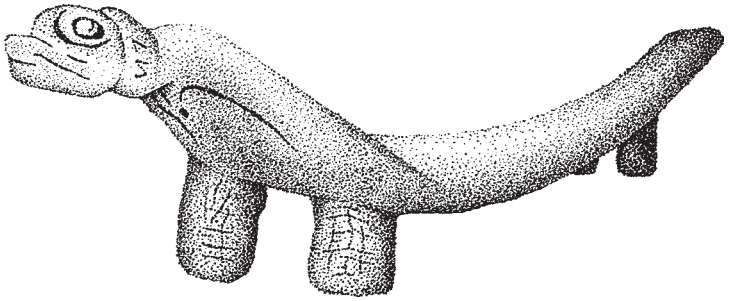
# West Indian Iguana Specialist Group



# *Newsletter*

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## In This Issue



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## News & Comments

The following press release comes from the Bahamas Department of Agriculture via Sandra Buckner, WIISG Co-Chair.

April 6, 1998 News Release

The Bahamas is home to three species of rock iguanas, that live in most cases on small isolated cays, which from first glance, would be thought incapable of supporting such magnificent creatures.

*Cyclura rileyi cristata* is one of three sub-species of the *Cyclura rileyi* found in The Bahamas. It is found only on White Cay (also called Sandy Cay) in the Southern Exumas. The cay is approximately one kilometer long and one half kilometer wide. The island is typical of most of the Bahamian cays with sparse vegetation (approximately 25 species). Beside the iguanas, the cay is home to anole lizards, insects and other invertebrates. The cay is also used by both migratory and resident (nesting) birds.

The iguanas have for some time been suffering from rat predation, and recently also by a raccoon carelessly placed there by some unthinking individual. The raccoon has thankfully been eradicated, however, the rat predation threatens the sub-species with extinction, if they are not removed.

As a result of the population decline, this animal is considered to be one of the most endangered lizards in the world, and is listed as a priority species by the World Conservation Union (IUCN).

The population has benefited from intense surveys and monitoring by Dr. William K. Hayes and Dr. Ron Carter from Loma Linda University in California. Studies have revealed that the population has been reduced to a critically low maximum of 200 individuals. Studies have also revealed that the population is skewed towards males, with a possible minimum of 10 females in the total population. This is extremely alarming as it implies that the reproductive capacity of the population is severely depleted, further reducing their chance of survival.

The Ministry of Agriculture and Fisheries in fulfillment of its Wildlife management mandate, in cooperation with The Bahamas National Trust, will be carrying out a rodent eradication programme on White Cay during the next four weeks. Mrs. Sandra Buckner, President of The Bahamas National Trust, is also Co-Chair of the IUCN West Indian Iguana Specialist Group. Through the efforts of Mrs. Buckner, Flora and Fauna International, a conservation organization headquartered in Cambridge,

UK, has agreed to lead us in this project.

Mr. Mark Day from Flora and Fauna International will act as Project Manager for the programme. Toby Ross and Karen Varnham also from Flora and Fauna International, will be a part of the project team.

Dr. William Hayes has also agreed to come to assist in the project. We are very appreciative of the distinguished individuals who have agreed to assist us with this national project.

The project will be based on a system that establishes a grid of bait stations. The bait will be placed inside bait stations constructed from plastic tubing. Bait stations will be monitored on a constant basis by personnel who will remain on the island for the duration of the project.

All attempts will be made to reduce the impact on the environment in general, and specifically, to other species that share the cay as an ecosystem. It is envisioned that negative impacts to the environment will be negligible, however great care will nonetheless be undertaken for maximum environment safety. Bait will only be placed within bait stations, and all supplies will be kept in sealed plastic bins. All unused supplies of bait will be removed from the island upon completion of the project.

The Department of Agriculture has assigned two Officers to take part in the project. Additionally, Officers from the Department of Environmental Health Services will be taking part in the project. It is hoped that through the experience gained, these Bahamians will be equipped with the skills needed for carrying out similar rodent control programmes in other parts of The Bahamas.

The Ministry wishes to stress that all precautions will be taken to prevent impact on non-target species and ecosystems. The anticipated benefits of the project will result in an improvement in the general ecosystem conditions of the cay. Predation on iguana eggs, hatchlings, and juveniles will be eradicated. This will result in an increase in the iguana population size, as well as a restoration of the sex ratio to close to normal.

The project will also enable the recovery of the environment, of the seabird colonies and other wildlife on Sandy Cay. Similar projects conducted in other parts of the Caribbean have shown that many groups prosper after rat eradication: this includes birds, reptiles and plants.

Additionally the project has an important ecological value as it will become the demonstration project that will raise greater awareness of the benefits of ecological restoration of numerous other Bahamian cays.

The following press release comes from The U.S. Dept. of Justice via Bruce Weissgold, CITES Policy Specialist, U.S. Fish and Wildlife Service.

