

## CONSERVATION RESEARCH REPORTS

### Sea Turtles in the Netherlands Antilles

Until recently, information on sea turtle nesting in the Netherlands Antilles consisted mostly of anecdotal accounts and sea turtle nesting was considered to be a rare or accidental occurrence. DEBROT ET AL. (2005. *Caribbean Journal of Science* 41:334–339) cited several recent studies and presented documentation of several additional sea turtle nesting beaches on Curaçao, Klein Curaçao, St. Eustatius, and St. Maarten. Historically, most studies have focused on large sea turtle nesting beaches, whereas the results of this study support the idea that small, scattered nesting beaches could cumulatively contribute significantly to both reproductive output and recovery potential of several species when examined on a regional scale.



ROZENNIE SCAG (GETIMAPA)

Leatherback Sea Turtles (*Dermochelys coriacea*) are nesting more frequently in the Netherlands Antilles.

### Impact of Foxes on Freshwater Turtle Populations

The resilience of a freshwater turtle population to stage-specific predation is density-dependent, and some species are more susceptible to predation because of their life-history strategies. Nest predation by introduced Red Foxes (*Vulpes vulpes*) on Australian freshwater turtles is a major source of mortality, but its full impact has yet to be evaluated. Freshwater turtles are long lived, and a population decline resulting from nest predation by foxes may take a long time to become evident. SPENCER AND THOMPSON (2005. *Conservation Biology* 19:845–854) evaluated the impact of foxes on population growth and patterns of survival of two widely distributed Australian freshwater turtles in the Murray River, where nest predation rates have previously been reported at above

95%. They estimated densities and survivorship of *Emydura macquarii* and *Chelodina expansa* from the nest to adult stage, and then conducted a fox-removal program to determine the impact of foxes on populations of these species. *Chelodina expansa* was five times less abundant than *E. macquarii*. Densities of *C. expansa* nests were low and situated away from shore, and nest-predation rates were half those of *E. macquarii*. *Emydura macquarii* populations had low productivity and relied on a standing crop of adult turtles for population maintenance, whereas *C. expansa* had relatively more juveniles in the population and was less reliant on adult survival. Despite its vulnerable status, *C. expansa* is relatively more stable than *E. macquarii*, primarily because there were proportionally more juveniles in the population. Management options focusing on reducing adult mortality in both species will be most effective.



DARREL SEINHESE

Populations of *Chelodina expansa* in Australia appear to be less vulnerable than those of *Emydura macquarii* to nest predation by introduced Red Foxes (*Vulpes vulpes*), presumably because nest densities of the former are low and nests are located farther from shores.

### Destructive Collecting Practices and Reptilian Abundance

Collecting reptiles often results in irreparable damage to microhabitats. Such activities and the concomitant destruction of habitats are increasing in frequency due largely to rising demand for reptiles in the pet market. GOODE ET AL. (2004. *Journal of Wildlife Management*

68:427–432) compared abundance of reptiles on rock outcroppings in Arizona before and after disturbance. Results suggest that destructive collecting techniques led to a decrease in the abundance of diurnal lizards, which preferred undisturbed portions of rock outcrops. The authors recommended that collecting methods be strictly regulated and that implementation of these regulations be accompanied by increased enforcement to render them effective.

### Loggerhead Turtle Nesting Trends

HAWKES ET AL. (2005. *Oryx* 39:65–72) analyzed a 24-year set of data from intensive monitoring of a nesting beach at Bald Head Island, North Carolina, USA and more limited data from nearby rookeries to investigate trends in Loggerhead Turtle (*Caretta caretta*) nesting numbers. Re-migrating turtles were larger and had larger annual clutch frequencies than neophyte turtles. However, no statistical evidence suggested either an increasing or decreasing trend in numbers of clutches laid per year, although a significant decrease in the number of turtles nesting and number of clutches laid per year was found over the period since 1991.



SCOTT A. ECKERT (WIRECAST)

Loggerhead Turtles (*Caretta caretta*) often nest on beaches in subtropical and even temperate zones.

