

Long-distance Conservation

National Zoo Holds Hope for the Micronesian Kingfisher

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The introduction of an exotic species can be devastating to an ecosystem and its biodiversity—and nowhere is that more apparent than on the Pacific island of Guam. The accidental introduction of the brown tree snake (*Boiga irregularis*) shortly after World War II heralded the extermination of many bird species on Guam, including the Marianas Fruit Dove (*Ptilinopus roseicapilla*), Guam Broadbill (*Myiagra freycineti*), Rufous Fantail (*Rhipidura rufifrons*), and Cardinal Honeyeater (*Myzomela cardinalis*). Another species that appeared headed for a similar fate was Guam's Micronesian Kingfisher (*Todiramphus c. cinnamominus*). Having evolved without the brown tree snake as a natural predator, the kingfishers were an easy target for the reptile, and by the early 1980s the bird's population had dwindled to an estimated 29 individuals. It was then that several U. S. zoos, the U. S. Fish & Wildlife Service, and Guam's Division of Aquatic and Wildlife Resources (DAWR) started a multi-agency effort to help keep the Micronesian Kingfisher off of Guam's list of extinct species—even if that meant removing the remaining birds from the wild.

Known as *siheks* in their native home, Micronesian Kingfishers, like most other members of the kingfisher family, have a large head, a short neck



and tail, and a straight, strong bill that is flattened on the top and bottom. Both the male and female have a chestnut-colored head, a greenish-blue body, and a blue tail. The male's breast is rusty cinnamon, and the female's is white. These small birds, about six inches long with a wingspan of almost eight inches, historically inhabited the forests and mangrove swamps of Guam.

Guam's Micronesian Kingfisher is one of three distinct subspecies that exist throughout Micronesia and is the only one that is extinct in the wild. The subspecies *reichenbachii* from the island of Pohnpei and *pelewensis* of Palau still exist in the wild. The three subspecies are similar to one another in size and shape and differ primarily in the amount and placement of the cinnamon coloration. The two subspecies still in the wild live in similar forest and mangrove swamp habitats to the ones that Guam's kingfisher once inhabited, and they share the same diet of insects, small reptiles, and fish.

Although individuals of *cinnamominus* were sighted in the wild as late as 1988, most of Guam's kingfishers were by then living half a world away in North American zoos, as a captive breeding and management program was being developed. When individuals first began to be captured, however, no record existed of this species in captivity. Husbandry techniques were developed based on the limited information known about their natural history and past

experience with other species of kingfishers. Now almost 20 years later, the program's success is reflected in the Micronesian Kingfisher's current population, which has almost tripled since the program began, to 75 birds. Although no individuals have yet to be released back into the wild, returning them to their native habitat on Guam is the long-term goal—a goal that is closer to being reached with the relocation of captive-bred birds to a new breeding facility on Guam, including three birds from the Conservation and Research Center for the Smithsonian's National Zoo. Scientists hope that a return to the kingfisher's native climate, light cycles, and food sources in Guam will increase breeding successes in the program.



Meanwhile, zoos in North America continue to breed birds, taking every opportunity to strengthen the population's numbers and genetic diversity. The National Zoo's Conservation and Research Center in Front Royal, Virginia, had a significant success in 2004 with the hatching of a chick from a genetically valuable pair; because the population is so small, it is important to breed individuals whose DNA is as different from one another as possible—as with the chick's parents—to maintain genetic diversity



Shown here is a captive-bred **Micronesian Kingfisher** at various ages (first four photographs) and its mother (last photograph). From left to right: Three days old. © Jessie Cohen / Smithsonian's National Zoo • Four weeks old. © Jeff Reynolds / Smithsonian's National Zoo • Ten weeks old. © Jessie Cohen / Smithsonian's National Zoo • Three months old. © Jessie Cohen / Smithsonian's National Zoo • Adult female. © Jessie Cohen / Smithsonian's National Zoo.