October 30, 1998 News Release

Thomas E. Scott, United States Attorney for the Southern District of Florida, Lois J. Schiffer, Assistant Attorney General for the Environment and Natural Resources Division of the U.S. Department of Justice and Jorge Picon, Resident Agent in Charge for the U.S. Fish and Wildlife Service in Miami, announced that a federal Grand Jury sitting in Miami has returned an 11 Count Indictment charging Dwayne D. Cunningham, 41 of Pembroke Pines, and Patricia E. Cunningham, 35 and Robert A. Lawracy, 32, both of West Palm Beach, Florida with illegally trafficking in reptiles protected under domestic and international [law] in violation of the Lacey Act (the Federal anti-wildlife trafficking statute) and the Endangered Species Act (ESA), as well as charging the defendants with conspiracy and smuggling. Each of the ten felony charges in the indictment are punishable by up to 5 years in jail and up to a $250,000 fine, while the single misdemeanor, the ESA violation, is punishable by up to a year in jail and a $100,000 fine. Dwayne Cunningham is named in seven felony charges and a single misdemeanor; Patricia Cunningham faces four felony charges and a single misdemeanor; and Robert Lawracy faces four felony charges. Lawracy surrendered to federal authorities today. According to statements in Court, arrest warrants are pending against the remaining two defendants.

According to the Indictment, from 1992 through December 1997, the defendants engaged in trafficking reptile species that originated on various West Indies islands and that are protected under an international treaty known as "CITES", the Convention On International Trade in Endangered Species of Fauna and Flora, which is implemented in the United States through the Endangered Species Act. Several species of *Cyclura* (Ground Iguanas), including the Exuma Island Rock Iguana and the Virgin Island Rock Iguana and Red-footed Tortoises, are alleged to have been smuggled into the Untied States aboard cruise ships touring the Caribbean and the Bahamas that employed Dwayne Cunningham and Lawracy. The species of *Cyclura* listed in the Indictment, are species currently threatened with extinction, and listed on Appendix I of CITES, the highest level of protection

available under the treaty. According to the allegations in the Indictment, the defendants held none of the required documents for the species they imported, possessed and sold.

The Indictment further alleges that in an effort to conceal the smuggling of Exuma Island Rock Iguanas, the Cunninghams procured from the U.S. Fish & Wildlife Service a permit for the "captive breeding" of species listed under the Endangered Species Act to create the impression their sale of these reptiles stemmed from a viable domestic breeding program rather than smuggling of wild-caught animals. Moreover, the Indictment also charges that in furtherance of the conspiracy to trade in smuggled Caribbean reptiles, Dwayne Cunningham and Lawracy stole mature red footed tortoises in 1995 from the Curaçao Zoo and smuggled them to the United States.

A second part of the indictment centers on the smuggling of highly protected Madagascan Tree Boas, Madagascan Ground Boas, Radiated Tortoises and Spider Tortoises, from Madagascar into Germany, and ultimately into Florida. The Cunninghams are alleged in the indictment to have been couriers, purchasers and sellers of these reptiles. Other members of this smuggling ring, including several German citizens, have already been the subject of Indictments in the Middle District of Florida.

Mr. Scott commended the work of Special Agent Chip Bepler of the United States Fish and Wildlife Service for his work on the case.

The United States was represented in this matter by Thomas Watts-Fitzgerald, Chief of the Environmental Crimes Section at the U.S. Attorney's Office and Peter J. Murtha, Senior Trial Attorney, United States Department of Justice, Wildlife and Marine Resources Section.

**Announcements** ✲ Following a recommendation at the Oct 1998 WIISG meeting at White Oak Florida, a Registry for *Cyclura* held in the private sector is being developed by James Conyers of CRISIS. Currently an introductory cover letter and simple questionnaire are being developed and should be ready for distribution by the beginning of May. Distribution format will include email, fax and post. For more information or to submit potential target audiences for the survey contact James Conyers (address below).

During 3 weeks in June, CRISIS (Conservation & Research of Island Species & Insular Systems) will be deploying 2 field teams in the Hellshire Hills of Jamaica. Working in support of the Jamaican Iguana Research and Conservation Group CRISIS will be providing personnel and equipment to conduct extensive ground searches for additional nesting sites and iguanas. In addition to attempting to locate iguanas and nest sites the teams will be working on GPS/GIS maping of the area. For more information, or if you are planning to be in Jamiaca during June and would like to join a team in the field for a couple of days contact:

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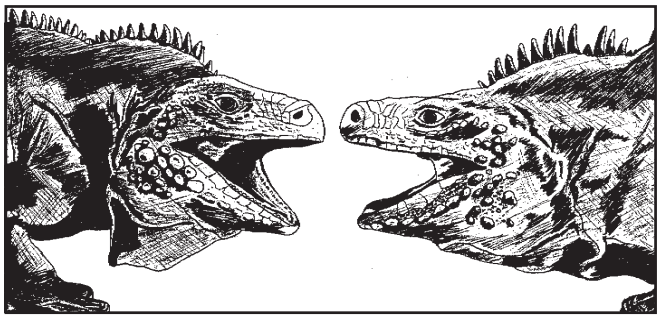
Headstarted *Cyclura collei* wearing radio transmitter

