Iguana Specialist Group Meeting

6–7 November 2005
South Andros, Bahamas

The ISG expresses its appreciation to Chuck Knapp (University of Florida/Shedd Aquarium), Sandra Buckner, and the Bahamas National Trust for the extensive planning and organization of a successful ISG Meeting and Species Management Workshop for the Andros Island Iguana (*Cyclura cychlura cychlura*). Special thanks also go to Mike and Petagay Hartman, of Tiamo Resort, for the fabulous accommodation, gourmet food, deeply discounted rate, and warm welcome. It was a truly wonderful meeting that was enjoyed by all.

JOE BURGESS

Resident male *Cyclura cychlura cychlura* at Tiamo Resort, Andros.

Blue Iguana Recovery Program

Fred Burton
National Trust for the Cayman Islands

Fourteen months have now passed since Hurricane Ivan, a category 4–5 hurricane, tracked along the southern coast of Grand Cayman causing catastrophic damage to human property and livelihoods, and delivering dramatic impacts to natural environments. Aerial photographs eight months after the storm show the

THOMAS WIEWANDT, WILD HORIZONS

Participants in the 2005 ISG Meeting and Species Management Workshop (left to right): Rick Hudson, Peter Tolson, Kirsten Hines, Steve Conners, Tom Wiewandt, Stesha Pasachnik, Joe Burgess, Quentin Bloxam, Ricardo Johnson, Jeff Lemm, Byron Wilson, Karen Graham, John Iverson, Allison Alberts, Catherine Stephen, Bruce Weissgold, Miguel Garcia, Jan Ramer, Fred Burton, Tandora Grant, Samantha Addinall, Tarren Wagener, Joe Wasilewski, Sandra Buckner, and Chuck Knapp.

JOHN BINNS

Grand Cayman Blue Iguana (*Cyclura lewisi*).

island's once extensive Black Mangrove forests shattered and scarcely beginning recovery, while the dry forests are beginning to regenerate a closed canopy despite extensive treefall. The xerophytic shrubland communities that are habitat for the Grand Cayman Blue Iguana (*Cyclura lewisi*) were only lightly impacted and appear fully recovered. The captive-breeding and head-starting facility for the Grand Cayman Blue Iguanas, in the QEII Botanic Park, is now fully restored and has been further expanded and enhanced since the hurricane.

Twenty-three two-year-old *Cyclura lewisi*, originally slated for release at the time the hurricane struck, were finally released in December 2005, and were radiotracked with assistance from a team of international volunteers for two months after release (December 2004–January 2005), and for a further two months in May and June 2004. After a period of weight loss immediately post-release, the iguanas established home ranges and foraging patterns which were characterized in the summer tracking period. Survival over the first seven months was at least 91%.

Summer usage areas of females was 0.6 acres, surprisingly similar to summer usage areas determined by Goodman et al., for larger, mature, free-roaming females in the QEII Botanic Park, and a single wild adult female tracked by the program in summer 2005. The released males in the Salina Reserve occupied an average of 1.4 acres each, with much more extensive overlap in usage areas. Spacing and overlap of the usage areas indicates the iguanas chose to maintain a population density of 4–5 iguanas per hectare in this unnatural setting of a single age class surrounded by unpopulated habitat. A second release, of 70 individuals, is scheduled for December 2005, into the same areas currently occupied. This release will bring the restored population in the Salina Reserve to approximately 91 individuals, with representation from ten different founder lines. Subsequent releases will require access to the Salina's southernmost soil zones.

The studbook continues to be maintained to a high standard by Tandora Grant (San Diego Zoo/CRES), and is now informing the program's release strategy with a goal to reach representation by at least 20 different founder lines in each restored subpopulation by the time each reaches its anticipated carrying capacity. Progress to date is on target towards this goal. Three new founders bred in captivity for the first time in 2005.

A high infertility rate was observed in nests laid in the southern sector of the QEII Botanic Park, where a new dominant male had taken over a territory of five females, four of which were his siblings. As a result of this unusual infertility, only 92 eggs were initially viable from a total of 166 eggs laid in both the captive and free-roaming populations. The dominant Park male was taken back into captivity to allow unrelated males to claim this territory for the 2006 breeding season.

One hundred new hatchling cages were prefabricated and flat-packed in the USA as the result of a three-month IRCF campaign to secure funds and a manufacturer capable of a customized design in time for the August hatch. These cages were subsequently assembled in Grand Cayman by volunteers from the Rotary Club of Grand Cayman Central. These lightweight

cages are holding the 2005 hatch until the next iguana release in December frees cage space at the facility. Again, with IRCF assistance, funds are currently being sought to complete a security fence around the facility, which will also serve to secure tour income to the program.

A custom non-profit company, Tours for Nature Ltd., has been formed and has secured a contract with Royal Caribbean Cruise lines and Celebrity Cruises to operate cruise passenger tours to the Blue Iguana facility with all profits going to the program. Tours are now operational and are expected to generate useful revenue for the first time in the coming winter tourist season. Tours are also being expanded to cater to on-island bookings for guests at major hotels.

The program is collaborating with the Fort Worth Zoo in a project to characterize the physical, climatic, and dietary environment in the successful captive-breeding facility on Grand Cayman, and to compare this to enclosures at Gladys Porter (Brownsville, Texas) and Indianapolis zoos, where captive breeding has been less successful to date. Results are intended to guide *ex-situ* captive managers in efforts to improve breeding success, which is currently one constraint on achieving *ex-situ* population goals for this species.

The first Species Recovery Plan for *C. lewisi* (2001–2005) has now run its course. Achievements were reviewed and a new plan developed in a workshop hosted by the Grand Caymanian Resort on Grand Cayman in September 2005. Local participants represented the BIRP staff, the National Trust for the Cayman Islands, and the Cayman Islands Department of Environment. Visiting participants came from Durrell Wildlife Conservation Trust, San Diego Zoo, ISG/IIF, and IRCF. The workshop was facilitated by Simon Hicks.