### Efficacy of Green Turtle Headstarting

Headstarting is a management technique employed to enhance recruitment of turtles into diminished or extirpated marine turtle populations. Although numerous worldwide projects have been implemented, few detailed investigations have examined the efficacy of the concept. BELL ET AL. (2005. *Oryx* 39:137–148) noted that between 1980 and 2001,

16,422 captive-raised hatchlings and 14,347 yearling Green Turtles (*Chelonia mydas*) were released from the Cayman Turtle Farm. Approximately 80% of all turtles released were subject to some form of tagging. A total of 392 tagged animals have been recaptured at intervals of up to 19 years. Of this total, 160 individuals were captured in the Cayman Islands and 232 were recorded from other locations within the wider Caribbean and southeastern United States. A positive relationship exists between time at large and size at recapture, and data suggest that growth rates are comparable to those of wild Green Turtles in the region. Age at maturity may be as short as 15–19 years, depending on stage at release. Results show that some headstarted turtles are moving around the Caribbean, surviving for long periods of time, contributing to local breeding population, and may be displaying age-related shifts in habitat utilization similar to those recorded for wild individuals.



An adult Green Turtle (*Chelonia mydas*) on a Grand Caymanian beach.

JOHN SULLIVAN, RIBBIT PHOTOGRAPHY

### Marine Turtles in The Gambia, West Africa

BARNETT ET AL. (2004. *Oryx* 38:203–208) reported the first systematic survey of the marine turtles of the 80 km of The Gambian coastline, and brought together new data and all past records and reports of marine turtles in The Gambia. Green Turtles (*Chelonia mydas*) are the most abundant turtles and this is the only species so far observed nesting in The Gambia, with peak nesting between August and October. Although 75% (60 km) of The Gambian coastline appears to be suitable for turtle nesting, most nesting activity is confined to the southern coastline. Offshore foraging habitat is apparently extensive. Strandings of Green Turtles, Olive Ridley Turtles (*Lepidochelys olivacea*), Leatherback Turtles (*Dermo-*



Hawksbill Turtles (*Eretmochelys imbricata*) have been recorded along The Gambian coast.

ROWAN BYRNE (WIDECAST AND WWW.MARINETURTLES.COM)

*chelys coriacea*), and Hawksbill Turtles (*Eretmochelys imbricata*) have been recorded, but we were unable to find evidence for Loggerhead Turtles (*Caretta caretta*). Threats are mainly of human origin, and include illegal harvesting of eggs, juveniles, and adults, as well as mortality as fisheries bycatch, including trawling. One stranded Green Turtle apparently had fibropapilloma disease. The major threat to nesting habitats is erosion and unregulated development of the coast for tourism. Marine turtles are fully protected under Gambian law.

### Lesser Antillean Snakes: Conservation Concerns

Thirty-three islands in the Lesser Antilles range in area from 0.06–1,510 km<sup>2</sup> and collectively harbor 25 species of snakes representing five families and 10 genera. HENDERSON (2004. *Oryx* 38:311–320) noted that the islands have suffered at least six, and possibly as many as 11, historical extirpations and at least one historical extinction. The number of snake species per island is 1–5, and species richness is correlated with island size and habitat diversity. Islands that harbor three or more species exhibit greater habitat diversity, are larger, have a higher maximum elevation, and are situated closer to the South American mainland, the source area for most genera. North of the Guadeloupe Archipelago, islands support one or two species (an *Alsophis* or an *Alsophis* and a *Tjiphlops*). From the

Guadeloupe Archipelago southward, snake faunas have species belonging to genera that are widespread on the Neotropical mainland: *Boa*, *Corallus*, *Chironius*, *Clelia*, *Liophis*, *Mastigodryas* and *Bothrops*. Between 50 and 75% of the Lesser Antillean snake fauna preys on *Anolis* lizards. Snake faunas in the Lesser Antilles are not saturated, and many islands could support additional species; fossil evidence and written records indicate that they did. The islands have a 5,000-year history of habitat alteration, but introduced predators probably have had the greatest negative impact on snakes. The potential establishment of an



Introduced predators, notably the mongoose (*Herpestes javanicus*), undoubtedly have had the greatest negative impact on native Lesser Antillean snake populations. *Mastigodryas bruesi* is somewhat less vulnerable than many other species because of its arboreal inclinations.

RICHARD SAUNDK

alien snake (e.g., *Elaphe guttata*) into the Lesser Antilles is a valid concern. Preventing additional introductions of alien predators and protecting satellite island populations of threatened species are the two most important mechanisms for snake conservation in the region.

# 19TH ANNUAL MEETING OF THE SOCIETY FOR CONSERVATION BIOLOGY

## Universidade de Brasília, Brazil 22 July 2005

Excerpts from abstracts dealing with the conservation of reptiles.

