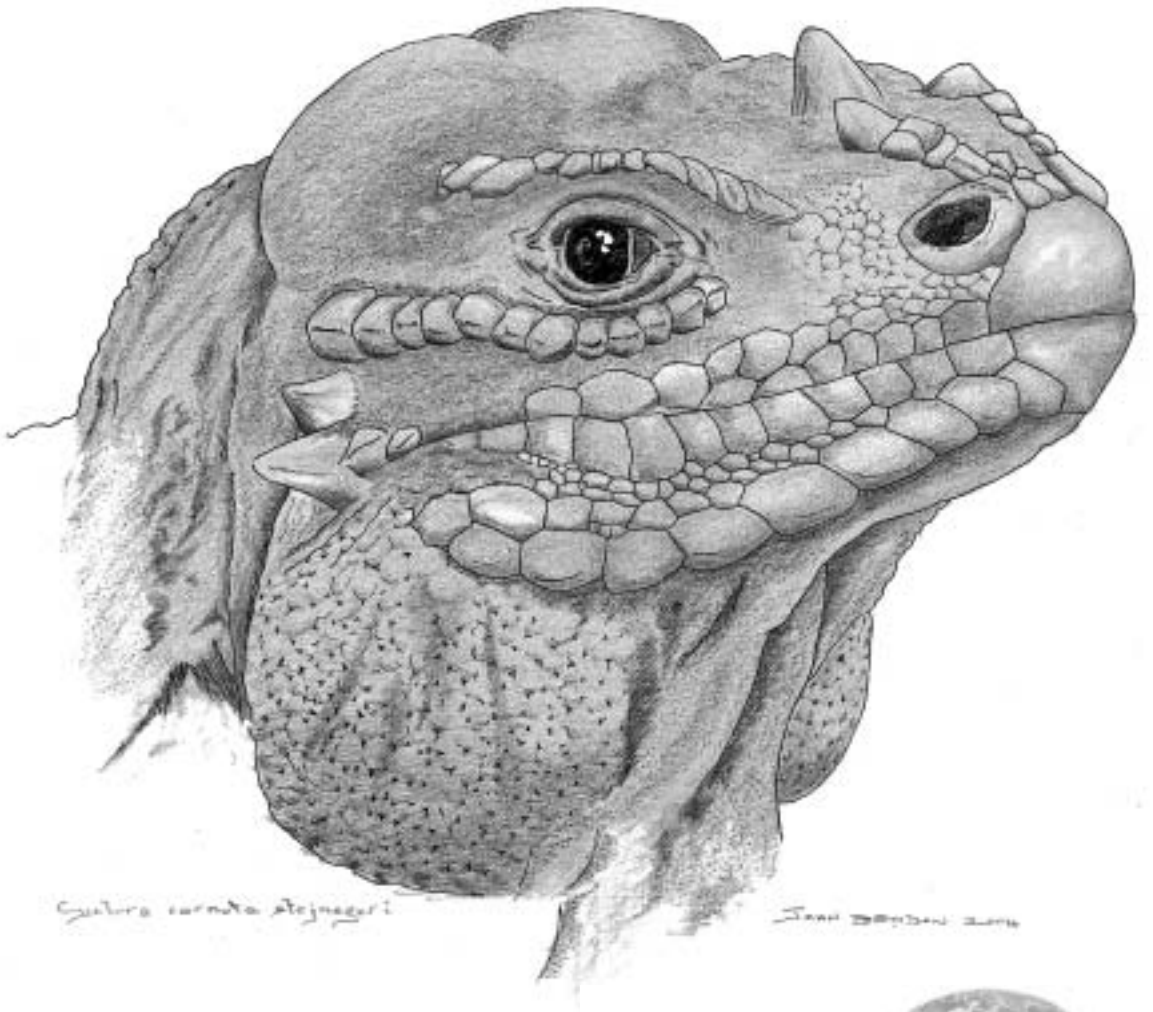


The Mona Island Rhinoceros Iguana, *Cyclura cornuta stejnegeri. Illustration by John Bendon.*

Juvenile Rhinoceros Iguana at the headstarting facility on Mona. *Photograph by Alberto Alvarez.*

Mona Island lies between Puerto Rico and the Dominican Republic. *Illustration by John Binns.*

Magnificent Iguanas of Isla Mona

John Bendon

Bath, England

Photographs by the author except where indicated.

