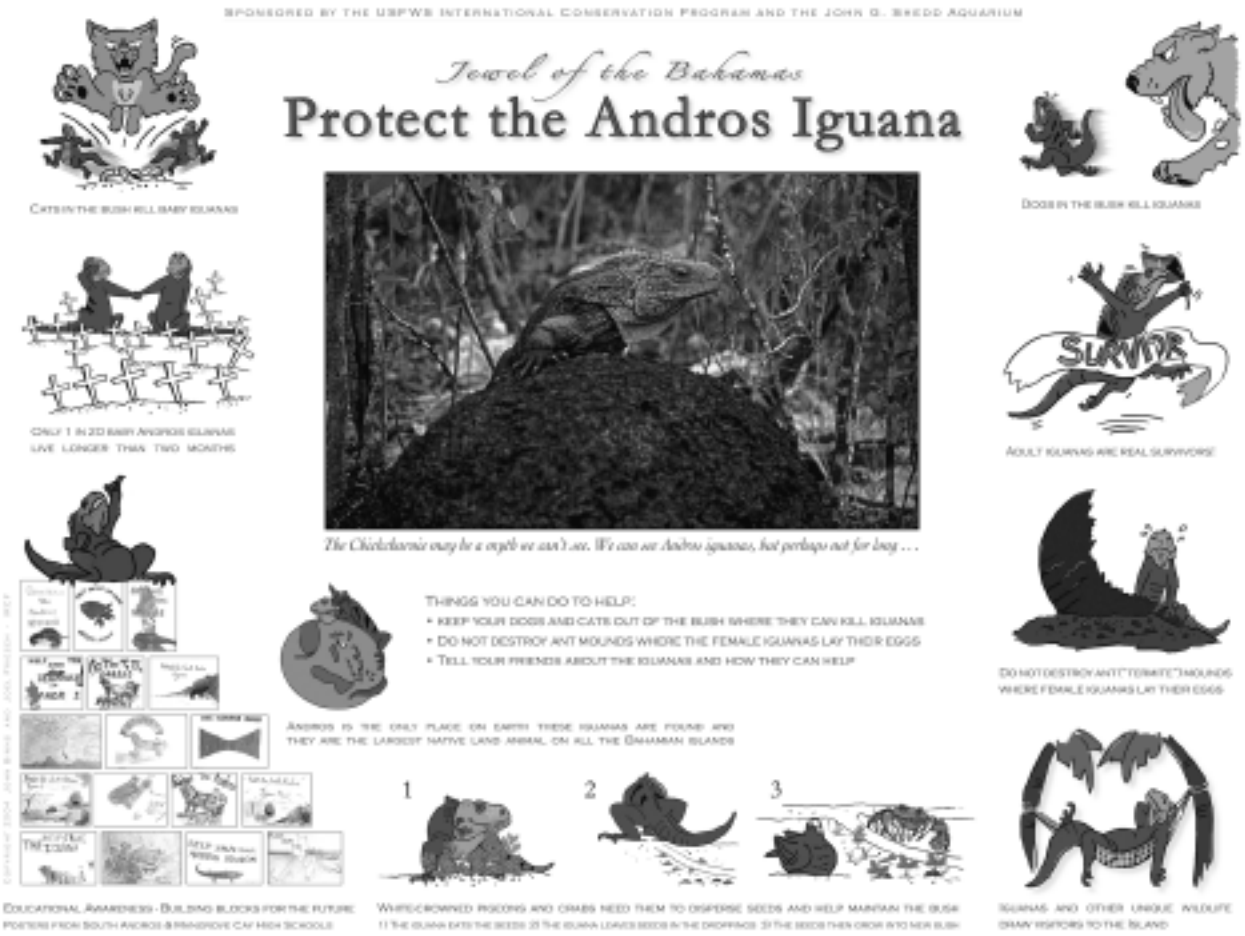
As fate would have it, a week later, I was slated to leave the island with Joe Wasilewski, who had come to visit for a few days

to help with the research. We decided to leave one day early because Hurricane Michelle was churning up the Caribbean and heading for Andros. As rain fell and the sky darkened, we waited anxiously in the one-room airport on Mangrove Cay, hopeful that our plane would come to deliver us to safety. Instead, we were flooded with forbidding radio reports about how the hurricane was to make a direct hit on Mangrove Cay. We will never forget the radio announcer exclaiming, "the nation prays for Andros!" No planes came and the nervous crowd retreated to the safety of shelters. Joe and I were stranded for hours, still hoping

Andros Iguana skull found in May 2004 at a known hunting camp on the West side of Andros. According to anecdotal accounts, 40 iguanas were captured for food in just one illegal hunting expedition. We found many bones at the site and it was littered with shed iguana skin. Typically, iguanas are brought back to the settlements alive and sold.

Local Andros boys, Ricardo, Ray, and Bradley assisting the author in the field.

