

JOB PROGRESS REPORT RESEARCH PROJECT SEGMENT

STATE: Territory of Guam

PROJECT NO.: E-2-2

SUB-PROJECT: D

JOB NO.: 1

JOB TITLE: Establishment of Populations of Endangered Species in Snake-Free Areas

PERIOD COVERED: October 1, 1998 to September 30, 1999

SUMMARY

Sixteen Guam rails (*Gallirallus owstoni*) (8 males, 8 females) were released in Area 50 on 16 November 1998. Rails survived an average of 198 days, although 5 (31%) rails were still known to be alive at the end of the reporting period (318 days). Seven birds (44%) were found dead, 2 birds had their radios fail before the end of the fiscal year, while 2 birds dropped their radios. A total of 4 females and 5 males nested during the reporting period producing 17 nests (mean clutch size of 2.94 eggs, range = 1-4) and successfully hatching 42 of 50 eggs (84%). Birds were capable of recycling quickly as the average time between the hatching of successive nests for any particular bird was 55.5 days (range = 27-112 days). A total of 512 trap nights (TN) were completed for the fiscal year, capturing 8 feral cats (1.56 cats/100TN) and 5 monitor lizards (0.98 monitors/100TN). A mark-recapture study should be initiated to get a population estimate and survivorship data on rails hatched in Area 50, and to gain additional information on movements, reproduction, and habitat use.

INTRODUCTION

Census data collected between 1960 and the early 1980s documented the reduction in range and numbers of the Guam rail (Wittelman et al. 1990). The extirpation of the Guam rail from the wild was due primarily to predation by the introduced brown tree snake (*Boiga irregularis*) (Savidge 1987). In 1984, the rail was added to the U.S. Endangered Species List when only about 20 individuals were known to remain in the wild. In 1982, Guam's Division of Aquatic and Wildlife Resources (DAWR) developed a captive breeding program for the rail and collected all known remaining rails from the wild (n=21) by 1986. The rails have reproduced well in captivity and currently number about 140-150 birds distributed between Guam and 14 mainland zoos.

From 1989-1999, 267 Guam rails were released on Rota, Commonwealth of the Northern Mariana Islands (CNMI) for the purpose of establishing an experimental wild population in a snake-free environment (Beauprez and Brock 1999). In 1995 and 1999, reproduction was documented among the rails translocated from captivity to the wild on Rota, suggesting that the technical aspects of introduction were achievable.

Current brown tree snake control methods include the reduction or eradication of snakes from large-scale areas using trapping and enclosure barriers (Brock et al., in prep.). Area 50 is a 24-ha plot of mixed forest in Northwest Field on Anderson Air Force Base, Guam (Figure 1). It is surrounded by old runway tarmacs and enclosed by a 2-m tall chain link fence. It has been set aside for the purpose of environmental recovery activities to include

the removal of brown tree snakes, feral pigs (*Sus scrofa*), and deer (*Cervus mariannus*),