Review of the 2001–5 plan showed that the protected area goals were substantially not met, but that all other goals in the plan (population restocking, captive breeding, education and awareness, and resource development) have been met and in some cases surpassed. Over the period 2002–5, while the Blue Iguana Recovery Program has been fully operational, considerable funds have been raised and substantially expended in implementing this plan. These reflect both the ambitious scope of work achieved, and the often unavoidably high cost of doing business in the Cayman Islands. The majority was contributed by corporate donors within the Cayman Islands. Other leading sources of project financing were raised and channeled through the Durrell Wildlife Conservation Trust, the International Reptile Conservation Foundation, and the International Iguana Foundation. Income from commercial activity (retail products and tours) has been relatively insignificant, but is now targeted to expand.

Volunteerism has expanded greatly. Notable volunteer resources have been recruited internationally via IRCF, and locally through service clubs and individual long-term volunteers. The program now has three full time staff: a volunteer director and two salaried wardens. IRCF continues to provide extensive free services equivalent to additional program staff, as well as consistent contributions from other overseas participants who made commitments in the 2001–5 SRP. The cumulative effect has been a massive savings on the cash cost of the work achieved.

The new Species Recovery Plan 2006–2010 calls for 300–500 acres of xerophytic shrubland on Grand Cayman to be protected in order to support a restored population of at least 1,000 Blue Iguanas. Plans have been extended to breed and rear sufficient genetically optimal iguanas for release, to safeguard the species via an *ex-situ* captive population, to continue education and awareness activities, and to further build the financial, human, and technical resources that will be essential to save this species.

Ricord's Iguana

Jan Ramer
Indianapolis Zoo

Grupo Jaragua, ZooDom, and Indianapolis Zoo have been working together to develop a Ricord's Iguana (*Cyclura ricordii*) curriculum directed toward the 3rd grade classroom. This work is funded by grants from the U.S. Fish and Wildlife Service - Wildlife Without Borders Latin America and Caribbean Program, and AZA's Conservation Endowment Fund. The curriculum includes a booklet with natural history information about the species and its habitat, vocabulary words, maps, etc. Resource kits consist of a plastic bin that students will fill with sand. Plastic eggs, cacti, thermometers, light bulbs, etc. allow students to pretend to incubate eggs and take sand temperatures. A game board with iguana questions and a poster are provided for every classroom. Teacher workshops will be held in Santo Domingo, and in the towns closest to Ricord's Iguana habitat this spring, and the curriculum will be implemented this fall. The

JOHN BINNS

Ricord's Iguana (*Cyclura ricordii*) at ZooDom.

Dominican Department of Education is helping fund these workshops!

ZooDom's four Ricord's Iguana juveniles that hatched during the ISG meeting in 2002 are all doing very well, and the ten hatchlings from 2004 received PIT tags and physical exams in April when Jan Ramer was there with a group of Indianapolis Zoo members. The breeding pair was also examined and found to be in good health.

Ernst Rupp, Grupo Jaragua, has been working hard in the Pedernales habitat, recording hundreds of hatchlings last year. Grupo Jaragua has worked tirelessly on local education and involvement in the conservation program, and also in developing ecotourism opportunities in the area. Ernst received emergency funds last fall from the International Iguana Foundation to conduct survey work on the southern shore of Lago Enriquillo, when he learned that one of the local senators was planning to bulldoze a prime Ricord's Iguana habitat to build houses.

Indianapolis Zoo, Grupo Jaragua, and Durrell Wildlife Conservation Trust recently submitted a proposal to the U.S. Fish and Wildlife Service to continue population and habitat analysis in all three known Ricord's Iguana habitats and to conduct workshops for biology students and Department of Wildlife technicians. If funded, this work will continue through 2007.

Jamaican Iguana Recovery Project

Byron Wilson and Rick Van Veen
University of the West Indies, Mona

A grant for $20,000 (US) was recently obtained from the Disney Wildlife Conservation Trust (submitted through the IIF). Additional funds to support work over the past year were obtained from the International Iguana Foundation, the International Iguana Society, Conservation International, and the Miami Metrozoo. Two new GPS units were purchased with funds from a New Initiative grant awarded to Byron Wilson (BSW) from the University of the West Indies, Mona.

Research and Outreach Activities.—We continued to encourage protection of the Hellshire Hills ecosystem through the participation of other researchers and interested parties. In the past year, we initiated a new project focusing on the intestinal parasites of wild pigs (with Professor Ralph Robinson and postgraduate student Chinedu Okoro from UWI). Ms. Tamia Harker has just begun a postgraduate program (with BSW) that will involve sea turtle work along the Hellshire coast, and Dr. Dave Miller (Geography and Geology, UWI) has been conducting research on the beach profile dynamics of Manatee Bay. Other notable visitors included Dr. William Cooper and Dr. Karl Rollings. In addition, we coordinated camping field trips for three different UWI courses (two in conservation biology, one in forest ecology). We also recently hosted an overnight excursion for the Jamaican Geographical Society, and assisted with a children's show for local television, "Hello World Jamaica" on CVM-TV. In short, we are trying to get as many people involved and interested in conserving the Hellshire Hills as possible.

Pitfall Trapping Experiment.—This field experiment, examining the impact of mongoose control on the terrestrial herpetofauna of the Hellshire Hills, proceeded into its ninth year. The 2005 results were not remarkable in terms of faunal abundance. 2006 should be an interesting year due to anticipated increases in faunal abundance resulting from high levels of productivity

BYRON WILSON

Jamaican Iguana (*Cyclura collei*).

spurred by high levels of rainfall. In addition, removal trapping of mongooses and other mammalian predators from control plots will be conducted during the period of pitfall trapping assessments, to remove the confounding influence of predators tampering with traps or trapped specimens.

Headstart and Release.—In conjunction with the Fort Worth Zoo, in February 2005, we released 15 headstarted *C. collei* into the core iguana conservation zone. Three UWI undergraduate students also participated in the release, which brought the total number of repatriated headstarters to 75.

2005 Nesting Season.—The first nest was deposited on 24 May, and the last nest was deposited on 20 June. A total of 14 nests were recorded from the two known communal nesting sites (i.e., "Upper" and "Lower"). Dawn Fleuchaus and Stephanie Wicker assisted with nest watches, as they did during the 2004 nesting season. Iguanas attempted to nest at the two new nesting areas identified in 2004, but abandoned the effort after the areas were disturbed by wild pigs. One new nesting area was discovered in a rock hole, with eggshell fragments indicating that seven hatchlings emerged in the 2005 season; additional evidence of nesting from previous year(s) was also noted.

