

CONSERVATION RESEARCH REPORTS

Traditional Maori Knowledge of Tuatara

Traditional ecological knowledge can be highly informative and integrated with complementary scientific knowledge to improve species management. This is especially true for abundant species with which indigenous peoples have frequent interactions (e.g., through harvest), but has been studied less frequently in isolated or declining species. RAMSTAD ET AL. (2007. *Conservation Biology* 21: 455–464) examined Maori traditional ecological knowledge of Tuatara (*Sphenodon* spp., reptiles that resemble lizards, but are the last living representatives of the order Sphenodontia) through semi-directed interviews of elders of Te Atiawa, Ngati Koata, and Ngati Wai Iwi (similar to tribes), the guardians of several islands currently inhabited by Tuatara. Maori are indigenous to New Zealand, having settled 800–1,000 years ago. Tuatara are endemic to New Zealand, have declined in numbers since human settlement, and are now restricted to 37 offshore islands. The detail and volume of Tuatara traditional ecological knowledge were less than that recorded in studies of more abundant or accessible species. In addition, traditional knowledge of the cultural significance of Tuatara was more common and detailed among the elders than traditional knowledge of Tuatara biology or ecology. The traditional knowledge collected, however, provided the first evidence of seven former sites of Tuatara occupation, suggested five additional sites Tuatara may currently occupy, contained novel hypotheses for scientific testing, and



JENNIFER M. GERMANO

Although traditional Maori ecological knowledge of Tuatara (*Sphenodon* spp.) was less than that recorded in studies of more abundant or accessible species with which the Maori were more familiar, interviews with elders revealed new information about areas formerly inhabited by Tuataras and cultural roles not previously reported.

described Tuatara cultural roles that have not been reported previously. The authors concluded that, in at least some cases, traditional ecological knowledge may persist as species decline and may serve as a valuable source of ecological information for conservation.

Changes in Tropical Forests Affect the Herpetofauna

Plantation forests and second-growth forests are becoming dominant components of many tropical forest landscapes, but little information is available concerning the consequences of different forestry options for biodiversity conservation in the tropics. GARDNER ET AL. (2007. *Conservation Biology* 21: 775–787) sampled the leaf-litter herpetofauna of primary, secondary, and *Eucalyptus* plantation forests in the Jari River area of northeastern Brazilian Amazonia. They used four complementary sampling techniques, combined samples from two consecutive years, and collected 1,739 leaf-litter amphibians (23 species) and 1,937 lizards (30 species). They analyzed the data for differences among forest types regarding patterns of alpha and beta diversity, species-abundance distributions, and community structure. Primary rainforest harbored significantly more species, but supported a similar abundance of amphibians and lizards compared to adjacent areas of second-growth forest or plantations. Plantation forests were dominated by wide-ranging habitat generalists. Secondary forest faunas contained a number of species characteristic of primary forest habitat. Amphibian communities in secondary forests and *Eucalyptus* plantations formed a nested subset of primary forest species, whereas the species composition of the lizard community in plantations was distinct, and was dominated by open-area species. Although plantation forests are relatively impoverished, naturally regenerating forests can help mitigate some negative effects of deforestation for at least some herpetofaunal species. Nevertheless, secondary forest does not provide a substitute for primary forest. In the absence of further evidence from older successional stands, we caution against the optimistic



RAY ROOPER

claim that natural forest regeneration in abandoned lands will provide refuges for the many species that are currently threatened by deforestation.

claim that natural forest regeneration in abandoned lands will provide refuges for the many species that are currently threatened by deforestation.

Invasive Green Iguana Roadkills

SMITH ET AL. (2007. *Journal of Kansas Herpetology* 22: 14–16) examined 11 years of reptilian roadkill data from Cape Florida State Park (CFSP), a vegetatively restored, urban state park in southern Florida that was largely destroyed by Hurricane Andrew in 1992. The survey recorded 135 individuals of eight reptilian species, of which three were exotics. Native Southern Black Racers (*Coluber*



GARY BUSCH

Invasive Green Iguanas (*Iguana iguana*) often cross roads and even pause to bask on them, and consequently comprised 30.4% of the total number of roadkills in Cape Florida State Park.

constrictor priapus) and invasive Green Iguanas (*Iguana iguana*) each comprised 30.4% (N = 41) of the total number of roadkills. The other exotics were Giant Ameivas (*Ameiva ameiva*; N = 7) and a Red-eared Slider (*Trachemys scripta elegans*). The three exotic species collectively accounted for 36.3% of records. Roadkilled iguanas were first recorded in 2001 and peaked in frequency in 2003 (N = 13) and 2004 (N = 12), which coincided with periods of greatest density recorded at CFSP. Results underscore the threat of exotic species faced by protected areas and the need for data necessary for making sound management decisions.