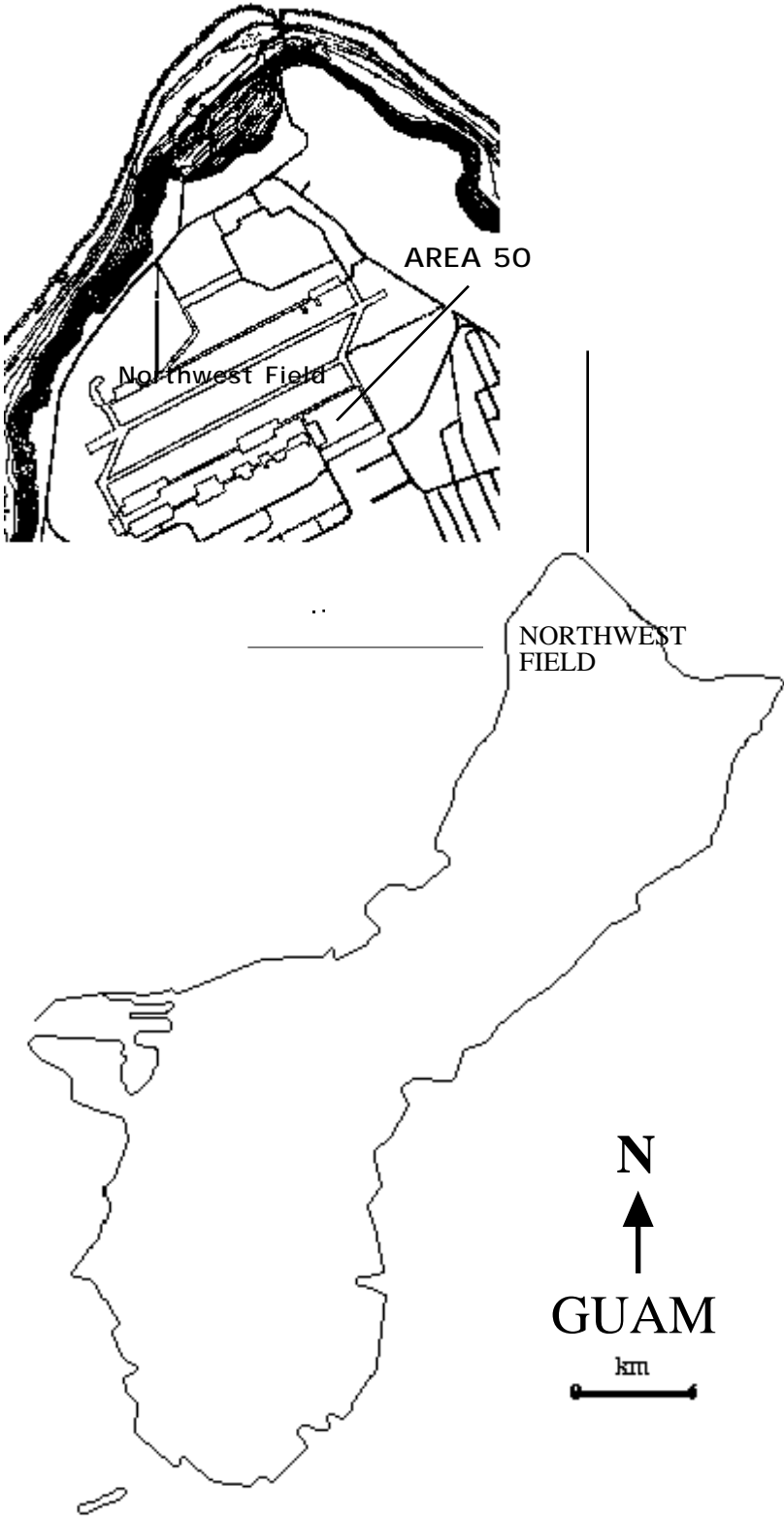


Figure 1. Location of Area 50 in Northwest Field, Guam.

and the recovery of several native species including the Guam rail, Mariana crow (*Corvus kubaryi*), Micronesian kingfisher (*Halcyon cinnamomina*), and the tree *Serianthes nelsonii*.

OBJECTIVES

1. Establish a wild population of Guam rails in snake-free habitat in northern Guam.
2. Monitor survival, dispersal, reproduction, and establishment of released rails through radio telemetry.
3. Use rails born in Area 50 as stock for introductions of birds to other snake-free areas on Guam.

METHODS

Sixteen Guam rails (8 males, 8 females) were released in Area 50 on 16 November 1998. All birds were equipped with backpack mounted radio-transmitters (Holohil, Inc., Ontario, Canada). A serially numbered aluminum band was placed on the right leg of all birds and a red band placed on the left leg of the males. Birds were tracked using a precision direction finding antenna array (Telonics, Inc., Mesa, Arizona) or hand-held antennae (Conway et al. 1993, Shivik et al. 1996).

The removal of brown tree snakes from the perimeter of Area 50 continued during the study. Trapping methodologies follow those in Brock et al. (1999). As many as 10 traps were used to capture feral cats from inside and surrounding Area 50 prior to and throughout the study.

RESULTS

Predator Control

A total of 512 trap nights were completed in Area 50 during FY99, capturing 8 feral cats (1.56 cats/100 trap nights) and 5 monitor lizards (0.98 monitors/100 trap nights). All predators were captured outside the fence of Area 50, although cat scat was seen inside the fence on several occasions.

Survival

Rails survived an average of 198 days, with five (31%) birds still known to be alive at the end of the reporting period (range = 0-318 days) (Table 1). Seven (44%) birds were found dead, two had their radios fail before the end of the fiscal year, and two birds dropped their radios.

Movements

Rails initially made large movements during the first 1-2 weeks after being released until they found a mate and settled into territories. Birds seemed to concentrate in the four-corners of the area, with few movements across the interior. Home ranges seemed to cover 1-2 ha, although specific values had not yet been calculated at the end of the reporting period. It appears that males may range farther than females, particularly when females are on a nest, but these data have not yet been analyzed.

Table 1. Fates of 16 Guam rails released in Area 50, November 16, 1998.

Frequency	Band #	Sex	Age at Release	Weight (Grams)	# Days to Status*	Fate
164.066	2007	M	5 mos	245	7	Dead, failure to forage
164.126	10301	F	7 yrs	280	318+	Alive
164.197	617	F	2 yrs	280	206	Dead, cause unknown
164.211(883)**	696	M	6 mos	235	318+	Alive
164.287	692	F	6 mos	205	85	Dead, caught in vegetation
164.356	695	M	6 mos	255	273+	Radio Failure
164.378	2001	F	5 mos	215	203+	Dropped Transmitter
164.406	693	F	6 mos	205	318+	Alive
164.481	622	M	2 yrs	255	318+	Alive
164.588(104)**	10302	F	7 yrs	255	318+	Alive
164.629	2006	F	5 mos	240	84	Dead, caught in vegetation
164.702	680	F	11 mos	225	128	Dead, cause unknown
164.760	694	M	6 mos	270	0+	Radio Failure
164.862(287)**	2008	M	5 mos	240	260+	Dropped Transmitter
164.888	697	M	6 mos	220	103	Dead, cause unknown
164.932	618	M	2 yrs	245	226	Dead, tangled in vegetation

*Birds with a (+) next to their “# Days to Status” indicates that the bird is, or could still be alive, and may have lived longer than the number indicated.