**Fund Raising** ✲ A few t-shirts designed by Jeff Lemm (San Diego Zoo) are still available to help raise funds for WIISG activities. It features a 4-color drawing of two adult male Cuban iguanas in a face-off position on both the front and back of the shirt (right). The shirt is ash-gray in color and available sizes include: Youth M and Adult S, M, L, and XL. The cost is $14 per shirt, ($10 for youth size). To place an order, please send checks made out to the FORT WORTH ZOO to Jeff Lemm, San Diego Zoo, P.O. Box 120551, San Diego, CA 92112. Printing of the shirts was the generous donation of Allen Repashy at SouthSwell ScreenArts. The West Indian iguana educational poster featuring full color photographs of 14 rock iguanas and a map of the Caribbean is also available. Contact Rick Hudson, Fort Worth Zoo.

IUCN/SSC West Indian Iguana Specialist Group



Working to Save the World's Most Endangered Lizards

**Editorial** ✲ For me, the paper by Censky et al.[1] which relates the discovery of iguana rafting was not a surprise. I am aware of first hand observations made by local scientists and fishermen who frequently saw iguanas swimming in the sea, far from the coasts, between the different Guadeloupe Archipelago islands.

To check for over-water dispersal, I tried to observe *Iguana delicatissima* at sea by taking males on a boat and allowing them to jump in the water. One individual jumped on its own, swam for 80 seconds, dived 3 meters and stayed under water 28 minutes, then surfaced and swam for 40 minutes. *Iguana iguana* is able to withstand about 270 minutes under water[2]. Even if rafting is the means of over-water dispersal, free swimming over great distances is for iguanas another means of colonization.

Moreover, human transport also contributes to colonizations. I have also observed first hand boatmen throwing living *Iguana iguana* from Les Saintes into a Guadeloupe harbour. This is a common practice because iguanas are so numerous there that they are garden pests. *Iguana iguana*, which are said to inhabit only some islands of this archipelago[3], naturally colonized islands where *Iguana delicatissima* was present, and now competes and hybridizes with them. Currently Les Saintes have only *Iguana iguana* and *delicatissima* x *iguana* hybrids.

During hurricanes, iguanas can be thrown from their trees by the wind and carried to sea (film made by Mr. Plassais in Saint-Barthèlemy during Hurricane Luis). During Hurricane Hugo (1989) the water temperature was 28-29 degrees Celsius[4]. These temperatures allow iguanas to swim without being cooled to the point where they are unable to move.

Censky et al.[1] suggested that the iguanas seen in Anguilla, Barbuda, and Antigua came from Guadeloupe. Louis Redaud (Parc National Guadeloupe) told me that a raft with about 15 iguanas was seen one week after Luis between Guadeloupe and Antigua. Mark Day (Flora and Fauna International) and I collected iguana tissues from nearly all the Lesser Antilles iguana populations, so we are able to determine, without speculation, the real origin of the rafting iguanas.

The assertion of Censky et al.[1] concerning iguana distribution is based on outdated statements[3]. For example, both iguana species inhabit Basse-Terre and *Iguana iguana* out competes, hybridizes with, and eliminates *Iguana delicatissima* there; on Martinique both species are also present, with *Iguana iguana* introduced by man from Les Saintes at the beginning of the 1960s. Thus, it is difficult to say from where iguanas originated when actual iguana distributions are not known.

Because a raft was seen landing on an island, it is incorrect to assume that this means of colonization may explain all the terrestrial vertebrate distributions. Man is also responsible for the redistribution of a fraction of West Indian herpetofauna.

1. Censky, E.J., K. Hodge, and J. Dudley. Nature 395:556, 1998.
2. Moberly, W.R. Comp. Biochem. Physiol. 27:21-32, 1968.
3. Lazell, J.D. Bull. Mus. Comp. Zool. 145:1-28, 1973.
4. Pagney Bènito-Espinal, F. In: Hugo Genëse, Incidences Gèographiques et Cologiques sur la Guadeloupe, edited by F. Pagney Bènito-Espinal and E. Bènito-Espinal. Parc National de la Guadeloupe, p.19-75, 1991.

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**Turks and Caicos News** ❊ The Turks and Caicos Department of Environment and Coastal Resources, The Denver Zoological Foundation, and The Conservation Agency have begun a joint project to relocate individual *Cyclura carinata carinata* that will be displaced by development of Big Ambergris Cay. The relocation effort will initially be focused on Long Cay, Caicos Bank, once the feral cat population there has been eradicated.