South Camp Reconstruction.—Our primary research station ("South Camp") was severely damaged during Hurricane Ivan in September 2004. Using discounted and salvaged materials, South Camp was re-built in June 2005 with major assistance from Brian and Stephanie Wicker and Larry and Dawn Fleuchaus. In particular, Brian and Larry, both professional tradesmen, put in several days of hard labor and saw the reconstruction effort through to near completion. We are indebted to them all for their hard work, good company, and donations of tools and other camp toys.

Invasive Predator Control.—Predator-control efforts continue to make the core iguana area a safer place for young iguanas and other threatened wildlife species. In addition to the 55–60 small mammal traps that are operated continuously, we also expanded our wild pig and dog control efforts through the deployment of additional snares. Catch totals for the period include: 7 cats, ~85 mongooses, 25+ pigs, ~50 rats, and 0 dogs. The main problem with our anti-invasive effort continues to be the difficult nature of cat control. Some individuals are simply not trappable by our current methods. Because leg-hold traps and poisons would pose a risk to native wildlife species, the only solution is to obtain a small caliber rifle outfitted with a spotlight and a silencer. This piece of equipment is at the top of our wish list, but the legal (and illegal) gun situation in Jamaica is not conducive to making this a reality. We would also like to expand our present trapping grid to include a loop trail outside the existing trapping loop. Recent radio-telemetry results indicate that such an expansion would enhance post-natal dispersal in *C. collei* (see below). The current trapping program remains a major effort, owing primarily to the difficulty of accessing the remote interior Hellshire location, not to mention the logistical obstacles posed by the transport of equipment and traps to remote sites. However, continuous removal of mammalian predators is arguably the only conservation activity that is improving conditions for wild iguanas in Hellshire. We thank other members of the trapping team for their efforts, especially Marlon Osborne and Edwin Duffus.

2005 Hatching Season.—The 2005 hatching season was extraordinarily successful, with a minimum of 157 hatchlings recorded for the season (2.5 times as many as 2004). Interestingly, and probably attributable to wetter incubation conditions, the average SVL and mass of hatchlings in 2005 was notably greater than in 2004. Twenty hatchlings were taken to the Hope Zoo for headstarting, 41 participated in a radio-telemetry study (see below), and the remainder were marked and released.

Radio-Telemetry of Hatchlings.—Forty-one hatchlings were outfitted with radio transmitters, of which six slipped out of their harnesses almost immediately; hence, data were collected for 35 individuals. Activity patterns and hide-site selection were similar to patterns observed in 2004, although dispersal distances were greater. High mortality attributable to mongoose and cat predation was also noted. Preliminary analysis of mortality data indicates that hatchlings that disperse out of the predator-controlled area are doomed. Direct observation of mongoose predation on a transmittered hatchling was also observed, and one hatchling was tracked to the stomach of a young Jamaican Boa (*Epicrates subflavus*). Detailed data on dispersal, post-dispersal settling, and subsequent behavior were also obtained. Still on-going, the study will conclude in early December 2005.

Goat Islands.—Two reconnaissance trips were made to the Goat Islands in 2005. The habitat still looks relatively intact, but a rumored organized charcoal operation on Great Goat Island is of great concern. As always, the critical impediment to a Goat Islands rehabilitation program concerns the delegation of management authority. Recently, however, the Urban Development Corporation (UDC) has finally been delegated management authority for both of the Goat Islands, as well as for most of the Hellshire Hills (the organization also owns those areas). We are presently in discussions with UDC that should result in the signing of an MOU with the Durrell Wildlife Conservation Trust (DWCT) and the Department of Life Sciences (UWI), so we can initiate fund-raising activities and begin the restoration project.

2006 Objectives: (1) Continue existing initiatives (e.g., predator control, headstart and release, monitoring iguana population); (2) Radio telemetry of post-partum iguanas; (3) Biological surveys of the Goat Islands; (4) Assessment of "western" and "eastern" Hellshire iguana populations; (5) Consolidation of *C. collei* data sets; (6) Advocacy for management capacity (UDC); (7) Formalization of Goat Island restoration agreements (DWCT); (8) Initiation of genetic studies of Jamaican Iguanas; (9) New postgraduate student to undertake GIS-based habitat assessment of Hellshire; (10) Revision of Species Recovery Program (Summer 2006?); (11) Iguana project facility — Port Royal Marine Laboratory; (12) Fund-raising…

Turks and Caicos Iguana

Glenn Gerber and Allison Alberts
Zoological Society of San Diego

Translocations.—The recently established populations of *Cyclura carinata* on French, Six Hills East, Bay, and Middle Cays were last visited in April/May 2005. All of these populations have exhibited excellent adult survivorship and growth rates. Average adult sizes on all the translocation cays are now larger than those documented for the source cays, Big Ambergris and Little Water. Successful reproduction has occurred on all translocation cays

each year since establishment (January 2002 for French, Bay, and Middle Cays; January 2003 for Six Hills East Cay). All animals captured in April/May 2005 from the first cohort of juveniles produced on the cays were determined to be reproductively mature, based on published size at maturity data (Iverson 1979). Compared to the source populations, this represents a reduction in age at maturity on the translocation cays from 6–7 years to 1.5–2.5 years. Accelerated growth rates on the translocation cays are occurring despite significantly lower plant diversity than on the source cays, and are attributed to low levels of intraspecific competition on these cays relative to the dense source populations. Growth trajectories are expected to decrease as population densities increase.

Big Ambergris Cay.—Development activities on Big Ambergris Cay have increased dramatically in the past year due to new partnerships with outside developers and resulting in establishment of the Turks and Caicos Sporting Club. Irreparable damage to native habitats was already underway in April 2005 during our last visit, and recent reports from Big Ambergris by TCI-based colleagues are extremely grim. Heavy machinery of all kinds is in daily use and no visible effort is being made with regard to iguanas or other wildlife.