Isla Mona is paradise!
When God created Eden,
He probably thought of Mona.
If you go to Mona —
it will change your life!

— Rafael Joglar, 2003

I stepped off the plane exhausted and excited, about 7000 miles and 31 hours away from where my journey began. The time in Puerto Rico was 9:30 pm, but my body told me that it was really 2:30 am the next morning. This trip was very special; I had volunteered to be a field assistant on a research project currently underway on Mona Island, the home of *Cyclura cornuta stejnegeri,* the Mona Island Rhinoceros Iguana. This magnificent creature has lived untouched on this island, separated from other large iguanines, for thousands of years, although an alternative school of thought suggests that the lack of substantial genetic differentiation from *Cyclura cornuta* of Hispaniola speaks to a recent, possibly even human-mediated, arrival on the island.

Aerial view of Isla Mona. *Photograph by Alberto Alvarez.*

The entire human population of Mona Island taking a lunch break.

Alighting from the aircraft, I was immediately struck by the grand tropical aspect of the place, the cacti growing at the airstrip, unusual birds, and strange noises. That night, I was amazed by the innumerable stars bright against the black sky, and by an immense silence that covered us like a cloak and was interrupted only occasionally by the bark of a Night Heron. Lying in bed, knowing I was on an island in the middle of nowhere, no one walking down the street, and hearing no cars or other sounds of a modern metropolis was a strange and wonderful sensation.

Mona Island is a unique ecosystem, with considerable endemism. In addition to the iguana, the island hosts an endemic frog (*Eleutherodactylus monensis*), three endemic lizards (*Anolis monensis*, *Sphaerodactylus monensis*, and *Ameiva alboguttata*), three endemic snakes (*Typhlops monensis*, *Epicrates monensis monensis*, and *Alsophis portoricensis variegatus*), and an endemic, albeit extinct, tortoise (*Geochelone monensis*). Non-endemic reptiles include widely distributed skinks in the *Mabuya sloanii* complex, the introduced gecko, *Hemidactylus mabouia*, and three species of sea turtles.

In October, hundreds of Careys (Hawksbill Turtles, *Eretmochelys imbricata*) hatch on the beaches. They are gathered by the researchers, duly processed, and returned to the beach for their crawl to the sea. Although clutches may contain as many as 120 eggs, the chance of survival to adulthood is only one in 10,000. Their lives are fraught with danger; en route to the water they are eaten by hawks and herons; once in the water, they become prey for fish; and, if any survive, humans hunt them for the rest of their lives. A 200-lb. turtle takes fifty years to grow, one minute to kill, an hour to cook, and thirty minutes to eat. I am genuinely surprised that any are left.

The climate on Mona is hot. The island consists mainly of an elevated plateau. Beaches are scarce and the only substantive one is on the southwestern shore. The unique vegetation includes 84% plateau forest, 8.7% shrub forest, 0.6% cliff forest, and 6.7% coastal plain. Eleven varieties of cacti and 29 different species of *Euphorbia* have been identified. Two of these (*E. petiolaris* and *E. mancinella*) are poisonous to humans, although iguanas eat fruits of the latter.

At any time, only about 12 persons, including two rangers, inhabit the island. Facilities for the human population are limited to a few houses, a communal kitchen, a couple of workshops, a hurricane-destroyed theater/museum, and a new shower and toilet facility. Two vehicles, plus a digger, several bikes, and a boat provide transportation. Nine years ago, the only two cars on the island smashed into each other in a freak accident (don't ask!).

What I find most appealing about Mona is that the iguanas don't just frequent the wilder, more distant parts of the island. Finding one right there on the doorstep was not unusual. Mostly, they would ignore me completely, looking to the left and right, perhaps munching on a couple of fallen fruits or a leaf or two as they moved about. Their lives seem quite tranquil — but, after all, they've been living here since long before the research station was built, walking the same routes, soaking up the sun's rays, and just being iguanas.

Returning from the kitchen to the bunkhouse, coffee in hand, the early morning sun already hot, I see a big, calm, gray iguana. He seems to be staring at the trees, maybe wondering what's for breakfast.