The feasibility study for this relocation effort, conducted jointly in January 1999, also resulted in a range extension for *C. c. carinata*. A previously undocumented population of iguanas was found on J.A.G.S. McCartney Cay. Given the high iguana density observed in regions of the island visited, and the size of the island (ca. 5 km x .25 km), J.A.G.S. McCartney Cay could support several thousand iguanas and would therefore represent an important sub-population. Thorough population estimates for J.A.G.S. McCartney Cay are planned by the research team in upcoming months.

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In April of this year, Rick Hudson and Glenn Gerber met with Government and NGO representatives in the Turks and Caicos Islands (TCI) to offer assistance in developing a comprehensive conservation strategy for *Cyclura carinata carinata*. The following recommendations were made in meetings with the Director of the TCI National Trust, and the Director and Chief Scientific Officer of the Department of Environmental and Coastal Resources (DECR): 1.) continued monitoring of all extant iguana populations, 2.) establishment of a feral mammal eradication program, and 3.) implementation of stringent mitigation protocols for new developments impacting iguana populations. To facilitate implementation of this strategy, an MOU between the DECR, the National Trust, and the WIISG was proposed. All parties agreed to the value of an MOU and a draft document was circulated. In accordance with the MOU, the WIISG will act in an advisory capacity for iguana conservation issues, and will oversee and coordinate the activities of WIISG members in the TCI.

Regarding the Big Ambergris development, mitigation actions previously recommended by the WIISG were reviewed, and an informal proposal for relocating iguanas from Big Ambergris to nine cays in the TCI (presently without exotic mammals or extant iguana populations) was presented. Responses to the presentation were positive and a formal proposal for this work is in preparation. An interdisciplinary team from the San Diego Zoological Society will undertake the proposed project, with assistance from the DECR and the National Trust. To further discuss mitigation of the Big Ambergris development, including the official establishment of Little Ambergris Cay as a Sanctuary, meetings were also held with the Assistant Director of Planning and with the Permanent Secretary of Natural Resources.

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## Taxon Reports

### Lesser Antillean Iguana (*Iguana delicatissima*)

A status survey and conservation assessment of the *Iguana delicatissima* population on Sint Eustatius was conducted 30 October - 12 November, 1998. Participants were Steve Reichling (Memphis Zoo), Brian Leysner (CARMABI), Glenn Gerber (Univ. of Tennessee), Catherine Malone (Texas A & M Univ.), and Jaap Begeman (SteNaPa). The survey was funded by the Memphis Zoological Society Conservation Action Network. The following is a brief and preliminary summary of our findings.

Six males and five females were captured in the field, and an additional 1.4 captives were examined (King's Well Hotel). Range (mean) for male/female measurements were: SVL(mm): 145-434 (364)/88-401 (322); TL(mm): 417-867 (743)/233-797 (631); mass (g): 152-3430 (2803 excluding juvenile)/236-2650 (1914 excluding juvenile).

Adult females exhibited the gray dorsal coloration and pink or red jowl pigmentation often attributed to males exclusively. In this way the population on Sint Eustatius (representing the St. Kitts bank) resembles the one on Anguilla (the northernmost bank in the species' distribution) and differs from populations at the southern end of the distribution, for example, Dominica. The hatchling resembled juveniles observed in Dominica, and are very different in coloration compared to juvenile *I. iguana*.

Steve Reichling and Catherine Malone

The 7.9 animals actually handled (6.5 wild, 1.4 captive) were permanently marked with Trovan PIT tags (courtesy of Fauna & Flora International) on the dorsal surface of the left rear leg (except for one hatchling tagged on left posterior trunk), and by attaching a unique color combination of glass beads to the base of the nuchal crest.

An objective of the survey was to estimate density by mark-resight or distance survey methodology. However, densities were too low to be quantified by either technique. During ~116.5 man hours over 12 days, searching throughout the island, only 23 animals were caught or sighted in the wild. Previous density estimates, based on similar experience by Day and Leysner in 1992 of ~300 animals seems reasonable.

Relative densities were estimated as hours searched per iguana seen. The island was subdivided into seven zones which appeared to offer distinct habitat types to iguanas: Quill crater, outer slopes of Quill, foothill scrub around base of Quill, Island Estate development, Cultuurvlakte (central plain), foothills and guts bordering northern hills, and northern hills (Boven, Gilboa, Little Mountain). No iguanas or signs of recent presence were observed in four zones: Quill crater, outer slopes, foothill scrub, and Cultuurvlakte. Hours searched per iguana were: Boven Hills 2.75, bordering foothills and guts 7.3, Island Estates 1.8.

