
ZOO VIEW

The first reptile collection at the San Diego Zoo was assembled in 1922 and the first reptile house was the modified International Harvester building, built for the Panama-California Exposition during 1915–16. In 1931, C. B. “Si” Perkins was in charge and lobbied for a better facility; his new building, designed specifically for reptiles, opened on 4 July 1936. This large structure is still home for the collection. Many reptiles are kept outdoors in large enclosures: crocodylians, giant tortoises, and large varanids and iguanids. A series of small buildings named in honor of the late Laurence Klauber, known for his studies on rattlesnakes, house a number of smaller amphibians and reptiles. Klauber was the first curator of reptiles in the 1920s, consulting curator beginning in 1931, and served on the Board of Trustees from 1943 to 1968.

Charles Shaw followed Perkins and developed successful reproductive programs for Galápagos tortoises and other reptiles. When Shaw died, Jerry Staedeli was installed in his post. Later, James Bacon became curator until he died in 1986. Jim was concerned about conservation issues, especially those related to the potential loss of island populations. His assistant, Earl (Tom) Schultz was elevated to his post until he retired several years ago. The present curator, Donal Boyer, was formerly the supervisor at the Dallas Zoo where we were colleagues for over a decade.

Herpetological research at the San Diego Zoo has been ongoing over many years, especially from the Center for Research of Endangered Species (CRES), which began in 1975. Developed to improve captive breeding and health of wild and captive animals, CRES has been in the forefront of zoo conservation initiatives. One of the major thrusts has been the West Indian iguana effort, involving an *in situ* and *ex situ* component. In fact, Allison Alberts, Valentine Lance, John (Andy) Phillips, and retired CRES Director Kurt Benirschke have published many papers on herpetological subjects.

Allison heads the CRES Applied Conservation Division. She has used statistical models based on radiographic measurements to predict oviposition date and clutch size in Cuban iguanas (*Cyclura nubila*) and also studied the effects of incubation temperature and water potential on growth and thermoregulatory behavior. She has predicted gender of lizards

using two dimensional ultrasound imaging and plasma testosterone concentration. Her investigations include seasonal reproductive cycles of the desert tortoise, pheromonal self-recognition in desert iguanas, dominance hierarchies in male lizards, pre-release health screening in animal translocations, chemical and behavioral studies of femoral gland secretions in iguanid lizards, and many other studies on chemical recognition and behavioral aspects of lizards and chelonians. Recently, four Anegada Island iguanas, a species found in the British Virgin Islands, hatched at the CRES off-exhibit reptile research facility. Fewer than 300 individuals remain in the wild and there has been an 80% decline since the 1960s. The Zoo supports a head-starting program on the island and the staff is currently surveying the wild population and investigating nesting ecology. In addition to her work in the Caribbean, Allison has a long-standing interest in the reptiles of southern California, with division staff currently conducting radiotelemetry studies to better understand the behavioral ecology of coast horned lizards, rosy boas, and red diamond rattlesnakes.

When I read her seminal publication "West Indian Iguanas: Status Survey and Conservation Action Plan," which included conservation strategies, taxonomic accounts, action plans, and beautiful color photographs compiled by specialists, it seemed appropriate to ask her to share her accomplishments with our community. Because Allison is so committed to the continued survival of West Indian iguanas, her description of the Cuban iguana program below nicely incorporates her vision of a successful zoo conservation effort using combined expertise and resources for the overall recovery of a species.—James B. Murphy, Section Editor.

Herpetological Review, 2002, 33(2), 119–120.

© 2002 by Society for the Study of Amphibians and Reptiles

Ten Years of Conservation Research on Cuban Rock Iguanas

ALLISON C. ALBERTS

Center for Reproduction of Endangered Species
Zoological Society of San Diego, P.O. Box 120551
San Diego, California 92112, USA
e-mail: aalberts@sandiegozoo.org

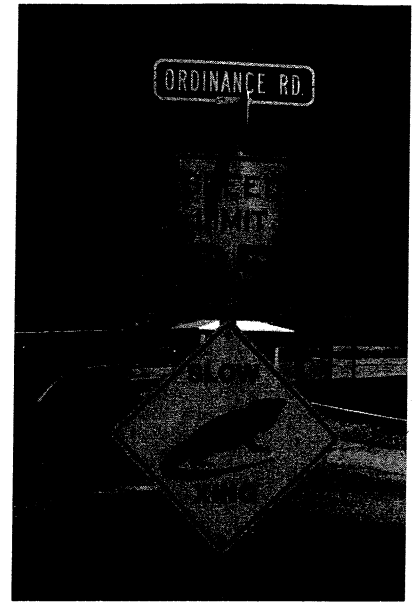
With funding from the National Science Foundation Conservation and Restoration Biology Program, I and fellow researchers in the CRES Applied Conservation Division began studies of Cuban iguanas on the U.S. Naval Base at Guantanamo Bay, Cuba, in 1992. Our intentions were to gain an understanding of the basic biology of these iguanas, as well as to develop practical conservation strategies for population recovery. For three years, we collected baseline data on population density, social behavior, reproductive hormone cycles, home range size, and daily and seasonal activity patterns. We found a negative relationship between female size and reproductive success, with larger females producing a higher percentage of non-viable eggs. That larger, presumably older, females tend to show greater infertility and egg mortality suggests that reproductive senescence might occur in this long-lived species. We also found that hatchlings from eggs incubated at higher temperatures grow more quickly than those incubated at lower temperatures. Finally, field experiments revealed that temporary alteration of local social structure through translocation of dominant males might represent a valuable management tool for small iguana populations by ensuring that a greater percentage of males have an opportunity to contribute to the gene pool.