Little Water Cay.—Cats, which first crossed the sandbar connecting this cay to Water and Pine Cays in 2000, are still the major concern for this otherwise protected population. A small-scale cat-trapping program that was initiated last year resulted in the capture and removal of three cats from the island's southern end, but this program was suspended in the spring of 2005 and has not yet been reinstated due to a shortage of TCNT staff. No sign of cats was seen during my last visit at the southern boardwalk study site in May 2005, and recent reports from Bryan Manco of the TCNT suggest that this is still the case. Cats were still in evidence at the northern boardwalk study site in May, and their impact on this population (most notably juveniles) is gradually becoming evident. Gerber will accompany a team from Island Conservation to Little Water, Water, and Pine Cays in March 2006 to assess the situation and begin the preparations necessary for full-scale cat and rat eradications. In collaboration with engineers at Johnston's International, efforts are underway to produce and price a fence design that will stretch across the sandbar and isolate Little Water Cay from Water and Pine Cays. Johnston's has offered to install the fence for free.

JOHN BINNS

Turks and Caicos Rock Iguana (*Cyclura carinata*).

Caribbean Wildlife Foundation.—The Zoological Society of San Diego is helping to establish a non-profit conservation organization in the TCI through the donation of boats and equipment that have been dedicated to the TCI iguana project for the past five years, and by covering legal fees associated with incorporation. The new non-profit (tentatively called the "Caribbean Wildlife Foundation") should be functional by mid-2006. Operation will depend on securing outside funding through grants, donations, and other sources. While much of the initial focus will undoubtedly be on iguanas and the TCI, the organization will not be bound to these taxonomic or geographic restrictions. As a non-profit based in a Caribbean country, the foundation will be eligible for a variety of funding sources closed to US- or UK-based non-profits.

Cyclura cychlura figginsi

Charles R. Knapp
John G. Shedd Aquarium and University of Florida

Iguana populations in the Exumas were monitored briefly in May 2005 by the Shedd Aquarium. The translocated *C. c. figginsi* population on Pasture Cay (see past ISG reports for historic details) was visited for 1.5 days, but only six adult iguanas were seen or captured. Pasture Cay is inhabited by rats, and this population is being used to investigate the potential impacts of rats on the growth of iguana populations. Sixteen iguanas were translocated originally in 2002. Three iguanas (two in 2003 and one in 2005) have been confirmed dead and six alive. The others remain missing. The lack of adults is a strong concern but mitigated slightly by the presence of hatchlings and juveniles. We have documented extraordinary growth rates in recaptured juveniles. The unintended translocation of a male-biased propagule is suspected as the reason for the apparent loss of adult iguanas. Intensive monitoring of the population is needed to study the long-term effects of the male-biased translocated colony.

Bitter Guana and Gaulin Cays were monitored for a total of four days resulting in 45 iguana captures (18 recaptures). The goats reported previously on Gaulin Cay were not seen; however, we documented the larvae of *Cactoblastis cactorum* for the first time on an *Opuntia* cactus pad. The iguana education signs posted originally in 1998 have fallen and must be replaced. Bitter Guana Cay was surveyed briefly and two goats were observed. Our concern is the substantial increase in tourist traffic on the two cays, especially Gaulin Cay. Over the past decade, we rarely observed tourists on Gaulin Cay. However, tourists were observed on the cay each day. The visitors come from Staniel Cay located immediately north of the cays. The tourists are being told to visit the island and feed the iguanas. This is a concern because visitor


JOHN BINNS

Exuma Island Rock Iguana (*Cyclura cychlura figginsi*).

traffic in the Exuma Cays has been increasing substantially over the past decade. Many of these tourists land on cays inhabited by iguanas. For example, the Allen Cays in the northern Exumas experience up to 600 people each week from one-day Nassau excursions. The islands in the southern Exumas also receive high-impact visitors from Great Exuma aboard one-day excursion tourist trips. Consequently, few iguana populations in the Exumas remain free from visitor impacts. Visitors purposely feed the iguanas, thus altering their natural behavior and potentially their health. A study should be initiated to investigate the potential impacts of visitor traffic on iguana populations in the Exumas.

The Exuma Island Iguana occurs on only seven cays in the archipelago, and the total population does not exceed 1500 individuals. Protection offered in the form of isolation is being eroded as more yachtsmen cruise the Exumas and islands are leased. Humans bring with them their dogs, cats, and unwittingly deleterious behavior of feeding the lizards. I have become increasingly concerned for the Exuma iguanas over the last two years because of elevated human activity on the cays they inhabit. More protection in the form of signs with rules should be offered to the few populations remaining throughout the Exumas.

25-Year Overview for *Cyclura cychlura inornata*

John Iverson
Earlham College

We continued our study of the Allen Cays Rock Iguana with fieldwork in May 2005. Analysis of the mark-recapture data for subadults and adults (>25 cm snout-vent length) over the first 25 years of field work (1980–2004) using Program MARK (courtesy Gary White at Colorado State University) demonstrated that: (1) the two natural populations of Leaf and U Cays have more than doubled over those 25 years (total populations on Leaf and U Cay now number about 600 and 300, respectively, excluding young of the year); (2) the sex ratio on both islands has shifted from about two males per female in the early 1980s to one-to-one currently; (3) annual adult survivorship has averaged about 90% (although higher in the shy females than the bolder males, and higher on U Cay than Leaf Cay, where tourist visitation and feeding is much higher); and (4) population growth has slowed to near zero over the last few years. Our analysis suggests that the two populations are approaching or have exceeded the


CHARLES R. KNAPP

Allen Cays Rock Iguana (*Cyclura cychlura inornata*).

carrying capacity (K) of their respective islands (with standing crop biomass exceeding 100 kg/ha on Leaf Cay).

The fact that adult survivorship is higher on Leaf than U Cay and yet annual population growth rate on Leaf Cay has exceeded that on U Cay seems antithetical. However, we believe this pattern is a result of higher juvenile mortality on U than Leaf Cay. Preliminary data on nest survivorship for two years (2001–2002) support this hypothesis. Nesting areas on U Cay are less than one meter above sea level, and have wetter, more easily saturated soils. Storms during hatching season in September can cause the suffocation of late-stage eggs or hatchlings in the nest.