**Frequency in parentheses represents a replacement transmitter.

Reproduction

Four females and five males nested during FY99, producing 17 nests (mean clutch size = 2.94 eggs, range = 1-4) and successfully hatching 42 of 50 eggs (84%) (Table 2).

Birds were capable of recycling quickly as the average time between the hatching of successive nests for any particular bird was 55.5 days (range = 27-112 days). The first nest was found on January 14, 59 days post-release. Females displayed nest site fidelity as nests were often within 10-20 m of their previous nest, with the exception of female .196 whose nest with her second mate was about 300 m north of her previous nest sites.

Table 2. Nesting of Guam rails in Area 50, 1999.

Freq(F/M)	# Nests	# Eggs	# Hatched
.377/.355	2	6	6
.196/.888-.861*	3	8	4
.587/.211	5	15	14
.126/.481	7	21	18
Totals	17	50	42
Average	4.3	12.5	10.5

*Female .196 first nested twice with male .888 until he died, then nested with male .861.

DISCUSSION

When Guam rails were initially released into Area 50, when birds were seen pacing along the edge of the fence on several occasions, as if they were still confined in their holding cages at the DAWR breeding facility. It was this sort of behavior that led to the death of

one bird seven days after its release, suggesting the bird never adapted to the wild. However, after several weeks, most birds seemed to settle down and establish territories. The perimeter fence was successful in controlling the dispersal of the rails, as no birds were known to have escaped during the study. This facilitated the pairing up of rails and the establishment of territories. Most birds appeared to settle within 100 m of the fence, mostly in the south, west, and east corners, in areas of secondary forest and low scrubby vegetation. Snake capture rates remained at maintenance levels (0.0 – 0.5 captures/100 trap nights) throughout the study and no mortality of rails or eggs was attributed to snake predation.

The capture rate for feral cats outside of Area 50 was quite high (1.56 cats/100 trap nights) compared to the overall rate for Rota (0.37 cats/100 trap nights) (Beauprez and Brock 1999). Cats captured on Guam were larger than on Rota (avg = 3,375 g on Guam, avg = 2,270 g on Rota). It was reported that Air Force personnel living at the nearby Detachment 5 facility had been feeding a number of feral cats. This may explain the high capture rate at Area 50, as well as the relative health of the cats. It is advisable to continue trapping cats in and around Area 50 to prevent future predation on introduced rails.

Rails made large movements following their release until they found a mate and settled into territories. Birds seemed to concentrate mostly in the south and west corners, and they could often be heard calling during the early morning and evening hours. Home ranges seemed to cover 1-2 ha, but this may vary depending on whether the bird was solitary or paired. Pairs seemed to be more sedentary than unpaired birds, and males appeared to range farther than females. A complete analysis of telemetry and movement data should be completed to determine the home ranges of individual birds, pairs, and broods.

Males may play a critical role in nesting and brood rearing. Although females were most often found on nests during the daylight hours, males were periodically found incubating during daylight hours as well. Males also seemed to incubate more often at night. Additionally, since the turnover rate between successive nests was quick (avg = 55.5 days), males may play a more important role in rearing the brood and only a minor role in the actual incubation, as the female may often be incubating a nest while the male is taking care of the offspring. A more thorough study of the reproductive biology and behavior of Guam rails should be initiated.

Rail reproduction in Area 50 was excellent, with 42 chicks produced from 9 captive-reared birds. However, the survival rate of chicks is unknown. Chicks were heard in the vicinity of their radio-marked parents on numerous occasions, but were rarely seen. On one occasion, a pair of juvenile rails was captured in a cat trap, but one of them was killed when the trap door came down on its neck. The surviving chick was old enough to be banded, but was too small for a radio transmitter and was released. Many of the chicks produced at the beginning of the year would now be of reproductive age and could be producing offspring of their own inside Area 50. A mark-recapture study should be initiated to estimate the number of rails in the area. This would allow wild-born birds to be banded and radio-marked, and provide information on their movements, reproduction, and habitat use.

RECOMMENDATIONS

1. Continue trapping and removal of feral cats from in and around Area 50.
2. Continue to perimeter trap for snakes around Area 50 to reduce the threat of predation.

3. Continue to monitor rails via radiotracking to obtain data on movements, reproduction, and habitat use.
4. Implement a mark-recapture study to gain a population estimate for rails in Area 50, and data on survivorship of rails hatched in Area 50.

PROJECT COST

The estimated cost of this project under E-2-2 is \$50,000.

LITERATURE CITED

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Report prepared by: Grant M. Beauprez and M. Kelly Brock