Two iguana-related projects are ongoing. Alberto Alvarez, Department of Natural and Environmental Resources (DNER), heads an Iguana Headstarting Program, and Nestor Pérez, a Colombian post-graduate at the University of Puerto Rico–Río Piedras (UPR), is conducting research on reproductive and territorial behavior. The latter project, funded by UPR and DNER, is currently in the third of a projected five years. The only substantive prior research on Mona Island Iguanas was the basis of Thomas Wiewandt's 1977 doctoral thesis.

Nestor's study uses nest monitoring, radiotracking, and individual identity numbers in an effort to determine sex ratios, paternity information, size of home ranges and territories, movements, survival rates, and total population size. Mona Island covers about 65 km^2 and much of it is very difficult terrain. Nesting sites are scattered widely and some are almost inaccessible. Twelve nests have been carefully monitored and surrounded by zinc fences. These are visited daily during the expected time of hatching. Hatchlings are trapped inside the fences, collected, and taken to the research station for processing. Each is measured and weighed, blood samples are taken, and transponders inserted. This year, 121 hatchlings were processed. At about 30 minutes per lizard, this entailed 60 hours of work for each of two people.

Twelve carefully monitored nests were surrounded by zinc fences.

About half of the lizards are released in designated areas and the rest are held in headstarting cages. Some of those remain for several years and attain sizes sufficient to enhance chances for survival after release. Others may be released earlier, according to their progress, and the capacity of the headstarting facility.

Three different radio transmitters are used. One, for the larger animals, is enclosed in a pouch attached to a collar made out of plastic tubing, and hangs loosely around the neck. These present some risk of strangulation, and radios attached directly to iguanas without straps are generally preferred. The second type of radio is much smaller and is used for juveniles and even occasional hatchlings. Because young animals grow quickly, these transmitters are tied around the lower part of the body above the pelvis, swing loosely, and usually fall off after some time. Not only does this prevent the ties becoming too tight over time, but also the transmitters can be recovered and re-used. The third type of

Radio transmitters used for the larger animals are enclosed in a pouch attached to a collar made out of plastic tubing.

Hatchlings are collected from the nesting sites and processed at the field station. About half of them are returned to the wild at the release sites and the remainder are placed in headstarting cages.

This large male was about to shed its skin.

This occupant of *Ciudad Lagarto* monopolizes a prized basking site. *Photograph by Alberto Alvarez.*

transmitter, about the size of an AA battery, is implanted in the body cavity of larger animals. Although a longer recovery period might be preferable, animals are usually released after three days due to space and time constraints. Once transmitters are fitted, animals are individually tracked using a VHF receiver. Radio transmitters usually last three months to three years, depending on type.

My own experiences tracking iguanas were mixtures of struggle and elation. One day, in the very dense, almost "jungle-like" part of Mona, I set out with the radio receiver to find iguana #22. The antenna was unwieldy and kept getting caught on branches. I kept getting tangled in vines, and had a difficult time determining in which direction I was going and where I had been. Finding an iguana was not so easy. I would turn the antenna until the signal was stronger and then walk in that direction. Then the signal would fade and I would turn, lose the signal, lose myself, trip a lot, but eventually catch the signal again. I followed it until I reached a sheer rock wall. Shouldering the radio equipment, my tote bag, and a camera, I clambered up more easily than I had suspected I could — only to find, sitting on the top, a few feet away from the edge, staring at me, a beautiful female iguana with #22 painted in red latex on her side. The experience of stumbling through the jungle, scratched, badly bitten, and very dirty, was well worth the reward of seeing her nod "hello." The sight of number twenty two at the end of all that will stay with me forever.

Adventures with Iguanas

Ciudad Lagarto.—A garbage dump near the headstarting facility has grown steadily over the years. I named it *Ciudad Lagarto* ("Lizard City") and erected a large sign to that effect. Many of the released headstarters don't stray very far and several of them have taken up residence, along with wild animals, in the dump, which supports a total population of about 20 lizards. If I approached slowly and stayed low, I could easily observe them, and I noted that each one had its own place. Once I stood up, however, most of them quickly disappeared.

A fairly large iguana lived near the front by a pile of old doors. She was beaded and tagged and had made a "nest" of dead grass under one of the doors. She was the largest and obviously

Headstarted iguanas spend the first months of their lives in one of ten contiguous units.

the "alpha" animal in the area, even though a female. Quite assertive and very much the "home-body", she was close and easy to recapture, and had been weighed and measured more often than most of the other iguanas, providing us with important information on growth in large adults.