During our fieldwork in May 2005, we also visited two other islands onto which iguanas were apparently introduced, and we discovered a third. One of these islands had no iguanas in 1996, but now has at least 40, representing all size classes. Fieldwork in March 2006 will focus on more rigorous surveys of these translocated populations, as well as the exploration of many other small cays in the northern Exumas to which iguanas may also have been introduced.

Cyclura pinguis

Kelly Bradley[1] and Glenn Gerber[2]
[1]*Dallas Zoo and* [2]*Zoological Society of San Diego*

The Anegada Iguana headstart and release program is going very well, with a consistently high rate of survival. The first 24 headstarted iguanas to be returned to the wild were released in October 2003 and ranged in size from 2050–750 g. Survival after two years has been 79%, with 19 animals still alive. The 24 animals released in 2004 ranged from 1540–600 g. After one year, this group has experienced an 88% survival rate with 21 animals still living.

JEFF LEMM

Anegada Iguana (*Cyclura pinguis*) from Anegada.

Because the smallest animals from the 2003 and 2004 releases survived, we decided to further reduce animal size for the October 2005 releases. This past fall, an additional 24 iguanas were released, ranging in size from 1055–415 g. The same release strategy was used as in years past. Twelve animals (6.6) of equivalent sizes were released at each of two study sites: rocky woodland on Middle Cay and sandy scrub in Bones Bight.

The eight smallest iguanas ranged in size from 612–415 g and received internal transmitters to insure our ability to monitor them long-term. Dr. Bonnie Raphael and Nina Palmer from the Wildlife Conservation Society conducted the health screenings and transmitter implantation surgeries. The 16 remaining iguanas were fitted with external transmitters attached to the nuchal crest with nylon coated stainless steel wire and crimping tubes.

All of the animals were released into the wild during the first week of October. The iguanas were tracked daily for the first month, after which survival was 100%. The first follow-up monitoring trip took place in December 2005. After 60 days, 22 animals were still alive, representing a 91% survival rate. Additional follow-up trips will take place in February, May, July, and October 2006.

Conservation Outreach for the Anegada Iguana

Lee Pagni
Zoological Society of San Diego

Conservation Education continues to play an important role in the recovery of the Anegada Iguana (*Cyclura pinguis*). With momentum building from previous years' activities, 2005 saw numerous conservation education activities related to the recovery program.

The program received a grant from the IUCN's Sir Peter Scott Fund for creating outreach materials to include an interpretive guide to the headstart facility, a poster, and complementary brochure to raise local awareness about recovery efforts. These materials will be produced and distributed in 2006. Funding was also received from the World Association of Zoos and Aquariums for capacity building of local educators. These funds were used to cover travel expenses for a group of 12 educators from the BVI to attend a one-day workshop on environmental education coordinated by the Virgin Island Network of Environmental educators (VINE), based in St. Thomas, USVI, the BVI National Parks Trust, and the San Diego Zoo. A grant from the Institute of Museum and Library Services helped fund outreach for a genetic analysis of the San Diego Zoo's captive group of Anegada Iguanas. The outreach activities include a secondary-level lesson on microsatellite DNA that is posted on the San Diego Zoo's website.

An annual highlight is the release of headstarted iguanas back to the wild. This year, 11 members of the Anegada community took part in the October releases. Besides bringing more awareness to the headstart program, local involvement in these types of activities is important to improving local support for other recovery efforts that include protecting key habitat and controlling feral predators.

Finally, outreach efforts were not restricted to the Caribbean. Middle-school students from the San Diego Zoo's ZooCorps program took part in important outreach activities. First, the group learned about Anegada Iguana conservation, produced a display about what they learned, and educated visitors to the zoo about the recovery program. ZooCorps members also created "genetic jewelry" based on a sequence of an Anegada Iguana gene. These colorful and genetically accurate beaded necklaces were given to students on Anegada during an outreach presentation by Kelly Bradley of the Dallas Zoo.

Fijian Iguana Update

Peter Harlow
Taronga Zoo

Thanks to the 18 Iguana Specialist Group members and all the other international specialists who made the long and expensive trip to Fiji for the "Conservation and Management Plan Workshop for Fijian Iguanas" in November 2004. The Species Recovery Plan from the workshop should be finalized and printed in early 2006. Several of the recommendations from the workshop have already been completed or are currently being implemented.

Two reports recommended by the workshop have been completed: the first, titled "Survey Techniques and Data Analyses for Estimating Fijian Iguana Abundance" (by Peter Harlow and Pita Biciloa), has been printed and distributed to all potential users in Fiji. This is a user-friendly description of how to conduct line-transect surveys and analyze the data using distance-survey techniques to obtain abundance estimates for both species of Fijian iguanas.

The second report, "Invasive Plant Assessment and Weed Management Plan for the Fijian Crested Iguana Sanctuary island of Yadua Taba" (by Jennifer Taylor, Peter Harlow, and Jone Niukula) has been printed and distributed. Four species of invasive plants were identified as needing intervention to control and eventually remove from Yadua Taba: Rain Tree, *Wedelia trilobata*, Guava, and *Lantana*. These species are continuing to spread on Yadua Taba and thus decrease the amount of dry forest habitat available for Crested Iguanas (*Brachylophus vitiensis*). Over 300 rain trees have so far been poisoned, which is more than half of the estimated total on the island. The report includes a five-year plan for the removal of these four invasive species by the sanctuary ranger.

This project began in July 2003, and by September 2005, *Wedelia trilobata* or "Trailing Daisy," as it is also called, had been totally eradicated from the island by intensive hand removal. This species is native to the Caribbean, but is highly invasive in the Pacific, covering the forest floor with a foot-thick layer of interconnected plants and choking potential iguana nesting habitat. The successful removal of this species from Yadua Taba is the first record of an invasive plant species being removed from any island in Fiji.

In September 2005, Clare Morrison, Isaac Rounds, Nunia Thomas (University of South Pacific), Pita Biciloa and Jone Niukula (Fiji National Trust), and Peter Harlow (Taronga Zoo)

JOE BURGESS

Fijian Crested Iguana (*Brachylophus vitiensis*).

completed the first of four two-week field trips to Yadua Taba Crested Iguana Sanctuary. We collected tree-use data and buckets of iguana fecal material (for later analyses) to obtain a better picture of Crested Iguana diet across all seasons. Six permanent transects were established and complete vegetation and iguana surveys along each transect were completed. Knowledge of the dietary requirements of this herbivorous species across all seasons is needed to assess potential islands suitable for future translocation of Fijian Crested Iguanas, or for forest restoration on degraded islands. The second trip took place in December 2005, and the fourth and final field trip is scheduled for July 2006.

