

Breeding the Guam Rail

(*Rallus owstoni*)

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Lowry Park Zoological Garden
Tampa, Florida

The Zoo

Lowry Park Zoological Garden is perhaps America's newest zoo, having reopened its admission gates to the public on March 5, 1988, after a total reconstruction. The \$8 million phase one of the zoo includes an Asian domain, a primate world, a children's village (with petting zoo), and a free flight aviary. The zoo is largely comprised of cageless environments and specializes in the educational display and breeding of endangered species. Phase two of the zoo, due to open Nov. 1, 1990, will include a further \$12 million in new facilities, including a Florida-at-night building, a Florida biome exhibit and an education complex.

The Free Flight Aviary

The zoo's free flight aviary is an 18,000 square foot, 45' high cable truss structure. It has a concrete perimeter wall foundation and is covered with 1" by 1" vinyl coated weld-mesh. The aviary, although appearing to be one open space, is divided into six separately managed units, providing opportunities for display and breeding of a wide variety of birds. Presently, in these spaces we manage 13 avian orders, comprised of approximately 200 individuals of 60 species. The target species emphasized are tropical, neotropical and some temperate birds that do well in the climate of west central Florida. We also manage four species of reptiles including the Chinese softshell turtle (*Trionyx sinensis*), the red-footed tortoise (*Geochelone carbonaria*), the blue-tongued skink (*Tiliqua scincoides*) and the green iguana (*Iguana*) as well as the brush-tailed bettong (*Bettongia penicillata*), a small Australian marsupial. Since our grand opening we have successfully bred 14 species of birds in the aviculture department.

The aviary contains mature live oak trees and a wide variety of native and

exotic subtropical trees, shrubs and ground covers. The aviary has an artificial waterfall, stream and pond, water from which is recirculated through an electric pump. There is a 400 square foot pressure-treated timber platform about 15 feet above grade, accessed by a wide staircase, that allows for greater public viewing opportunities. It also functions as a sun and rain shelter, a place to hang artificial heat sources (electric porcelain and infra-red heaters), perching locations, nesting areas and feed stations. The top of the platform is covered and heaters also hang in these rafters.

Intraspecies competition is minimized by limiting the numbers and sexes of birds of a given species within the aviary. Interspecies competition is minimized by providing a surplus of scarce resources which typically include:

1. Mates — by introducing only pairs of surgically sexed birds.
2. Nesting sites (boxes, platforms and nesting materials).
3. Food — by providing a number of feeding sites.
4. Water — by providing several drinking locations.

Nest sites and feeding stations are specially constructed and placed in the aviary with target species in mind.

The Guam Rail Project

The Guam rail captive breeding project was adopted by our institution in March of 1988 because it was representative of the sort of program we felt progressive zoos should participate in. Although this rail species is somewhat drab and not particularly popular with the public, it represents an important cooperative endeavour between the government of Guam, the National Zoo and several other zoos in this country, including the Lowry Park Zoo.

At the beginning of 1986 it was reported that this flightless species, endemic to the tropical island of Guam in the western Pacific, was extinct in the wild due to the prior introduction of the brown tree snake (*Boiga irregularis*) in the late 1940s. There was a population of between 40,000 and 80,000 Guam rails on the island as early as 1960. By 1984, the number had dropped to 16 birds and by 1986, it appeared to be extinct in the wild. The brown tree snake had also devastated most other forms of avifauna on the island and by 1984 had reached a population of between one and three million (Shelton 1984, 1986). Although it was planned to begin captive breeding programs for all of Guam's endemic birds, by the time the program got underway there were only viable populations of the Guam rail and the Micronesian kingfisher (*Halcyon c. cinnamomina*) remaining. Several of the birds were transferred from the Guam Division of Aquatic and Wildlife Resources (GDAWR) captive facility to the Bronx and National Zoos in the United States. As these two facilities established the husbandry and management guidelines for the species and successfully bred the birds, surplus progeny were sent to other American zoos wishing to participate in the project. From the original 21 founders there are now at least 132 Guam rails in eleven collections in the United States and one on Guam (Derrickson, pers. comm.). By agreement, all birds in the American gene pool remain the property of the Guam DAWR.

Drs. Haig and Ballou, and Derrickson at the National Zoo are responsible for the genetic evaluation and population management of the species which endeavors to preserve the maximum genetic variation from the original founders.

Our experiences with the Guam rail began with the post-quarantine introduction of a male into the largest portion (b-side) of the free flight aviary, with a hand-raised, imprinted female. The female was removed after a few weeks because her desire to interact with the public posed a threat to her well-being (she liked to peck at the shoe laces of passersby on the public walkway). She had also shown no interest in the parent-reared male. On June 7, 1988, a new female was introduced into the aviary. For the first two days there was a little aggression between the pair and the male

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never left his territory (b-9). After two days, the pair was observed together in the male's territory. This territory was a triangular shaped area, bordered on two sides by a perimeter wall and on one side by the sidewalk. The territory was approximately 500 square feet.

The nest consisted of a shallow depression, 4" in diameter and was located under a low shrub (*Photinia glabra*) visible from the sidewalk. On July 3, 1988, the first egg measuring 28 mm (?? in) by 43 mm (?? in) was laid. On July 4, a second egg 23 mm (?? in) by 41 mm (?? in) was laid. The final egg was laid on July 6, 1988 (no measurement recorded) and incubation began. The male incubated during the a.m., with the female taking over during the p.m. When the male took over incubation, the female would leave b-9 to feed and drink, being gone normally about 15 to 20 minutes. She would then return to b-9 to defend the nest site while the male continued incubation. When the female incubated, the male would leave b-9 for up to several hours and was often observed carrying a leaf or piece of bark mulch back to the nest. The female was observed getting off the nest and defending the site for 10 to 15 minutes before the male returned to b-9 to incubate. All three chicks hatched within a few hours of each other on July 26, 1988, making the incubation time 20 days. After the chicks hatched, both of the adults stayed exclusively in b-9 and were observed brooding the chicks at the nest site for a day or so and near the nest site for the following few days. For several days, the chicks would run back to the comfort of one of the adults in a stressful situation and hide under their belly feathers. Typically, in this situation, the other adult would charge the intruder (including zoo keepers) with wings slightly raised in a threat posture. The chicks emitted highly pitched audible peeps when being bothered or caught up.