Other individuals, several of them similarly prone to recapture, lived inside refrigerators. Resultant data demonstrate that, in 18 months, between the ages of about two to three years, weight gain ranged from a quite satisfactory 500 g to as much as one kilo.

I visited *Ciudad Lagarto* and the inhabitants of the enclosure nearly every day that I was on the island. I very much enjoyed sitting inside the cages and watching them. If I was still and did not attempt to grab them, they would go on about their business and ignore me. I only did this at the beginning and end of the day, since the animals go "mad" when disturbed during the heat of the day and rush headlong into the wire mesh sides of the cages. But, in the evening, when the last rays of sunshine dip into the ocean, whole new hordes of life forms awaken, namely the mosquitoes and sand flies. That was my signal to get out as quickly as possible and slap on the repellent (one can't wear it near the reptiles, as it may harm them).

Bathroom Hatchlings.—Gravid iguanas enter the nesting burrows and emerge looking spent and emaciated. One nest site was in an open area where the station's massive grass cutter would pass over it. Fearing that the nest or emerging hatchlings might be damaged, the eggs were removed and reburied elsewhere. The reburied eggs were late in hatching; so, after some discussion, we dug them up and placed them in a container filled with soil from the site and set it under the house.

Although quite warm by temperate standards, October temperatures drop each day — and iguana eggs need temperatures of about 30 °C to hatch. Nothing was happening. We peered into the container each day and checked the temperature, which was hovering around 26 °C. Finally, we decided to bring them into the old wooden house and, more specifically, into the bathroom, which seemed to be the warmest place, especially when we added a light. A little water stabilized the humidity and the temperature settled at 31 °C under the sand and at 35 °C on the surface. Now, all we had to do was continue waiting.

The very next morning, I was in the bathroom brushing my teeth when, as an afterthought, I removed the light to see what was going on in our incubator. There, poking up like dark, wet pebbles on a beach, were four heads. The first hatchlings had started to come out of their eggs. This continued for four days. Every so often, I would go into the bathroom and another head would have popped up like a crocus in spring. I kept them warm and watered them, just as one would with delicate flowers — and they responded by growing larger in front of my eyes (they really did grow, as they were absorbing their yolk sacs). Thirteen little iguanas eventually sprang to life. It was like magic. Even the seasoned researchers were excited and appeared from time to time with their cameras. Hatching is typically a very private enterprise, as the eggs are normally underground.

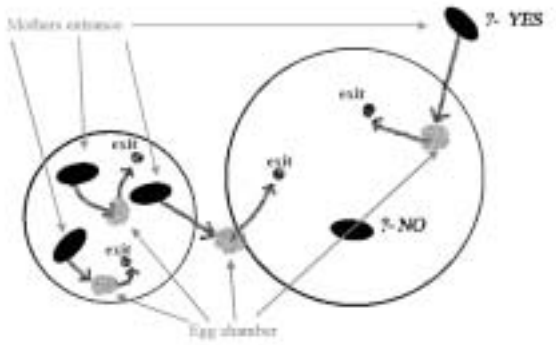
This individual is one of the largest iguanas on the island.

What we learned from this exercise is that we could not process these babies straight away. When hatchlings appear above ground for the first time, they may be anywhere from a few days to well over a week in age. At that age, they could be safely handled, if the yolk sac has shrunken and dried and the skin has healed. If we tried to handle them at a younger age, their moist and slippery skin wouldn't take the paint with which we wrote their numbers, nor would it cut cleanly for the insertion of transmitters. So, the bathroom hatchlings taught us to use the umbilical scar as an indicator of when processing could begin.

Two for the Price of One.—The fences placed around iguana nests sometimes did not work. In one instance, two fences next to each other were supposed to yield three sets and one set of hatchlings, respectively. Instead, the former yielded only two and the latter two as well. We think that the third set from the first fence tunneled to the surface at an angle, only to emerge within the second fence — mystery solved. Unfortunately, when the time came to collect the second set of hatchlings, the heat of the day was upon us. The little lizards running around the circular wall of their enclosure were far too fast to catch, and, if we came close to succeeding, they disappeared into their own hatching tunnel. As we needed to process them the next morning, I suggested that we go out at night with headlamps and grab them while they were sleeping. The result was a comic farce.