As elsewhere in the Caribbean, one of the main threats to iguanas at Guantanamo Bay is a sizeable population of feral cats, which consume large numbers of juveniles each year. In 1995, we released 45 juvenile Cuban iguanas, collected as eggs on the base and reared at the San Diego Zoo, at two locations on the base. These animals were part of a long-term head-starting experiment designed to test whether juveniles that have been raised in captivity until they reach a less vulnerable body size have improved chances for survival against introduced predators in the wild.

Prior to the release, several studies were undertaken with the captive juveniles at the Zoo. Monthly measurements of the distance individual iguanas would allow an observer to approach before fleeing indicated that captivity did not result in a decrease in fear of humans. Food preference tests showed that juveniles were willing to sample unfamiliar native plants after several months on an artificial diet, suggesting that they are unlikely to experience difficulty in adapting to natural food sources. A thorough veterinary screening showed that all of the juvenile iguanas were in good health and could be released safely. A CNN film crew accompanied us to Guantanamo to cover the release, and the story, which aired on both Headline News and Science and Technology Week, generated international attention. Follow-up studies indicated that the released juveniles adapted well to life in the wild. Their growth, thermoregulation, and behavior, particularly with regard to predator avoidance, closely parallel their wild counterparts.

In late 1994 and early 1995, approximately 60,000 Cuban and Haitian migrants arrived unexpectedly on the base. Extensive areas of natural habitat were graded along the coastline to construct temporary housing, resulting in disturbance to natural ecosystems. At the height of the migrant crisis, the dry tropical forest surrounding our study site was reduced to less than 5% of its former extent, and we could only locate a single adult male in the area. With funding from the Zoo, we studied how rapidly and to what degree the iguana population was able to achieve its former dimensions, and how the natural process of recolonization of the area by iguanas correlated with recovery of vegetation at the site. This research provided an ideal opportunity to document the extent to which Caribbean dry tropical forest ecosystems are resilient enough to recover from disturbance, and to study the ecological role that iguanas play in the recovery process.

By 1999, we had documented a relatively stable group of 25 individuals at the site, with approximately 15% turnover in group composition per year. For both males and females, the relationship between body mass and body length was comparable to that of healthy wild iguanas, indicating that iguanas were able to forage



effectively at the site following disturbance. In order to document revegetation of the site, we also measured changes in the biomass of plant material over time. Although the rate of increase slowed in 1999 (1.05 m³/month) compared to 1998 (1.52 m³/month), the total biomass of vegetation at the site continued to grow throughout the study period.

Public education is key to the success of any conservation program. Thanks to a supplemental award from the National Science Foundation's Informal Education Program, we have been able to incorporate a public education component into our work on the base. Although Cuban iguanas comprise a conspicuous component of the local fauna and have been adopted as an informal mascot by many base residents, their biology and conservation status are not widely understood or appreciated. A major focus of our educational efforts has been to provide opportunities for the general public to participate actively in our field research effort. On three separate trips in 1997, we offered interested volunteers on the base the opportunity to participate in standardized iguana censusing and help collect data on antipredator and thermoregulatory behavior. Feedback from over 40 participants in the form of surveys was overwhelmingly positive, with 93% of respondents finding the research experience extremely worthwhile, 83% of respondents experiencing a positive shift in attitude regarding scientific research following their field experience, and 90% of respondents indicating that they would recommend the research experience to other base residents.

In collaboration with HVS Productions, we also produced a video that describes the basic biology of iguanas, their conservation status and requirements, and the goals, study methods, and results of our research program. Copies of the videotape have been distributed to the environmental office, library, and schools on the base. On each of our trips to the base, we have offered public lectures at which we provide information on iguanas, their conservation status, and how to appreciate and enjoy them without harming them. We have given numerous presentations to both elementary and secondary students on the base, prepared an endangered species pamphlet for incoming base personnel, and designed an Iguana Crossing sign for sites on the base where road casualties were known to have occurred.

Our work at Guantanamo Bay is but one example of the many contributions zoos are making to the conservation of West Indian iguanas. Over 20 American Zoo and Aquarium Association (AZA) member institutions have provided direct funding and other resources to West Indian iguana conservation projects, primarily in Jamaica, but also in Dominica, the Cayman Islands, the Dominican Republic, the Bahamas, the Turks and Caicos Islands, and the British Virgin Islands. With the help of zoos and other dedicated conservation partners, some of the rarest and most impressive lizards in the world are starting to make a comeback.

FURTHER READING

- ALBERTS A. C. 1999. Developing recovery strategies for West Indian rock iguanas. *Endangered Species Update* 16:107–110.
- _____. 2000. *West Indian Iguanas: Status Survey and Conservation Action Plan*. IUCN—The World Conservation Union, Gland, Switzerland. 117 pp.
- _____, J. M. LEMM, A. M. PERRY, L. A. MORICI, AND J. A. PHILLIPS. 2002. Temporary alteration of local social structure in a threatened population

of Cuban iguanas (*Cyclura nubila*). *Behavioral Ecology and Sociobiology* 51:324–335.

_____, 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.

_____, 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.