Despite the small sample size, a clear pattern emerged regarding the distribution of *I. delicatissima* on Sint Eustatius. All iguanas were encountered in one of three areas: the Boven Hills region and the foothills and guts at the margin of these hills at the north end, and in the Island Estates development area on the NW slope of the Quill. These localities encompass the most inaccessible parts of the island from the standpoint of threats to the iguanas. Boven Hill and surrounding peaks are physically difficult to access due to the lack of roads and steep slopes with thick, thorny vegetation. Reaching the areas where iguanas live probably requires more motivation than most iguana hunters can muster. The Island Estate properties are retirement villas owned by American citizens, with lushly landscaped yards that are fenced and off limits to local residents hunting iguanas, as well as goats. An effort to search systematically throughout the island was made. Areas where iguanas were easily found in 1992 by Day and Leysner and independently by Reichling, such as the cliffs along Smoke Alley Beach, English Quarter, and the foothill scrub at the SW base of the Quill seem devoid of lizards now. Occasional sightings in these areas by residents indicate that some remain, but the numbers must be extremely low.

Human predation on Lesser Antillean iguanas for food continues to threaten the population on Sint Eustatius. The problem of feral goats which was noted in 1992 has gotten worse, with over 8,000 animals ranging free over the 11.8 sq. mile island (a goat to human ratio of 4:1). Reduction of the goat population and corralling the remainder is a sensitive issue which has resisted attempts to address in the past. A feral cat problem, which was not apparent during earlier field work, has developed and may be preventing recruitment of juveniles, although we saw no direct evidence of this. However, the cat population, and its negative influence on iguanas, can be expected to grow unless action is taken. An introduced plant (from Mexico?) locally known as coralito or coral vine (precise identity unknown by us) is slowly blanketing large parts of the island, covering native vegetation in a way reminiscent of kudzu in the southern US. This plant may represent a serious threat to the total ecosystem of Sint Eustatius, and specifically to iguanas by competing with food plants.

Blood samples were collected from 16 *delicatissima* (11 collected in the field and 5 from a captive group at the King's Well Hotel). These will be incorporated into the phylogenetic analyses of the genus *Iguana* and the West Indian iguaniines by Catherine Malone and Scott Davis (Texas A&M Univ.). The team also collected tissue samples from *I. iguana* on Saba during a side-trip (see Taxon Report this issue for I. *iguana*). Femoral pore samples from male *I. delicatissima* were collected for use by Allison Alberts (San Diego Zoo - CRES) in her analyses.

Three positive developments in the conservation of *I. delicatissima* on Sint Eustatius occurred between the 1992 surveys and the present study. A NGO, the Sint Eustatius National Parks Foundation (SteNaPa), has been established with the responsibility

Steve Reichling and Jaap Begeman

of managing and supervising the marine park and protected lands. SteNaPa Manager Jaap Begeman is a bright and dedicated biologist well-informed on the iguana issue and very interested in the species' protection. In March 1997 a law was passed making it illegal to hunt and kill iguanas on Sint Eustatius, punishable by a 5,000 guilder fine (~$2,860 US.) However, the law is not universally obeyed. Enforcement of the law usually occurs only when the staff of SteNaPa report a violation. The crater of the extinct volcano, the Quill, and the outer slopes of the old cinder cone above 250 meters has been designated a National Park. More relevant to iguanas was the designation of the Boven-Gilboa Hill/Little Mountain area as a "protected landscape", with further development prohibited. This area appears to support the greatest number of iguanas on the island. However, goats overrun this region and the landscape is considerably degraded. SteNaPa is currently finalizing a management plan for the Quill, and will then begin to develop one for the Boven Hills area.

When the Sint Eustatius field work was being planned, we hoped to find one of the last healthy populations of Lesser Antillean iguanas in need of protective measures and management to maintain the situation. Instead we found a dwindling remnant population with good protective measures on paper but not effectively implemented. The survey team believes that the most effective target for future efforts should be education and public relations on the island in an effort to inform the local residents and government of the status of their iguanas and need for protection, proposing alternatives or modifications to common practices that are sensitive to the needs of the people. Similar efforts have been carried out successfully through the coordination of Fauna and Flora International, and that expertise, via Mark Day, should be sought for any endeavor on Sint Eustatius. Now that the relatively concentrated population of Boven Hill has been located, another survey should be conducted to estimate density so that it can be monitored closely. Target year for both these activities is 2000.

As the only extant population of *Iguana delicatissima* on the St. Kitts island bank, the Sint Eustatius iguanas are important to the genetic diversity of the species. The current situation on the island is worsening, but optimism is warranted given the interest shown by SteNaPa and the local government in protecting the species. A carefully planned and deftly delivered education campaign will be the key to the long-term survival of iguanas on Sint Eustatius, and implementing this campaign should be a priority goal of the WIISG.

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In Martinique, *Iguana delicatissima* is restricted to the north coast of the island and some inland sites but I do not know the size of this population. The largest *I. delicatissima* population is found on Ilet Chancel.