Unintended Consequences: Raccoon Removal Helps Invasive Green Iguanas

MESHAKA ET AL. (2007. *Herpetological Conservation and Biology* 2: 149–156) examined the demographic responses of Green Iguanas (*Iguana iguana*) to the removal of Raccoons in an urban maritime state park in southern Florida. The rapid growth of iguanas to sexual maturity in an underexploited, if not vacant, niche contributed to rapid recruitment during the 4.5 years since removal of the limiting predator. The authors propose that at sites where Green Iguanas and high-density Raccoons are syntopic, Raccoon removal programs should be concurrent with equally concerted efforts to remove Green Iguanas. By replacing one limiting predator with another, a population explosion can be prevented.



An adult male Green Iguana (*Iguana iguana*) fends off a Raccoon (*Procyon lotor*) attack at Hugh Taylor Birch State Park in southern Florida.

American Crocodile (*Crocodylus acutus*) in Florida

When the American Crocodile (*Crocodylus acutus*) was classified as endangered in 1975, few data were avail-



Despite greater numbers of American Crocodiles (*Crocodylus acutus*) in Florida and a broader range in which reproduction is occurring, crocodiles are still threatened by land and water use modifications to adjacent habitat.

able upon which to base informed management decisions. Monitoring programs focusing on nesting ecology, growth, and survival show that crocodiles have responded positively to protection. The U.S. Fish and Wildlife Service is now considering downgrading the species from endangered to threatened.

Despite the progress, crocodiles are facing new problems, such as the continuing degradation of ecosystems in Florida and Biscayne bays. MAZZOTTI ET AL. (2007. *Journal of Herpetology* 41:122–132) reviewed results of research and monitoring programs that have been used as a basis for reclassifying *C. acutus*. They found that, despite greater numbers of crocodiles and a broader range in which reproduction is occurring, crocodiles are still threatened by land and water use modifications to adjacent habitat. To enhance habitat conditions and prey production and availability for crocodiles, freshwater flows to estuaries need to be restored to a natural pattern. A final concern is that, as crocodiles continue to recover and expand their habitat in coastal areas, interactions with humans will increase in frequency, posing additional challenges to the recovering population.

Investigating Natural Population Dynamics of New Zealand's Cryptic Diurnal Geckos

Habitat losses resulting from human settlement and introduction of mammalian predators have had a significant impact on New Zealand's threatened diurnal geckos. Approximately one-third of New Zealand's reptiles are restricted to mammal-free offshore islands, three species of lizards are extinct, and many others have dramatically reduced ranges. Clearly, New

Zealand's terrestrial vertebrates are in need of effective conservation management.

The endemic Marlborough Green Gecko (*Naultinus manukanus*) is confined to the Marlborough Sounds region of New Zealand. *Naultinus manukanus* is arboreal and diurnal. Potential threats include habitat fragmentation, loss of successional shrubland habitat, and competition with introduced species for habitat and food. Unfortunately, the behavior of these diurnal geckos makes conservation of this species a challenge. Few studies have been conducted on their reproductive biology, ecology, and behavior, because they are cryptic and difficult to detect. Accurate biological information about this species is vital for proper conservation management.

HARE ET AL. (2007. *Journal of Herpetology* 41:81–93) analyzed the population dynamics of *N. manukanus* as a model for understanding the ecology of other threatened diurnal geckos of New Zealand and to generate data necessary for the conservation of these species. Studies spanned 25 years, providing essential information about natural population dynamics, habitat use, and daily movement patterns. By analyzing sex ratios and reproductive rates, the authors found that the low reproductive output of *N. manukanus* renders them vulnerable to predation by invasive mammals. Although long-term prospects for *N. manukanus* appear good on Stephens Island, populations on the mainland are at high risk of declines because of habitat destruction, predation, and competition with exotic species. The K-selected life-history strategies of these unusual geckos require intensive management of competitors and predators to allow population trajectories on the mainland to become more stable.