The author with participants from the 2003 Shedd Aquarium iguana research expedition to Andros. *Photograph by John Bendon.*



Protect the Andros Iguana poster designed by John Binns and Joel Friesch. The poster is currently in schools and government buildings throughout Andros. A few even hang in local bars, since some of the most productive iguana-related conversations take place in those types of establishments.

that a plane would come and carry us away. However, we would face the impact of the hurricane while in a concrete hotel, and then be left stranded on Mangrove Cay for an additional two days. Thankfully, damage was not as bad as expected and no one was hurt, so Joe and I made the best of the situation by talking about iguanas with anyone who would listen. To this day, people still remember both of us and the reasons we study iguanas, because of that unexpected meteorological episode.

Reaching out to children and trying to establish a conservation ethic has been one of my major goals. I frequently bring high school students into the field with me to help with research. Most of these students have not been off their individual subislands and none have ventured into the watery interior of Andros. That pleasure is reserved for bonefish guides and fishermen. I instruct the students on how to capture and handle iguanas. Some even get to try their luck at radio-tracking. Another world opens up for them and the smiles on their faces speak volumes.

In order to reach more students and make a larger conservation impression, I have been bringing iguanas to the local high schools and giving presentations. The presentations are fun and the animated crowds always buzz with excitement when I pull out a 4-kg iguana from its bag. My first school appearance stressed the importance of these presentations. First, I asked how many students had ever seen an iguana. Approximately half the group raised their hands. I then asked how many had ever eaten an iguana and, again, approximately half raised their hands. Following my presentations, I often would hear from parents that students were talking about iguanas while at home.

The initial presentations provided the opportunity to develop a drawing contest for the students to further raise their awareness of iguanas. Students were given the opportunity to draw a mural with a "Protect the Andros Iguana" theme. All contestants were given an Andros Iguana t-shirt and winners received monetary prizes. Our initial thought was to use the winning entries as background for a poster that was in development with the help of John Binns and Joel Friesch of the International Reptile Conservation Foundation. Instead, we incorporated all the entries into the poster and it made a great impact. Last September, I returned to the schools to award the prizes and donate the posters. The teachers were all thankful that we were bringing something back to the community and the students enjoyed seeing their artwork on a poster that will be displayed in all government buildings and schools (as well as most

The poster contest winners from Mangrove Cay High School with their poster.

Students interacting with the author and an Andros Iguana at the Mangrove Cay High School. *Photograph by Audrey Owens.*

bars) on the island. One teacher even thanked us because our contest proved to students that good things can happen when they are presented with an opportunity, and then meet that opportunity with hard work.

As expected during this project, I have learned a substantial amount about the natural history of the Andros Iguana. Unexpected, however, was my conclusion that I should not be the spokesperson for the Andros Iguana. Instead, the local community must take stewardship and assume the role of actively protecting their iguanas. Only in this manner will the long-term survival of this impressive lizard be realized. I am much encouraged by the many dedicated people who I have met and who are willing to help take on this responsibility.

Acknowledgements

The Andros Iguana would still be an enigma if not for the gracious assistance of many organizations and individuals. The John G. Shedd Aquarium has been the largest benefactor of Andros Iguana research and their support is greatly appreciated. Recent financial assistance for educational materials was made possible through a grant from the U.S. Fish and Wildlife Service International Conservation Fund. Among many contributions, Tiamo Resorts of South Andros has provided crucial logistical support and contributed monetary prizes for the poster contest. Invaluable members of the research team include John Bendon, who designed t-shirts and maps, Audrey Owens, and Sandra Buckner. Lou Roth, John Rothchild, and Charles Julian of the Shedd Aquarium's research vessel have been assisting beyond the call of duty for years. In addition, the volunteers participating in the John G. Shedd Aquarium research expeditions are responsible for allowing us to repeatedly visit the island aboard the research vessel. Thanks also to John Binns and Joel Friesch of the IRCF for producing an incredible and invaluable conservation poster for the Andros Iguana.

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Research Opportunity

Join me from 6–15 May 2005 during the next, and possibly last, Shedd Aquarium iguana research expedition to Andros Island. This truly is a trip of a lifetime because we take you to areas that no one else has the opportunity to explore. We will be capturing iguanas for study and we also will witness the incredible behavior of the only iguana in the world that deposits its eggs in termite mounds. Only a handful of people have ever seen this event, so bring your camera and plenty of film (or memory card space)! Besides working in the field, you also will have opportunities to snorkel and swim, visit with local people, and travel to cays never before explored. If time allows, we will go fishing along the barrier reef and visit Bimini Island.

The price is $1895, which includes accommodations, meals from breakfast on day 2 through lunch on day 10, transportation during the expedition, and departure taxes. Airfare to and from Miami, alcoholic beverages, and dinner on day 1 are not included. If interested, please contact Michelle Jost at *mjost@sheddaquarium.org* or (312) 692–3191 for more information. Also feel free to contact me at *cknapp@ufl.edu* with specific questions concerning the fieldwork.