

# FINAL REPORT

## Results of Allen Cays Iguana study (*Cyclura cychlura inornata*)

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Our field research strategy this year (our 28th) was somewhat different than our usual primary focus on mark-recapture studies on Leaf Cay and U Cay in the Allen Cays. Over the past few years we have noticed that some iguanas on Leaf Cay and U Cay are becoming more wary of our attempts to capture them. Hence, we wanted to relax our efforts on the iguanas on those two islands in 2006 and 2007, in preparation for a major sampling effort there in May of 2008. Thus, like last year, we visited Leaf and U Cays this year only to collect and replace our digital temperature loggers there. This change freed us to accomplish a number of other goals that required more travel time among islands, and therefore, a little less total time in the field. Our other goals this year included:

- visit and assess the introduced population on Alligator Cay in the Exuma Land and Sea Park
- collect blood samples from iguanas on Alligator Cay to compare to samples from the parental population on Leaf Cay
- collect blood samples from the two very small iguana populations on tiny islands north of Leaf Cay in the Allen Cays
- assess reproduction (as we did last year) on the now substantial population of iguanas on Flat Rock Reef Cay in the northern Allen Cays, and collect more blood in order to determine the island source of origin of those iguanas
- survey the introduced population of *Cyclura rileyi* on Bush Hill Cay in the Exuma Cays Land and Sea Park

All of these goals were accomplished, although we are still awaiting an updated CITES export permit from the US Fish and Wildlife Service to export the blood samples (which are now under the care of Sandra Buckner in Nassau).

Alligator Cay: We spent the entire day of 25 June on Alligator Cay attempting to capture iguanas. They were exceptionally skittish, and twelve of us working for a full day captured only got 10 iguanas (4 male; 6 female). All ten were juveniles (15-25 cm SVL) and none were previously marked from Chuck Knapp's work. We also found the remains of four dead iguanas, and these were passed to Sandra Buckner, along with several carcasses found in May by Chuck Knapp, and held until our arrival by Tom Barbernitz. While on the cay we never saw a single large adult, nor did we see any evidence of nesting, even though it should have been the height of nesting season when we were there. The distinct possibility exist that no adults remain on the island.

Previous reports from Chuck Knapp indicated that the vegetation on the cay had been negatively impacted by hurricanes and storms in recent years. Given that iguanas have been observed on

nearby Narrow Water Cay for about five years (Tom Barbernitz, pers. comm.), it is possible that the adults on Alligator Cay either died or swam to Narrow Water Cay. We briefly visited the latter cay, and found the fresh tracks of several very large iguanas, though we saw none. It should be a future priority to capture some of these adults on Narrow Water Cay to determine if they were marked originally on Alligator Cay. As an aside, the available microhabitats and plant diversity on Narrow Water should be conducive to rapid population growth, assuming some females exist there.

Allen Cay: Only a single day was spent on Allen Cay (8.5 ha), and suboptimal weather (cloudy, breezy and cool) impaired lizard activity and our success. We captured only a single iguana, one that we have captured during six of the last seven years. Only 17 total iguanas have been caught on Allen Cay (including two marked males from Leaf Cay that were apparently relocated to Allen Cay by unknown persons) over all of our study years, including no juveniles or subadults. There is still no evidence of reproduction by iguanas on the Cay. Audubon Shearwater carcasses continue to be common on the Cay, presumably due to Barn Owl depredation.

Southeast Flat Rock Reef Cay: On 29 June we observed at least three individual iguanas on the island, and captured two of those (both recaptures). Last year we observed at least four, and so we believe that the entire population must be only 4 or 5 individuals. We have now marked a total of three of them, and have blood samples from two of them. All of the captures to date have been adult females; we have never observed any juveniles; and there is no obvious nesting habitat on the island. Reproduction is apparently not occurring. The questions of intervention are now on our mind. Should a male be relocated to this cay from Flat Rock Reef Cay to determine if reproduction can occur on this small rock (0.75 ha)? Or should the population be left as it is? We hope that an analysis of our blood samples will provide the information necessary to answer these questions.

Second Cay north of Leaf Cay: On 29 June, we also visited this cay, and observed and captured only two male iguanas (one previously marked). Blood was drawn from both. In 2005 we had observed and captured two male iguanas on this tiny islet (one recaptured this year), and we found a carcass of a third individual (given to Sandra Buckner). We believe that a total of only three adult males live on the cay. None of the iguanas from this cay bore toe clips when first captured (i.e., they were not recent introductions from Leaf or U Cay). Sufficient soil for iguana nesting is not present on this cay. The island is solid rock (0.25 ha), with sparse vegetation that barely reaches a half meter in height.