Santos, G., J. Pacheco, G. Ceballos, F. Mendoza-Quijano, G. Daily, and P. Ehrlich. **COUNTRYSIDE BIOGEOGRAPHY IN REPTILE AND AMPHIBIAN COMMUNITIES IN SOUTHERN COSTA RICA: CONSERVATION VALUE OF HUMAN DOMINATED LANDSCAPES.** The future of biological diversity in the tropics depends largely on the conservation value of human-dominated lands. In this study, we investigated the distribution of amphibians and reptiles in five habitats of southern Costa Rica: relatively extensive forest (227 ha), coffee plantation, pasture, coffee with adjacent forest remnant (<35 ha), and pasture with adjacent forest remnant (<35 ha). Species richness, composition, and abundance varied significantly with habitat type and distance from the extensive forest. Additionally, we recorded the local extinction of at least five species, likely as a result of human-induced changes such as forest fragmentation, introduced diseases, and global warming. Of the 67 amphibian and reptilian species recorded in our

plots, most (48, 68%) were found in forests and forest fragments, 36 (50%) in coffee plantations, and 38 (51%) in pastures. Additionally, 20 were recorded exclusively in extensive forest and forest fragments, eight in coffee, and eight in pastures. Relatively continuous forest and small forest patches in combination with coffee plantations are important for the maintenance of the region's biological diversity, despite large scale negative human activities.



JOHN BINNS

*Ctenosaura nolascentis* is restricted to an island in the Gulf of California, México. Like all islands in the Gulf, San Pedro Nolasco is a protected area. Enforcement, unfortunately, is inconsistent. Nevertheless, many Mexican species, including many that are threatened or endangered, have no populations in protected areas.

Santos, G., J. Pacheco, and G. Ceballos. **NATURAL PROTECTED AREAS AND THE CONSERVATION OF AMPHIBIANS AND REPTILES IN MEXICO: PRIORITIZING SPECIES AND AREAS FOR CONSERVATION STRATEGIES.** One principal goal in establishing protected natural areas is to preserve ecosystems and associated biodiversity in order to perpetuate natural evolutionary processes. This study evaluates the efficiency of protected natural areas for the conservation of Mexican amphibians and reptiles. These groups are highly diverse in Mexico, with 1164 species (360 amphibians and 804 reptiles) and high endemism (60%, 241 and 450, respectively). We used 34 inventory lists from protected areas and considered con-

servation status, geographic range, and endemism of listed species to build a hierarchical system to identify priority species for conservation. The complementary study of these areas revealed that 56% of the Mexican herpetofauna is excluded from the protected areas.

Jessop, T.S., J. Imansyah, D. Purwandana, H. Rudiharto, and C. Ciofi. **MANAGEMENT AND CONSERVATION REQUIREMENTS FOR KOMODO DRAGON POPULATIONS IN KOMODO NATIONAL PARK, INDONESIA.** Within archipelagos, populations may exhibit intraspecific differences requiring plasticity in management and conservation practices. Four of the five island populations of the Komodo Dragon (*Varanus komodoensis*) reside within the world heritage-listed Komodo National Park in eastern Indonesia. To identify current management and conservation requirements for the park's dragon populations, a concerted long-term research program has been established. Results indicate that major differences in demography and ecology exist between dragon populations on the two large islands of Komodo and Rinca and the two small islands of Motang and Kode. Specifically, island area influences prey diversity and avail-



JOHN BINNS

The Brown Basilisk (*Basiliscus vittatus*) actually may benefit from forest fragmentation because of its dependence on edges. Many species however suffer when human activities break up contiguous stretches of suitable habitat into pieces too small to support viable populations.



JOE WASTLEWSKI

Populations of Komodo Dragons (*Varanus komodoensis*) remain vulnerable to human affects on their habitat. Reductions in the population size of Timor Deer, attributable to poaching, affected body condition and population size structure of the Dragons.

ability, which, in turn, influences the density, growth, and body size of dragons. The Motang Island population, estimated at  $51 \pm 6$  post-hatchling individuals, recorded a recent reduction in catch per unit effort, body condition, and changes in population size structure. Such changes have resulted from a decreased abundance of Timor Deer, due to suspected poaching. Increased resource security and potential augmentation of prey density may be required to conserve this population.