Ilet Chancel, which is about 80 ha, lies on Baie du Robert on the Atlantic coast. In 1993, Mark Day, with my help, visited this island to measure and collect tissue samples from *I. delicatissima*. In 1994 and 1997, I visited this island and was able to find two of the iguanas tagged 4 years before (one male, one female) in the same trees. When I was in Chancel in August 1997, it was the laying season as in other parts of the range. I was able to estimate this population at 250-300 iguanas. Half of the island is covered with treessuch as *Hippomane* and *Tabebuia*, which are commonly eaten by iguanas. It was surprising not to find a greater iguana population as is found on Petite Terre. The limiting factor is apparently the small area available for egg laying. In fact, there are only two main sites and two smaller sites. In the main sites, the ground is overdug by the females such that they dig out previously laid eggs. In 10 days, more than 40 eggs were thus destroyed by iguanas. I have proposed some modifications of the two laying sites, mainly to increase the surface area and to prevent the collapse of one site that is situated at the edge of a plateau.

Ilet Chancel is planned to be a reserve shared between private owners (the island is inhabited) and the Office National des Forêts. In Martinique, *Iguana iguana* is also present, with its main colony found in Fort de France and increasing. This summer I will try to find solutions to prevent *I. iguana* from colonizing Ilet Chancel. We know that these common iguanas were introduced to Martinique in the 1960s, probably from les Saintes. Genetic studies will confirm this.

Following my work with Mark Day in les Iles de la Petite Terre (Guadeloupe) and a one year study on birds and iguanas sponsored by the Association pour l'Etude et la Protection des Vertèbrès des Petites Antilles (AEVA), the french government decided to create a natural reserve for these islands. The reserve was officially created on Sept. 3, 1998 and these islands now have full legal protection. Although the 1.5 $km^2$ islands were inhabited by 12,000 -16,000 *I. delicatissima* before Hurricanes Luis and Marylin (1995), at the beginning of 1996 the population dropped to about 6,000 individuals.

During the study we collected iguana scat monthly for one year to study iguana diets and compare the different kinds of vegetation consumed during the wet and dry seasons.

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## Common iguana (*Iguana iguana*)

The small island of Saba, located in the northern Lesser Antilles, was visited by Catherine Malone (Texas A&M University) and Glenn Gerber (University of Tennessee) from November 12-16 to investigate the population of common iguana, *Iguana iguana*, found there. Financial assistance was provided by the Memphis Zoological Society Conservation Action Network, and Fauna and Flora International. Logistical assistance was provided by Tom Vanít Hof (Saba Conservation Foundation), Jaap Begeman (St. Eustatius National Parks Association), Steve Reichling (Memphis Zoo), Brian Leysner (CARMABI), and Mark Day (FFI). The following is a brief account of our visit, including our interest in this particular population of *Iguana iguana*.

Saba is a small volcanic seamount (approximately 14 sq. km with a maximum elevation of almost 900 m) and is the only island on (near) the Saba Bank. Saba also appears to be the only island in the northern Lesser Antilles that supports a native population of *Iguana iguana* (excluding recent hurricane induced colonizations). All of the surrounding island banks support native populations of *Iguana delicatissima*, or at least did historically. Thus, the population of common iguanas on Saba is relatively isolated and somewhat an anomaly. Further, the animals are melanistic and therefore appear to differ, at least in coloration, from most other populations of the species. For these reasons, we suspect that Saban iguanas may represent a unique and endemic form of *Iguana iguana*.

A relatively young (only partially melanistic) adult male *Iguana iguana* displaying from a cliff face on Saba.

The recent finding that common iguanas on St. Lucia, which also differ in coloration from other populations, are genetically distinct from other sampled populations (S.K. Davis and C. Malone, unpublished data) also supports this. Consequently, the primary purpose of our visit was to collect blood samples from Saban iguanas for genetic analysis. In the process, however, we also collected data regarding distribution, abundance, threats, body size, coloration, and femoral pore secretions.

On Saba, we found iguanas to be widespread but patchy. Iguanas are primarily associated with rock outcroppings, cliff faces, and the steep slopes of rocky guts (ravines) from sea level up to at least 450 m. Although the maximum elevation that iguanas reach on Saba is not known, it is unlikely that they occupy elevations much higher than 450 m as climatic conditions (temperature, moisture, and sunlight) are probably not suitable. High elevations on Saba are almost continuously shrouded in clouds and the climax vegetation at the summit is elfin cloud forest. Even at lower elevations, cloud cover is common and thermoregulation is probably physiologically challenging much of the time. Indeed, it appears likely that melanism among the Saban iguanas is an adaptation to the thermoregulatory challenges imposed by the local environmental conditions.

Over the four day period of our trip, we saw at least 16 individual iguanas. Not a large number, but this is at least partly attributable to the fact that we had inclement weather conditions for much of our stay and the iguanas tend to occupy areas difficult to access. Several residents relayed to us that they regularly see iguanas basking on the rock wall that borders the islands only road, and on rock outcroppings and cliffs near their homes or businesses. Nevertheless, most residents questioned believed that the iguana population had decreased considerably in recent years. The population is, without question, well below carrying capacity.