Flat Rock Reef Cay: Iguanas were introduced by humans to this 5.3 ha cay in about 1996 (see previous reports), and the population has grown rapidly to a current size of about 100 iguanas. Indeed, we have yet to find a single carcass on this cay, presumably reflecting the optimal conditions there. This year our entire field crew worked on Flat Rock Reef Cay on 29 June, and then Kirsten Hines and I remained on the cay from 30 June to 4 July to assess iguana reproduction. Unfortunately, our visit to the cay coincided with that of a tropical wave that left the seas dead calm and the island temperatures in the high 90's. Because of the heat, lizard activity was significantly reduced, and lizards were unusually hard to locate. Despite spending six days on the cay, we captured a total of only 19 iguanas, 14 of which had been marked in previous years (12 with pit tags). We drew blood from 10 of the 19 (we had already drawn blood from the others last year). We also placed pit tags in the 5 new captures this year, as well as one recapture that we hadn't previously pit-tagged.

We have now accumulated enough recaptures of individual iguanas on FRRC to generate some preliminary estimates of growth rates for the iguanas there. These data suggest that growth on the cay is considerably faster than on Leaf or U Cay. This pattern was expected given the low density there (i.e., reduced competition for food), and a similar pattern found on Alligator Cay in the 1990's by Chuck Knapp.

While on FRRC Kirsten Hines and I excavated the nests we identified in 2006 to determine hatching success, which was 100% in four nests, 80% in one, 60% in another, and 0% in the last. Overall, 24 of 30 eggs had hatched and emerged, a survivorship rate of 80%, and virtually the same as the rate found on Leaf and U Cays (78.9%). We also identified six nest sites from this year, though we are certain that a few females would still nest this year after our departure. Each of these six nests was excavated, and the eggs measured and reburied with a digital temperature logger. We will excavate these in May of 2008 to determine nest success and incubation temperatures. Mean clutch size in this year's nests was 4.0 (range 2-5). At least one female nested both in 2006 and 2007. Kirsten and I are working on a manuscript comparing growth and reproduction of the introduced Flat Rock Reef Cay population with those same parameters for Leaf and U Cay. We plan to do one more season of field work on Flat Rock Reef Cay (May and July 2008) in order to complete that comparison.

Bush Hill Cay: We spent half of 26 June and all of 27 June on this cay, and captured a total of 97 iguanas, 58 of them being recaptures from previous years (and 39 being new captures; plus one carcass to Sandra Buckner). All but three were adults, and one of the three juveniles was apparently a yearling, measuring only 96 mm snout-vent length. We have now marked a total of 279 iguanas on Bush Hill Cay since we began work there in 2002, and preliminary population estimates suggest a total population of between 300 and 400 subadult and adult iguanas. For example, a crude Lincoln Index estimate based on 102 adults (> 20 cm snout-vent length) captured in 2005, and 93 captures in 2007, 31 of which were also caught in 2005, suggests an estimate of 306 individuals.

Table 3. Capture information by year for Acklins iguanas introduced to Bush Hill Cay. All trips 2002-2005 were for 24 hours or less in mid-May. The trip in 2007 was for 1.5 days in late June.

Year	Total captures	Total adults <sup>a</sup>	Total juveniles	Total recaptures	Percent recaptures	Cumulative # with marks	Cumulative number recaptures
2002	75	75	0	--		75	--
2003	72	69	3	16	22	131	16
2004 <sup>b</sup>	104	103	1	42	40	194	58
2005	106	105	1	59	56	241	117
2007 <sup>b</sup>	96	93	3	58	60	279	175

<sup>a</sup> includes all individuals 20 cm SVL or larger (the size when the juvenile pattern begins to fade)

<sup>b</sup> excludes single carcass found

Preliminary estimates of growth based on our recaptures suggest that juveniles reach 20 cm SVL (the probable size at maturity) after 5 years if male, and 8 years if female. We intend to spend

two days on the cay in May of 2008 in order to bolster our recapture sample and improve the precision of our growth and population estimates.

Future plans: We plan return to the Allen Cays in May of 2008 to undertake thorough censuses of Leaf, U, and Flat Rock Reef Cays, and to revisit Bush Hill Cay. Kirtsen Hines and I also plan to return in early July 2008 to assess reproduction for a third year.

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