For the first few days, flat pans with high protein game bird starter and an abundance of wax worms were set out in b-9. The adults were never seen feeding from these pans, preferring to eat their normal gruiform diet. The new pans of food caused many other aviary residents to come into b-9 to feast. It was believed that harm would come to these new birds, as we noticed that the Guam rails were becoming increasingly aggressive. The extra pans were removed. The

gruiform diet pans with extra live food (crickets, meal worms and wax worms) were fed in b-9 twice a day. The total diet we provided the rails is as follows: seasonal fruit mix, game bird mix, pheasant mix, hard boiled eggs, greens, meal worms, wax worms, crickets, bird of prey diet and trout chow. As is typical of rails, we have observed the parents picking up worms, bringing them to the young and holding very still while the chick pecks the worm out of the parent's beak. Several years ago I observed this behavior with the Lord Howe Island wood rail (*Tricholimnas sylvestris*) in Australia.

The nicobar pigeons (*Caloenas nicobarica*) who inhabited b-9 co-existed peacefully with the rails until the third egg was laid and incubation started. At that time they were driven away. A few black-necked stilts (*Himantopus mexicanus*) and a male blue-winged pitta (*Pitta moluccensis*) were allowed to enter b-9, but neither species remained long. Significant aggression was not observed between the Guam rails and other species, but on July 27, 1988 a young male crested wood partridge (*Rollulus roulroul*) was found dead on the sidewalk in front of b-9. The necropsy revealed a puncture wound through the skull. On August 6, 1988 a female pink-necked fruit dove (*Ptilinopus prophyreus*) was found badly wounded under a small shrub in b-9. On July 29, 1988, a female common hoopoe (*Upupa epops*) was found dead with traumatic injuries well outside of b-9. We did not see the parent Guam rails outside of b-9 during this period, so feel this was an unrelated incident. However, on August 16, 1988 it was decided that the Guam rail was not a good member of our mixed species collection. All five rails were removed and relocated to a planted, off-public-view breeding complex with 16 ft. long by 8 ft. wide by 10 ft. tall flights. No problems occurred with this move and the parents continued to protect and feed their three chicks. The three chicks were removed from their parents' aviary and relocated together at the age of 50 days. These unsexed young remain together now, at the age of four months.

Since this mixed species experiment in the free flight aviary, we have acquired another two pairs of this species which we house in the above mentioned off-public-view facility, each pair in a separate aviary. The

second breeding pair laid a single clutch of three eggs (for which we have no egg measurements) that hatched synchronously after 21 days of incubation. We continue to work with Guam rails in mixed species situations without problems. We have found, however, that a highly arboreal passerine of significant size that will not interact with the rails is the best.

It is reported by Derrickson (1987), that Guam rail eggs hatch asynchronously and that incubation begins with the laying of the first or second egg. This has not been our experience. In both our hatchings, the incubation began after the third and last egg and the chicks all hatched the same day. The recorded clutch size ranging from one to five eggs, the incubation being 20 to 21 days, the shared nest construction, incubation and brood care and other reported information by Derrickson (ibid), however, does correspond with our findings. The reported egg breaking trait common to rails (Ripley, 1977) has been recorded at our institution in both breeding pairs. Typically, a single egg is laid and broken or the shell is pierced. The birds have never eaten contents of an egg, nor has a full clutch ever been broken. It seems as though once our rails made up their minds to nest, they did so in earnest and did not break their eggs.

We have sent several birds (adults and independent young) to Dr. Brian McNab at the Department of Zoology at the University of Florida in Gainesville on short-term loans. The findings on his non-invasive basal metabolic research have been interesting and should appear in scientific publications soon. McNab has also noted the adult Guam rail, with a human-assisted launch, flaps to the ground at a 45 degree angle, whereas the young (about three months old) fly quite well in comparison.

Postscript

We will surgically sex the six young Guam rails bred at our institution at four months of age and offer them to Dr. Derrickson from The National Zoo. He plans to return with the birds to Guam in early 1989, where they will join other captive-bred members of their species. They will then be introduced to the Island of Rota some 50 kilometers (?? miles) north of Guam. Rota is an island without rail or brown tree snake populations.

I share the enthusiasm of my staff



Pair of Guam rails, male at left standing more erect, with their 10-day-old chicks.

in participating in this exciting, applied conservation project, and encourage other institutions to join our ranks. Rails, although viewed by some as difficult to manage in mixed species applications, are fascinating birds that will require much in the

way of captive work into the future. Flightless rails adapted to predatorless island environments have proven very vulnerable and several species have become extinct in recent history due largely to the introduction of exotic pests. It is, however, encourag-

ing to know that recent captive breeding programs for the Lord Howe Island wood rail and the Guam rail have been so successful. New projects for the species such as the Aldabra white-throated rail (*Dryolimnas cuvieri aldabranus*) should be considered for initiation. It is important, however, to ensure that such proposed programs do not supplant the captive carrying capacity for rails within American zoological institutions, as is better to do one project well, than several poorly. Toward this end, Scott Derrickson and I will be asking zoos throughout the country to assess their space for rails and to confirm or otherwise their interest in working with the Aldabra white-throated rail, who's long-term status in the wild is precarious.

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