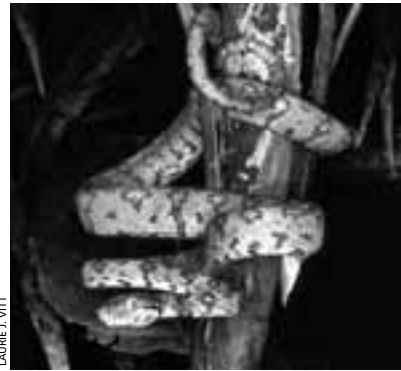
*Gerber, G.P. and A.C. Alberts.* **TRANSLOCATION AS A RECOVERY STRATEGY FOR THE CRITICALLY ENDANGERED TURKS AND CAICOS IGUANA.** In response to threats from introduced mammalian predators and human development, Turks and Caicos Iguanas (*Cyclura carinata*) were translocated in January 2002 and 2003 from two large but threatened island populations to four small protected islands with suitable habitat but lacking extant iguana populations. Translocation islands received 18–82 adult iguanas of equal sex ratio from one of the two source islands, depending upon their area (1–12 ha) and estimated adult carrying capacity. Source and translocated populations were monitored 2–3 times annually between 2002 and 2005. By five months, post-translocation adult iguanas on translocation islands had established normal movement patterns and were exhibiting normal or increased growth rates relative to source populations. Successful reproduction has occurred on all translocation islands each year since reintroduction and iguanas hatched on translocation islands are exhibiting growth rates 2–4 times that of juveniles of the same age on source islands. This has resulted in a decrease in



JOHN BEHNS

Translocated populations of Turks and Caicos Iguanas (*Cyclura carinata*) are showing growth rates and ages at maturity suggesting that they are taking full advantage of resources that are superabundant as long as the population of iguanas remains below carrying capacity.

age at maturity on translocation islands, relative to source islands, from 6–7 years to 2–4 years. We attribute increased growth rates on translocation islands to decreased intra-specific competition (i.e., density), relative to source populations, and predict that growth rates will return to baseline as carrying capacities are approached.



LAURE J. WITT

Animal populations inhabiting the Atlantic forest of northeastern Brazil are becoming increasingly fragmented, reducing the chances of maintaining long-term biodiversity. Particularly vulnerable are large species and those, such as *Corallus hortulanus*, dependent on forest habitats.

*Freire, E.M.X., U. Caramaschi, M.T. Rodrigues, and S.T. Silva.* **EFFECTS OF THE FRAGMENTATION OF ATLANTIC FOREST IN THE STATE OF ALAGOAS (NORTHEASTERN BRAZIL) ON THE DIVERSITY OF SPECIES OF LIZARDS AND SNAKES.** The Atlantic Forest of Brazil has become fragmented and reduced to about 7% of its original size. In the Northeastern Region, the most significant remnants are in the States of Bahia (6%) and Alagoas (2%). An inventory of different-sized forest fragments in the state of Alagoas involved 2,950 person-hours. Species diversity was high and 19% of the species were endemic to the northern part of the Atlantic Forest and two were new to science. The smallest area exhibited the highest diversity index, which two subsequent studies (1,100 person-hours) confirmed. This diversity may not be maintained, because the populations of animals in these fragments may not be viable in the long term.

*Bennett, D.* **CONSERVATION OF A LARGE FRUGIVOROUS MONITOR LIZARD IN THE PHILIPPINES.** Frugivory is a rare strategy in

lizards, but, in the Philippines, a group of large (>9 kg) *Varanus* lizards has evolved to become specialized frugivores in dipterocarp forest. Efforts to understand their ecology and promote their conservation have been hampered by their highly arboreal and secretive behavior. Here I report on the behavioral ecology of a population of *Varanus olivaceus* in fragmented forest on Polillo Island, Quezon Province, that have been the subject of a non-destructive and largely non-intrusive study instigated in 1999. Despite the large numbers of fruit types available to animals in dipterocarp forest, the lizards feed mainly on fruit from just four genera. They act as unique dispersers of *Pandanus* seeds, which results in high densities of these plants along slopes and ridges, which, in turn, has important implications for other fauna and flora dependent on *Pandanus* microhabitats. Their inability to fly means that large frugivorous lizards are more vulnerable to forest fragmentation than sympatric frugivores (birds and bats), but the results of this study indicate that populations can be maintained in disturbed forest if a few key resources are maintained.



JEFF LENNA

*Varanus olivaceus* is one of very few frugivorous lizards in the world and acts as an important disperser of *Pandanus* seeds.