Most were hidden under some pipes that had been cut down the middle. I suggested that we hold a pillowcase at one end and scare them into it. It didn't work — about nine iguanas ran out all at once, and the pillowcase caught only two. The rest ran round and round the circular fence as we turned on our heels trying to follow them, the bouncing lights on our heads only adding to the confusion. Somehow, we discovered the rest of the hatchlings, all buried in the sand, jumbled together in a misshapen ball. Neither of us had ever seen this kind of behavior, but we quickly took advantage of it and bagged some more of the lizards. Eventually, we caught all fifteen, but we were pretty sure that we had played the fools while the little iguanas outsmarted us. We were laughing out loud, but silently pleased that no one had been watching.

The Legend of 98.—The day iguana #98 escaped, he just jumped out of my hand, ran up the mosquito screen, found a small hole, and was suddenly outside. I ran down the stairs and looked up at him perched on the window ledge. He jumped, landed beside me, and started looking around. However, as I bent to pick him up, he took off, running about 3 m. I just watched, knowing it would be futile to try to chase him. By then, he had spotted the outside world for the first time. The sun shone down on him and, when he looked up, he didn't see me any more. Stepping lightly across the grass, stopping and nodding, then running, he fled into the brush and was gone. Unfortunately his number will have shed with his skin by the next time I visit



The fences placed around iguana nests sometimes did not work as intended.

Fights between adult males can be vicious.

Mona; I will never know if he survived. If this was a novel, I would say that, "the legend of 98 lives on."

Battles.—I had seen iguanas fighting in photographs only. It looked pretty vicious, but didn't prepare me at all for what I saw on Mona. These iguanas are among the largest and toughest species of *Cyclura*. They scramble over sharp rocks and cactus, they lose tails and fingers, and they're not fazed by harsh conditions — except possibly for cold weather, which forces them into a cozy hole somewhere. They are stocky and muscular, many have battle scars, and their horns and spikes often are worn or broken as a consequence of fighting or the mere wear and tear of living in a harsh environment.

A couple of hardened old hands lived near the research station. One was iguana #21, who I called "Tough Guy 21," and the other was just "Tough Guy." Both were aggressive. Tough Guy 21 had been around for a long time and was the uncrowned king of the area. He would swagger around and chase lesser males away. He always got the girl. One day during lunch, someone yelled: "Hey, iguanas are fighting over here." We dropped our rice and beans and dashed over, cameras at the ready, to find #21 fighting with Tough Guy. The new arrival was larger than our #21 and Nestor told me he had never seen him before. He was identifiable by a white spot of detached skin just behind his right shoulder (which we duly noted and recorded). The fight appeared to be a stalemate, either that or both combatants lost interest. After several minutes, each went his own way, nodding furiously and gaping so widely that it seemed like one could park a car in the cavity.

We didn't think much more about that encounter until a few days later. Female #27 seemed to be minding her own business under the watchful gaze of Tough Guy 21, when, out of nowhere, came the new Tough Guy. He sidled up to her and, from where we stood, appeared to be chatting to her amiably. Tough Guy 21 approached, the female backed off, and, like jousting knights, the two males rose up on their haunches, tipped

Many of the headstarted iguanas don't stray very far after they are released. Several have taken up residence, along with wild animals, in the dump, which supports a total population of about 20 lizards. *Photograph by Alberto Alverez.*

A young Rhinoceros Iguana peers out from the safety of a PVC pipe within the headstarting cages. *Photograph by Alberto Alverez.*

their heads and bodies slightly to the side, and began trotting around each other. All at once, #21 pounced forward and spat with a kind of hissing roar. This seemed to inflame the newcomer, who opened his mouth and went for 21. Now, with both their mouths wide open, they scraped alongside each other's faces, turning in a circle. They did not lock jaws, but continued turning and scraping and drawing blood all the while. This went on for about ten minutes, during which they ignored us as we approached rather closely to get photographs. Suddenly, they stopped, seemingly taking a break — or was the battle over?

Apparently, the new Tough Guy had won. The next day we saw all three animals again. The new guy and the female wandered off together, while #21 skulked in the background. This behavior was quite unusual for that time of year. It was like mating behavior, but occurred during the hatching season.