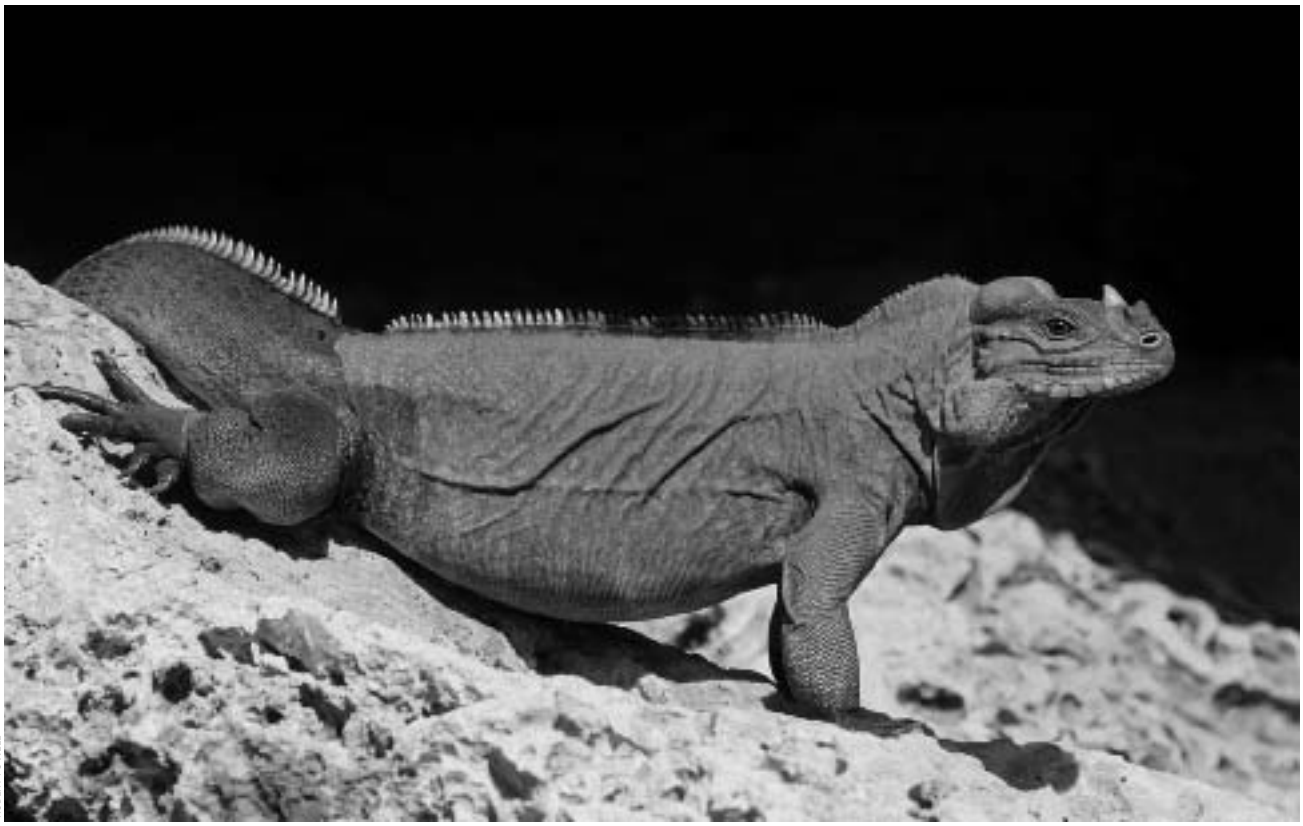
In September 2005, Craig Morley (University of South Pacific) and Peter Harlow, with local assistance, completed a rapid survey of Crested Iguanas on the 40-ha island of Macuata, where Crested Iguanas were re-discovered in 2004. Based on 22 nighttime sightings along 800 m of transect, an average of 25 iguanas per hectare of forest occur on the island, and almost half this island is currently covered in regenerating forest. This island is one kilometer off the northern coast of Viti Levu, Fiji's largest island, and about two hours by road from the capital of Suva. It is privately owned, and was heavily burned and goat grazed until 1994, when goats were removed. The forest is now recovering, and most of the iguana's favorite food tree species are present but in low abundance. This island is second in importance after Yadua Taba for the long-term conservation of the Crested Iguana, and together with Yadua Taba, these are the only Crested Iguana populations in Fiji where numbers are stable or increasing.

Doctoral student Suzie Morrison from the Australian National University (Canberra) began her field research on Yadua Taba in September 2005. Suzie and her partner, Zach Pierce, will be using mark-recapture and radio-tracking techniques to gather basic biological data on reproduction, juvenile recruitment, and habitat requirements of Crested Iguanas. Other projects include seed dispersal by iguanas and rats, the effects of the introduced invasive "crazy ant" on Crested Iguanas and their habitat, and dry forest restoration projects. See their project website at: http://www.fijiancrestediguana.com/

Mona Island Iguana, *Cyclura cornuta stejnegeri*

Miguel García
Puerto Rico Department of Natural and Environmental Resources

The endemic Mona Island Iguana, *Cyclura cornuta stejnegeri*, has been listed as endangered under the Endangered Species Act and the Regulation to Govern the Endangered and Threatened Species of the Commonwealth of Puerto Rico. This is because the species exhibits a limited distribution, relatively low population numbers, and reduced recruitment of juveniles into the breeding stage. Therefore, a head-start program was started in 1999 and is conducted by the Department of Natural and Environmental Resources (PRDNER), the Toledo Zoo, and the University of Puerto Rico. By October 2005, 87 headstarted iguanas had been released and 33 animals had been recaptured. We have recorded dispersal data for nine individuals and found relatively large home ranges, ranging from 2.4–22.2 ha. The average home range (MCP) for all individuals was 19.8 ha. All of the headstarted iguanas observed are active and in good health, indicating the success of this management strategy.