In addition to humans, Saba has feral cats, rats, sheep, and goats. These animals (including humans) must have a collective impact on the iguanas, but the extent of this impact is unknown. Predation of juveniles by cats (and possibly rats) may be high, as we did not see any juvenile iguanas during our stay. Sheep and goats are numerous and widespread, and appear to cause considerable damage to the vegetation, especially at lower elevations. However, residents that hunt sheep and goats informed us that their numbers are down dramatically from years past. Residents also hunt iguanas for food and may be partly responsible for their present distribution. That is, many of the cliffs and rock outcroppings where iguanas are common are

The view of Saba as seen from St. Eustatius, the nearest island to the south. The clouds enshrouding the higher elevations are typical and responsible for maintaining the island's high elevation climax vegetation (elfin cloud forest).

inaccessible without climbing gear, although the iguanas can easily be shot with a rifle.

Of the 16 iguanas seen during our visit, we were able to capture six: five males and one female. The female was 322 mm SVL and 1440 g. The males ranged in size from 224 mm SVL and 430 g to 435 mm SVL and 3170 g. All animals captured were adults, including the smallest male which had extremely large and well developed hemipenes for its size (based on our experience).

Saban iguanas are melanistic, but only as adults. The smallest animal seen (also the smallest animal captured) was bright green with bold black bands on the tail and partial black bands on the body. As the animals age they gradually lose their green coloration and the banding on the body is lost. Animals of intermediate size generally had tails which were strongly banded (black and very light tan), limbs that were completely black, and bodies that were partially melanistic (individual scales were black with an orange tip). The largest and presumably oldest animals were almost completely jet-black with little or no visible banding on the tail and little or no orange on the scales.

The only area of the body that apparently does not turn completely black with age is the dorsal surface of the head. The head and dewlap of young animals are predominantly green, as is typical of the species, but with age, a black patch develops posterior to each eye. With further development, the black patch becomes larger and more prominent, the rest of the head becomes very pale, and the throat and dewlap darkens like the rest of the body. The scales of the lower jaw, including the subtympanic plate, generally take on a deep (but bright) purple hue at this time as well. With increasing age, most of the head, throat, and dewlap turn entirely jet-black and only the dorsal surface of the head remains pale (often bluish white). In addition, the scales of the dorsal crest (including those on the dewlap fringe) which start out green, pale with age and then gradually turn black starting at the base and eventually extending to the tip.

In addition to collecting blood samples for genetic analysis, femoral pore secretions were collected for comparison with other iguana populations. This will be done by Allison Alberts (San Diego Zoo). Although these analyses are not yet complete, there were two unusual characteristics regarding the femoral pores of the Saban iguanas. First, every animal captured, including the adult female and the small male (less than one-sixth the mass of the largest male), had well developed femoral pores that were actively secreting. Second, all of the old adult males had femoral pores which seemed unusually large (again, based on our limited experience). The largest femoral pore exceeded 1 cm in diameter.

We will post another communication to the WIISG with the results of the genetic analyses when completed.

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## Anegada iguana (*Cyclura pinguis*)

The fledgling recovery effort for the critically endangered Anegada iguana, *Cyclura pinguis,* has a brand new headstart facility, one that markedly expands and improves this important component of that project. Despite a number of travel delays and setbacks due to Hurricane George which hammered Puerto Rico and much of the BVI, a team representing the WIISG finally arrived on Anegada and began work on 28 September 1998. Rick Hudson and Mike Fouraker (Fort Worth Zoo) and Jeff Lemm (San Diego Zoo, CRES) were joined by iguana biologist Glenn Gerber (University of Tennessee) who was already there working on an ongoing population assessment. This new facility was funded by a grant from the UK Foreign Commonwealth Office to the BVI National Parks Trust (NPT) which sponsored, in part, the construction team's stay on Anegada; additional funding was provided by proceeds from West Indian iguana poster and T-shirt sales.

The team arrived to find the area cleared and graded, and the cinder block foundation set according to specs. With the assistance of local construction workers the structure was completed by the end of Day 4, and then landscaped with local plants on the last day. The new facility consists of six large adjacent wire mesh units each measuring 3 m x 4 m x 2.6 meters and should provide the program with adequate space to increase their headstart capabilities in the coming years. What had began as a modest facility designed to hold three iguanas captured in 1997 has now been substantially expanded in scope, and currently houses 17 iguanas hatched in 1997 (2) and 1998 (15). Thirteen of the 1998 hatched iguanas were from a single nest that had been located and marked by Glenn Gerber in June, and then hatched and collected in September. Three more hatchlings were collected during our stay there in and around the Bones Bight area and the Settlement. Two deaths have occurred to date: one of the 1997 juveniles was predated by a racer *Alsophis,* and one of the 1998s died of unknown causes.

Concerned with the slow growth of the 1997 hatched iguanas, the team spent time reviewing husbandry procedures with Trust employee Rondel Smith who is in charge of the headstart program. Daily feeding and maintenance protocols were implemented, and procedures for monitoring monthly growth rates were put in place. With a small grant from the Fort Worth Zoo to the NPT, a second iguana caretaker, Kevin Faulkner, was hired on a part-time basis. A second shipment of dry iguana chow was recently sent to get them through a food shortage period caused by drought.