Mainland populations of the New Zealand endemic Marlborough Green Gecko (*Naultinus manukanus*) are at high risk of population declines because of habitat destruction, predation, and competition with exotic species.

Frog-Human Interactions

From human popular culture to drug development and biological research, frogs have been model organisms to which most people readily relate. TYLER ET AL. (2007. *Applied Herpetology* 4:1–18) explored interactions between frogs and humans. They focused on the major declines in frog populations and the increasing evidence for the role of humans in habitat destruction and introductions of invasive species. Human uses of anurans are discussed, including the wide range of chemical compounds found in anuran skin, some of which have led to the development of drugs for human and veterinary use. Cultural uses of anurans (e.g., food and entertainment) also are described.

Some human modifications to environments, such as run-off aggravated by development, may provide breeding sites for certain species and could be seen as a benefit. Overall, however, the effects are negative. Although human use for scientific purposes may have had some negative impact on anurans, these are scant in comparison to numbers lost from habitat destruction and large-scale environmental degradation. Better enforcement of regulations in the food and pet trade could improve the chances of long-term survival of frog populations.



Frog-human interactions are almost inevitably detrimental to frog populations. Better enforcement of regulations in the food (this is a frog/fish market in Myanmar) and pet trade could improve the chances of long-term survival of frog populations.

Introduced Boa Constrictors Threaten the Native Biota of Cozumel Island

Invasive species can upset the delicate balance in island ecosystems. Understanding the biological effects of exotics on a native biota is important. In 1971, Boa Constrictors (*Boa constrictor*)



SUZANNE L. COLLINS, CMAH

The Spotted Turtle (*Clemmys guttata*), a species of special concern in Pennsylvania, was among 15 herpetofaunal species observed at a National Superfund Site in Erie County.

were introduced to Cozumel Island, México, and they have negatively affected native (some endemic) prey species. In order to develop strategies to reduce boa pressure on the native biota, ROMERO ET AL. (2007. *Biodiversity Conservation* 16:1183–1195) studied changes in boa abundance over time. In addition, they used nocturnal road transect sampling and data from boa encounters during fieldwork to estimate distribution, abundance, and habitat use.



JEFF LEMMA

Boa Constrictors (*Boa constrictor*) introduced to Cozumel Island, México, have negatively affected native (some endemic) prey species.

The study found that boas are widely distributed across Cozumel and occupy all vegetation types. However, snakes were most abundant in areas uninhabited by humans, and boa mortality was relatively common in human-inhabited areas. Boas are habitat generalists, and control or eradication will pose challenges. Public education on the control of boas and the negative effects on native species is very important for a well-planned management program on Cozumel. Prevention of similar introductions elsewhere is also imperative.

Herpetofauna of a National Superfund Site

GRAY (2007. *Bulletin of the Maryland Herpetological Society* 43: 129–133) surveyed the herpetofauna of the Harper Drive Hazardous Waste Area, a National Superfund Site in Erie County, Pennsylvania, between 1995–1999. He observed two salamander, six frog and toad, three turtle, and four snake species, including the Spotted Turtle (*Clemmys guttata*), a species of special concern in Pennsylvania. The base-line data presented in this report, along with any future surveys at the site, may be useful in evaluating the effects of remedial action on the area herpetofauna.

Roads Threaten Galápagos Lava Lizards

Galápagos Lava Lizards (*Microlophus albemarlensis*) are heavily impacted by roads. TANNER ET AL. (2007. *Bulletin of the Chicago Herpetological Society* 42:125–132) measured mortality on Santa Cruz Island and found that fatalities averaged 0.4 mature males and 1.8 juveniles per km/day. Lizard population models that considered but were not limited to impact from roads suggested that the lizard population is on the path to local extirpation.



Galápagos Lava Lizards (*Microlophus albemarlensis*) are heavily impacted by roads.