ROBERT POWELL

Mona Island Rock Iguana (*Cyclura cornuta stejnegeri*).

In summary: (1) No released iguanas have been found dead; (2) Relatively large home ranges; (3) Survivorship data are still being recorded by active searching of marked individuals (with or without radios); (4) Population and Habitat Viability Assessment is needed to determine number of released iguanas necessary to obtain a positive and sustained population growth.

Cyclura nubila on Isla Magueyes, Puerto Rico

Miguel García
Puerto Rico Department of Natural and Environmental Resources

The introduced population of Cuban Iguanas on Isla Magueyes has become a problem. These lizards are very charismatic, but the Commonwealth of Puerto Rico has a strict public policy against exotic biota. Only researchers, students, and field workers (no tourists) are allowed on the island, but the animals have been fed and are now aggressive and numerous (~500 on 7.2 ha).

A discussion of this issue was held among ISG members and key points are listed below. A sub-group was formed to help the Puerto Rico Department of Natural and Environmental Resources find an acceptable solution to this dilemma.

Issues include: (1) The population is exempt from the U.S. ESA rules because it is an introduced population. Legally, the animals could be moved from the island to the pet trade within the U.S. Placing the animals in the U.S. pet trade poses serious risks that include improper care, undesirable precedent, and potential release and conversion to a new feral population. (2) This is a CITES I-listed species, so trade within the U.S. is not regulated. Translocating iguanas back to Cuba would involve U.S. export and Cuban import permits. Translocation back to Cuba is zoonotically risky to other herpetofauna. (3) The Cuban government should be contacted by the Puerto Rico Department of Natural and Environmental Resources to assess their interest and involvement in the future of this population. (4) The ISG is concerned about stating a policy in the event of backlash, preferring instead to have the Puerto Rican government decide policy and the ISG then advising on the potential problems of any action. (5) The establishment of colonies on mainland Puerto Rico is unlikely because of many predators even though the over-water distance is short. (6) A control plan is needed with an analysis of harvesting of adults through relocation (outside Puerto Rico), stopping population growth (nest destruction), and euthanasia (last resort).

Molecular Analysis of the Ctenosaurs of Nuclear Central America: Insights into Speciation, Conservation, and Management

Stesha Pasachnik
University of Tennessee

Mesoamerica has been defined as one of the Earth's biodiversity hotspots. The *Ctenosaura* group exemplifies this pattern because it is an incredibly species-rich clade; however, it has received little attention thus far in scientific research. In order to evaluate plausible explanations for speciation within this clade, I plan to: (1) construct a molecular phylogeny of the iguanas of the *Ctenosaura melanosterna* complex inhabiting the Caribbean borders and islands of Honduras, the heart of Mesoamerica (using

JOHN BINNS, ANIMAL COURTESY OF WEST COAST IGUANA RESEARCH

Honduran Black-chested Spiny-tailed Iguana (*Ctenosaura melanosterna*).

the *C. quinquecarinata* complex as an outgroup); (2) investigate the colonization by *C. bakeri*, *C. similis*, *C. melanosterna*, and *C. oedirhina* of the Bay Islands, Cayos Cochinos, and various Caribbean islets bordering Honduras; and (3) document the degree and directions of hybridization, between endemic *C. bakeri* and a wide-ranging congener, *C. similis*, on the island of Utila, Bay Islands, Honduras. This study will provide insight into diversity, species status, and the conservation and management strategies that are necessary to preserve species in the *Ctenosaura melanosterna* complex.

Genetic Studies Update

Catherine Stephen
Utah Valley State College

Iguana Phylogeography.—*Iguana* consists of two species, *I. iguana* and *I. delicatissima*. Whereas *I. delicatissima* historically has a very limited range restricted to the Lesser Antilles, *I. iguana* is found throughout the Neotropics and the Lesser Antilles (Burghardt and Rand 1982). *Iguana iguana* is unlikely to constitute a single interbreeding population, given the enormous physical distances and barriers to gene flow. We are using nuclear and mitochondrial DNA-sequence data to explore the phylogeographic history of this species. Samples included in the preliminary analysis have been collected from 17 different countries. Results from both data sets show a congruent, deep lineage divergence between the Central American populations and the South American plus Lesser Antillean populations of Green Iguanas. The topology of the phylogeny indicates that *Iguana iguana* arose on the South American continent and radiated much more recently into Central America.

Subfamily Iguaninae Phylogenetics.—Iguaninae is an ancient group with eight modern genera distributed throughout the Western Hemisphere and the Fijian Archipelago. Previous morphological and molecular studies of iguanine relationships have relied on incomplete sample sets that yielded conflicting topologies. The subfamily collectively spans thousands of miles across multiple geographical boundaries and exhibits a high degree of regional and island endemism. Because of its age and distribution, the group is uniquely suited to test biogeographic hypotheses, such as suggested occurrences of past refugia or relictual fragments, as well as allow empirical evaluation of molecular clock models. In order to generate a robust phylogeny, we have collected DNA-sequence data at four loci (two nuclear and two mitochondrial) for all eight genera, including 28 of the iguanine species. Phylogenies generated from maximum likelihood analysis of separate data sets result in congruent phylogenies with varying levels of resolution.

Preliminary analyses strongly support *Dipsosaurus* as the most basal lineage in the subfamily, followed by an early dispersal of *Brachylophus* to the Fijian Archipelago and a subsequent divergence of the *Cyclura* lineage. A sister relationship between *Sauromalus* and *Iguana* is supported by the combined analysis, and this clade is sister group to the rest of the subfamily (*Ctenosaura*, *Amblyrhynchus*, and *Conolophus*). Interestingly, *Ctenosaura defensor* falls outside of the *Ctenosaur* clade in the three data sets in which it was included.