The third fight I saw was so vicious that I got a bucket of water and threw it over the two combatants like they were dogs, after which they dashed off in opposite directions. I was admonished by the biologists for "interfering with nature," which I should have let take its course. I argued that the cat we caught had just killed and eaten three hatchling iguanas and also had interfered with nature, as it was not supposed to be on Mona at all. I felt that I had merely tipped the balance a little by ensuring two big, healthy iguanas would survive. I can see the other side of the argument, but I still believe I did the right thing. I was not going to watch two endangered lizards kill each other.[1]

Epilogue

Two nests, each surrounded by aluminum flashing, are on Pajaros Beach. Although 9 km from the station, we check them daily. This day, nothing. Perhaps, if it thunders again tonight, events will move along and tomorrow, early, the hatchlings may emerge. But now, I walk along the beach, watch the birds, move inland to a Seagrape tree, and find a place to sit in the shade. Alerted by a rustle in the leaves, I see an enormous iguana amble toward me. Unbelievably, he sits and rests beside me, right beside me, nodding. I nod back. I stare at his big black eye, sunlight glinting off the blackness. All at once we are friends, sitting there together.

[1] Editors' note: Although male iguanas sometimes die as a consequence of complications from combat-related wounds, most conflicts in nature cease before fatal injuries are inflicted — as long as the "loser" has an opportunity to escape.

Mash is placed daily in split-bamboo feeding "stations" for young Mona Island Iguanas (*Cyclura cornuta stejnegeri*) at the headstarting facility. *Photograph by Alberto Alverez.*

The magic of Mona was working again; the place weaves spells around those who visit, and I know I shall return again and again, if only I can. Presently, the lizard rose, glanced at me, and walked away. As he did, he looked back one last time before disappearing into the brush. I've had many experiences during my travels, but this beat them all. From the back streets of Cairo to the caves of Kandahar, travel is enlightening, but sharing the shade of a tree on a blazing afternoon with my lizard companion is a memory that will remain with me always.

Acknowledgments

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HEADSTARTING

Adapted from a report by Alberto Alvarez and used with permission.

The iguana headstarting program began in October 1999 with the construction of an enclosure on Playa Sardinera (in the west of Mona Island) where the DNER facilities are located. The enclosure is composed of ten contiguous units, each 3 m x 3 m x 2.3 m. Landscape arrays simulate a natural environment. Rocks and logs provide perches, plants provide shade, hiding places, and water reservoirs, PVC pipes (4" diameter, 1 m long), approximately 6.5' above the ground, provide climbing opportunities and more hiding and basking places. Several units contain smaller pipes (3") and bamboo sticks for hatchlings, an average of eight of which are kept in each unit, with the number of individuals in each enclosure depending on landscape characteristics, food resources, aggressiveness, and individual needs.

In 1999–2000, 47 hatchlings were collected at Sardinera and 4 at Playa de Pájaros; in 2000–2001, the numbers were 25 and 0; in 2001–2002, 1 and 5; and, in 2002–2003, 3 and 34, respectively.

Iguanas are fed daily or on alternate days with a mixture of moisturized prepared food (Zeigler® Iguana Mash) and wild fruits, flowers, and, less abundantly, leaves. Fruits and flowers have higher nutritional value. In general, about 30% of iguana food intake consists of collected natural food items. Mash (5–10 g for hatchlings, 10–15 g for older animals) is placed daily in split bamboo feeding "stations," whereas collected foods are spread randomly in each unit. Late in the afternoon, food stations are removed and cleaned. Regular cleaning is important to reduce infestation by fire ants, centipedes, scorpions, land crabs, and rodents. Vegetation inside the enclosure is watered as needed.

By the end of November 2002, all the signals from transmitters implanted in August 2002 were lost. Two signals from transmitters implanted in April 2002 were still detectable, but one was lost in December and the other one in January 2003. We discount animal predation, and believe that a combination of out-of-range signals and transmitter malfunction may be responsible. Collected data reveal that the fastest and farthest any one individual had moved was about 1 km in 3 days. The remaining animals were lost no more than 400 m from the release site. Animals with transmitters implanted in April 2002 were less than 800 m from the release point when the signal was lost.

Hatchling iguanas at the headstart facility in 2003. *Photograph by John Bendon.*

In December 2002, seven juvenile iguanas hatched in 2000 and weighing more than 1 kg, were released in the Sardinera and Playa Mujeres nesting sites. These were dominant individuals and responsible for considerable aggression in some enclosure units.

Six released iguanas have been recaptured in June and July 2003, including one with a disabled transmitter that had been implanted in April 2002. The remaining animals were from August 2002 and one from December 2002 releases.