This exhibit at the Smithsonian's National Zoo presents an important element of realism: an enclosure for a brown tree snake, the central antagonist in the Micronesian Kingfisher story. © John Gibbons / Smithsonian's National Zoo.

in the species. As the first Micronesian Kingfisher to hatch in five years at the facility, the chick was lauded as a huge success for the species. But as Scott Derrickson, bird curator at the center explains, it is a success that did not come without a lot of hard work.

“Breeding this species in captivity has proven to be problematic, and breeding this chick’s parents was especially challenging,” Derrickson says. For the past few years, the adult male and female excavated nest cavities, but the female did not lay eggs in the nests. Instead, she laid them while perched on a branch, and most were broken. But finally, she began laying in the nest. “We were thrilled when the female produced a fertile egg,” Derrickson says. “However, when the parents showed no interest in caring for it, we had to step in and place the egg in an incubator.”

Still, there were no guarantees. Few Micronesian Kingfisher chicks have been hatched successfully from eggs receiving full-term artificial incubation. But after 21 days of

monitoring and waiting, the zoo staff’s efforts were rewarded with the hatching of a chick.

“We were extremely pleased,” Derrickson says. “It was a huge milestone to have gotten so far with this particular pair of adults. Now we were able to look ahead to the next step: hand-rearing the hatchling.”

Being a surrogate parent to any baby animal is hard work, and this new kingfisher was no exception. Hand-rearing the kingfisher was labor-intensive, explains Derrickson, as young chicks need to be fed at two-hour intervals, seven to eight times per day. But on a diet of mice, insects, and lizards, the chick grew quickly; and at three months old, it was the size of an adult and fully independent.

With a life expectancy of up to 12 years, this young bird has a long road ahead. So what lies in store for it? “With a total population of only about 75 in the world and still none living in the wild, this genetically valuable young male is incredibly important to the future of the species,”

Derrickson says. It will become a vital part of the Micronesian Kingfisher's breeding program.

As a cooperative population management and conservation program, the American Zoo and Aquarium Association's Species Survival Plan for this species involves 11 other zoos in North America and Guam's DAWR. Together, they are managing the captive population of this species in order to sustain a genetically diverse population that ultimately can provide individuals for reintroduction to the wild.

"The work and research that the Smithsonian's National Zoo and many other zoos across the country are putting into this species is a great example of the important role that zoos play in environmental conservation," notes Paul Tomassoni, curator for birds at the National Zoo. "Another of our key roles in helping to save the Micronesian Kingfisher is public awareness." When visitors come to the National Zoo's Bird House to see Micronesian Kingfishers, they are treated to a unique multi-species exhibit that teaches people not only about the kingfisher, but also about Guam's environmental crisis as a whole. The National Zoo's pair of kingfishers shares the exhibit with a breeding pair of Guam Rails (*Gallirallus owstoni*)—a species whose brush with extinction mirrors that of the Micronesian Kingfisher all too closely. Like the kingfisher, Guam Rails have benefited greatly from research and captive breeding at the National Zoo and other zoos.

What makes the exhibit truly unique, however, is the third species that occupies it—the brown tree snake. Housed in an enclosure within the exhibit, the snake serves as a living example of what has brought both the kingfisher and the rail to the brink of extinction. "For visitors, this exhibit is much more than seeing predator and prey together," says Tomassoni. "It is a rare opportunity to see the whole picture at once—the snake, which as an exotic species has devastated Guam's native wildlife; and the birds, which represent the successes we are having in saving these species with the Species Survival Plan."

As invaluable as the captive breeding program is for the survival of the Micronesian Kingfisher, its re-establishment in the wild cannot be achieved unless brown tree snake populations are eliminated. During the past two decades, researchers have developed a variety of techniques for controlling the snake, including barriers, traps, and toxicants. Recent advances in controlling snake populations in relatively large areas of native habitat suggest that the reintroduction of Micronesian Kingfishers may soon become feasible.

In 1984, Guam's DAWR, along with several zoos, captured most of the kingfishers on Guam and sent them to mainland zoos for breeding. "Now, 20 years later, we are at a point where we can start returning them to their native home—and that's exciting," according to Derrickson.