Booby Cay Study.—*Cyclura carinata*, a Bahamian Rock Iguana, currently has two recognized subspecies. *Cyclura c. carinata* is found on several islands and cays throughout the Turks and Caicos Islands. The second subspecies, *C. c. bartschi*, is now

JOE WASILEWSKI

Bartsch's Rock Iguana (*Cyclura carinata bartschi*) from Booby Cay.

known only to exist on Booby Cay, a small island off Mayaguana Island, Bahamas, which is also within the subspecies' historic range. Support for subspecific status is weak. Geographic isolation appears to be the only strong indicator of genetic isolation. Recent conservation attempts made on the species' behalf have raised questions regarding the taxonomic status of the subspecies. We used mtDNA-sequence data to ask whether any genetic variation distinguishes *C. c. bartschi* from several sampled populations of *C. c. carinata*. Our findings show that the Booby Cay population of *C. carinata* is fixed for a common mtDNA haplotype found in Caicos Island populations of *C. carinata*. In contrast, four different haplotypes were found among populations designated *C. c. carinata*. We conclude that evidence is insufficient to support *C. c. bartschi* as a subspecies and recommend that the Booby Cay population of *C. carinata* be included in ongoing conservation efforts currently focused on the Turks and Caicos Islands.

Bartsch's Rock Iguana, (*Cyclura carinata bartschi*)

Steve Conners, Joe Wasilewski,
Joe Burgess, and John Bendon

The population of *Cyclura carinata bartschi* found only on Booby Cay, Mayaguana, Bahamas has been monitored annually since 1998. Repeated observations by a core group of team members indicate that the population has remained healthy and stable over this time period. All size classes and sexes have been seen during each visit despite the continued presence of introduced goats, rats, and a strong hurricane. Human activity (periodic camping by fishermen) on the island has had no negative impact on the iguanas. Interviews with local residents indicate that harvesting of goats may be increasing, which would reduce their population, and thus their impact on the vegetation. Currently, 50 individual iguanas are marked, but few recaptures have been made. Iguanas were observed foraging on seagrass during extremely low tides. A set of transect surveys has been completed, resulting in a conservative population estimate of 14.5 lizards/ha, or a total population of 558 animals on the Cay. We recommend that annual monitoring of this population continue.

International Iguana Foundation Report

Rick Hudson
Fort Worth Zoo

The International Iguana Foundation (IIF) currently has 14 Board members representing zoos, NGOs, corporations, and foundations; the group is largely U.S.-based with one foreign partner (Durrell Wildlife Conservation Trust). To date (December 2005), nearly $400,000 has been raised through a combination of annual Board pledges, grants, and donations. The IIF has received and administered over $120,000 in grants from a number of sources including AZA Conservation Endowment Fund, Morris Animal Foundation, SSC Sir Peter Scott Conservation Action Fund, Conservation International, and a host of zoos. One of the IIF's most generous sponsors has been the Disney Wildlife Conservation Fund (DWCF), which has awarded $68,750 to the IIF for iguana programs in Grand Cayman (2002–2003), Turks and Caicos Islands (2004), and Jamaica (2005).

JOE BURGESS

Resident male *Cyclura cychlura cychlura* at Tiamo Resort, Andros.

JOE BURGESS

Aerial view of Andros Island.

Where have these funds gone? The IIF has awarded just over $170,000 over four grant cycles (including the recent 2005 awards) to support iguana conservation work in Grand Cayman, Jamaica, Anegada, St Lucia, Dominican Republic, Isla Mona, the Bahamas, and Fiji. Funds also have been raised to support major projects that include emergency relief efforts for Hurricane Ivan damage ($17,000), Hope Zoo iguana facility renovations ($9,000), and the development of a feral mammal control plan for Anegada ($11,000, thanks to San Diego Zoo). Highlights of some of the projects and programs that IIF has supported include:

- Salary support for manager of the Blue Iguana headstart and breeding facility on Grand Cayman
- Support for the release and monitoring of 23 Blue Iguanas in Grand Cayman's Salina Reserve in 2005–6
- Support for biologist Rick Van Veen's salary to conduct fieldwork in Jamaica's Hellshire Hills, where he is solving many mysteries on the life (and death) of the Jamaican Iguana
- Support for the ongoing predator control effort in Hellshire Hills and studying the impact of their removal
- Support for the repatriation of 28 headstarted Jamaican Iguanas (2003 and 2005)
- Provided support to the ongoing iguana headstart program at Jamaica's Hope Zoo
- Support for field surveys and conservation research for the Anegada Iguana recovery effort
- Funding for the pre-release health screening, repatriation, and follow-up monitoring for 72 Anegada Iguanas (2003–2005)
- Assistance with the purchase of a dedicated project vehicle for the Anegada field researchers (split with IRCF funds from Daytona NRBA auction)
- Training and technical support for the Anegada Iguana headstart program
- Funding of signage for the protected nesting area for the St. Lucia Iguana
- Funding for research on the nesting ecology and hatchling survival of the St. Lucia Iguana
- Funding to the NGO Grupo Jaragua to conduct field research that led to the discovery of a major hotspot of Ricord's Iguana habitat in the Pedernales region of the Dominican Republic
- Funding for the translocation of ten San Salvador Iguanas from Green to Cut Cay in the Bahamas in 2005
- Funding for a new iguana population field assessment technique for the Mona Iguana
- Support for an ongoing natural history study for the Fiji Crested Iguana on Yadua Taba

The IIF faces a number of major challenges in 2006; these include the development of a strategic business plan, identification of corporate partners, ramping up fund-raising efforts, increasing visibility and exposure, and expanding content on the IIF web site.

The IIF Board of Directors met on 9–10 November 2006 following the ISG meeting in South Andros, Bahamas. The Board reviewed five proposals requesting a total of $53,473. Due to funding constraints, the Board was able to award $31,864 to the following five programs, four of which provide direct support to iguana species ranked Critically Endangered by the IUCN Red List (*Brachylophus vitiensis, Cyclura lewisi, C. collei,* and *C. pinguis*). Subsequent to the meeting, emergency funds were awarded for conservation of *C. ricordii*, also Critically Endangered.

IRCF Report

John Binns
International Reptile Conservation Foundation

In December, IRCF was granted $36,400 by the Dart Foundation toward improvements to the Blue Iguana Recovery Program's captive breeding and head-starting facility on Grand Cayman. IRCF's 501c3 status facilitated this grant, which will be transferred to the Blue Iguana Conservation Fund on Grand Cayman, where it will be utilized to refurbish and subdivide an oversized breeding pen, complete a storage shed and food preparation area, install piped water throughout the facility, and supplement funds already being raised by an IRCF web appeal to erect a security and tour management fence for the facility.