Headstarting has increasingly become a viable component of the recovery strategies for endangered *Cyclura*, especially where the primary threat is high juvenile mortality associated with predation by introduced exotics. In this case it is considered a stopgap measure to increase survivorship in juveniles which are lost to cat predation soon following hatching. Anegada supports a large population of feral cats, and a portion of the UK grant is designated to examine the feasibility of controlling or eradicating this threat. Another critical aspect of Mr. Gerber's field research is to locate and mark iguana nest sites so that hatchlings can be collected in sufficient numbers for headstarting and eventual release. This strategy has also been utilized successfully in the conservation efforts for both the Jamaican and Grand Cayman iguanas.

The facility is located near the municipal building which houses the police department and other local government offices, and is hence highly visible. Perhaps one of the more important roles that the new Anegada headstart facility will serve is that it will become an area of focus for the local people, helping to raise awareness and concern for the plight of their native iguana. We were encouraged to find that the conservation story of the Anegada iguana was already receiving excellent media coverage. Two local travel magazines for the BVI and a local airline featured articles on the ongoing efforts by the National Parks Trust to restore the iguana.

The UK grant also funded Glenn Gerber's 1998 field research and iguana population assessment which has already contributed substantially to our understanding of the nesting ecology and distribution of *Cyclura pinguis* on Anegada. A recent grant from the Zoological Society of San Diego will allow Glenn's field work to continue this year with the assistance of Jeff Lemm during both the nesting and hatching seasons. This information will increase our knowledge of the natural history and ecology of this critically endangered iguana, expand the headstarting program, and enhance our ability to take effective conservation action.

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## Recent Literature


Alberts, A.C. and T.D. Grant. 1997. Use of a non-contact temperature reader for measuring skin surface temperatures and estimating internal body temperatures in lizards. Herpetological Review 28:32-33.

Alberts, A.C., A.M. Perry, J.M. Lemm, and J.A. Phillips. 1997. Effects of incubation temperature and water potential on growth and thermoregulatory behavior of hatchling rock iguanas *(Cyclura nubila).* Copeia 1997:766-776.

Alberts, A.C., M.L. Oliva, M.B. Worley, S.R. Telford, Jr., P.J. Morris, and D.L. Janssen. 1998. The need for pre-release health screening in animal translocations: a case study of the Cuban iguana *(Cyclura nubila).* Animal Conservation 1:165-172.

Aresté, M. 1998. *Cyclura.* The ground iguanas of the Caribbean. Reptilia 2 (Mar/Apr):7 pp.

Bendon, J. 1997. Mayaguana blues. Journal of the International Iguana Society (Iguana Times) 6(1):3-9.

Bendon, J. 1997. Moon over Mayaguana: return to Booby Cay. Journal of the International Iguana Society (Iguana Times) 6(4):81-87.

Franz, R., C.K. Dodd Jr., and S.D. Buckner. 1996. A review of herpetology of the Bahamian archipelago. Bahamas Journal of Science 3(3):22-30.

Fuhri, C. 1997. Status of the Sandy Cay rock iguana, *Cyclura rileyi cristata.* Journal of the International Iguana Society (Iguana Times) 6(2):27-30.

Hayes, W.K. 1997. Decline of the Sandy Cay iguana. Journal of the International Iguana Society (Iguana Times) 6(2):31.

Lazell, J. 1997. The stout iguana of the British Virgin islands. Journal of the International Iguana Society (Iguana Times) 6(4):75-80.

Lemm, J.M. and A.C. Alberts. 1997. Guided by nature: Conservation research and captive husbandry of the Cuban iguana *(Cyclura nubila nubila).* Reptiles 5(8):76-87.

Martins, E.P. 1998. Estimating ancestral states of a communicative display: a comparative study of *Cyclura* rock iguanas. Animal Behavior 55:1685-1706.

Mitchell, N.C. 1999. Effect of introduced ungulates on density, dietary preferences, home range, and physical condition of the iguana (*Cyclura pinguis*) on Anegada. Herpetologica 55(1):7-17.

Rehak, I. and P. Valensky. 1997. Second generation of Cuban iguanas, *Cyclura nubila,* born in Prague Zoo. Gazella 24:93-107.

Tenlén, R. 1997. Mona-saaren leguanni, *Cyclura cornuta stejnegeri,* Barbour and Noble 1916. Herpetomania 6(3):5-13.

Warner, D.A. 1997. An overview on the evolution of the family Iguanidae. Journal of the International Iguana Society (Iguana Times) 6(3):57-65.

Wissman, M.A., and B. Parsons. 1998. Cesarean section in a *Cyclura* iguana. Reptiles 6(3):84-89.

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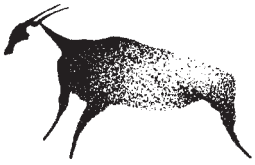

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