

**JOB PROGRESS REPORT
RESEARCH PROJECT SEGMENT**

STATE: Territory of Guam

PROJECT NO.: E-1-12

STUDY NO.: 4

JOB NO.: 2

JOB TITLE: Development of an Experimental Population of Guam rails in the Commonwealth of the Northern Mariana Islands (1480, 1311)

PERIOD COVERED: October 1, 1996 to September 30, 1997

SUMMARY

Nineteen Guam rails (*Gallirallus owstoni*) were released at the Sagua'gagha area of Rota in August and September 1997. Twelve of the rails (5 males, 7 females) were released into a 1.6 ha enclosure in the forest, while 2 breeding pairs were released in separate 25 m² holding pens. The remaining 3 birds (3 males) were released outside the enclosure within 400 m. Extensive efforts were made to remove predators from the release area. Mortality was 32% as six rails were confirmed dead. Sixty-three percent (n=12) of the rails survived to the end of the monitoring period. Forty-two percent (n=5) of the birds escaped the enclosures during the monitoring period. One radio-marked bird either escaped and dispersed from the release area or its transmitter failed. There was a problem with some of the transmitters exhibiting frequency drift. Rails that escaped from the enclosure or were released outside moved a mean distance of 756 m away from the release site, with the longest documented distance being 2.9 km. Rails (n=5) remained in the enclosures a mean of 10 days (range = 3-18 days) before escaping. Although work continued on the rail project beyond the end of the fiscal year, the 10-year cooperative agreement between Guam, U.S. Fish and Wildlife Service (USFWS) and Commonwealth of the Northern Mariana Islands (CNMI) for the introduction program expired September 30, 1997.

BACKGROUND

Census data collected between 1960 and the early 1980s documented the reduction in range and numbers of the Guam rail (Witteman et al. 1990). In 1984, only about 20 rails were known to remain in the wild and the species was added on the U.S. Endangered Species List. In 1982, the DAWR decided to develop a captive breeding program for the Guam rail and by 1986, all known remaining rails were collected (n = 21). The extirpation of the Guam rail from the wild was due primarily to predation pressure from the introduced brown tree snake (*Boiga irregularis*). The captive propagation program was organized under the auspices of the American Zoo and Aquarium Association (AZA) and presently includes the cooperation of 18

mainland zoos. The rails demonstrated an immediate propensity for breeding in captivity and to date over 400 rails have been produced in captivity (Derrickson 1996).

The captive management of the Guam rail uses the metapopulation approach, which calls for the establishment of more than one subpopulation (Foose et al. 1986). This has been accomplished by dispersing the captive rails into two primary captive populations on Guam and in U.S. zoos. Because reintroduction of the Guam rail to part of its historical range on Guam is a recovery objective, the establishment of an experimental wild population on snake-free Rota was proposed (USFWS 1989), to serve as a third genetic reservoir to prevent genetic drift and inbreeding, and to ensure the maintenance of behavioral adaptations for the wild. Reintroductions of captive produced animals are less likely to succeed than translocations of wild-caught animals because of behavioral deficits (Griffith et al. 1989). Experience gained in releasing Guam rails on Rota will provide valuable information, and perhaps birds, useful for future reintroductions.

OBJECTIVE

Establish a non-essential, experimental wild population of the Guam rail in suitable snake-free habitat on Rota, CNMI.

PROJECT HISTORY

In 1987, a Memorandum of Understanding was signed between the Government of Guam, CNMI, and USFWS for the establishment of an experimental population of Guam rails on snake-free Rota. An environmental assessment was prepared for the USFWS covering the introduction of the Guam rail to Rota. The DAWR reached an informal agreement with Dr. Stuart Pimm, University of Tennessee, and by which a graduate student resided on Rota to monitor the initial two rail introductions in cooperation with the DAWR as a part of his dissertation research. Dr. Pimm was successful in receiving several grants from international conservation organizations to support efforts to monitor the introductions on Rota.

After a permit to establish a “non-essential experimental population” of Guam rails on Rota was published (USFWS 1989), 22 rails were released at a site on the Sabana on Rota in December 1989 and January 1990. All but one rail were released with radio transmitters attached in order to monitor their dispersal, mortality and possible breeding success. The site proved to be unsatisfactory probably due to the presence of dense grassland habitat. Of the 22 released birds, the whereabouts of 9 were unknown as their radios failed, 4 were killed by vehicles, 2 were killed by cats, 2 apparently died of starvation, 1 died of poisoning, and 4 died of unknown causes (Witteman et. al. 1990, DAWR 1991).

In February 1991, 31 rails were released at the forest edge in I Chenchon Park near the Bird Sanctuary Overlook (Witteman and Beck 1991). This release appeared to be more successful than previous ones. Releases were discontinued until the spring of 1995 due to the low production of rails at captive breeding facilities.

For the 1995-1996 releases, the release site was moved further inside the forest east of the 1991 site. A total of 75 Guam rails were released during 1995-1996: 15 in March 1995, 30 in August 1995, 15 in September 1995, and 15 in April 1996. Extensive efforts were made to remove predators from the release area prior to the August and September releases after six birds from the March release were preyed on within three days of release. Thirty-five rails were instrumented with radio transmitters. Mortality was high as 19 rails were confirmed dead. Ten of these deaths were caused by predation (primarily by feral cats), one case of septicemia was confirmed, and the cause of death of the remaining eight birds was unknown. Six radio transmitters emitted mortality signals from below the cliffs in the Saguagahga seabird colony, and it was assumed that five of those rails were dead. The remaining radio-marked birds either dispersed from the release area, as an exhaustive ground search was not successful in locating these birds, or their transmitters failed. Following the April 1996 release, there was a problem with some of the transmitters exhibiting frequency drift, which may contributed to difficulties associated with locating lost birds. Some long movements made by radio-marked birds, which traveled greater than 1 km from the release area were documented. One bird was found more than 3 km west of the release site. Rails used supplemental feeding stations, which facilitated observation of non-radio-marked birds from blinds set near the stations. Eight rails (6 non-instrumented) were recaptured in live cat and rat traps, which also facilitated post-release monitoring of rails. In December 1995, reproduction was documented after an adult non-instrumented male came to a food station with a chick. It was estimated that this chick was 3-4 weeks old, based on plumage characteristics. This chick was captured about a month later, again with the adult male, in a live cat trap near the same area. The young bird has not been seen since then, but the adult male was seen in the area as late as August 1996, 11 months after release. One radio-marked rail established and maintained a territory below the bird sanctuary overlook from May through September 1996.

PROCEDURES

Study Site Description

The release area is a coastal limestone cliff area located on the eastern end of the island on a narrow shelf of native limestone forest bound by upper and lower limestone cliffs (Figure 1). South of the shelf and bordering the ocean is a large seabird nesting colony. The remaining area is a mixture of native forest pockets, scrub (secondary growth), and clearings with coconut plantings.

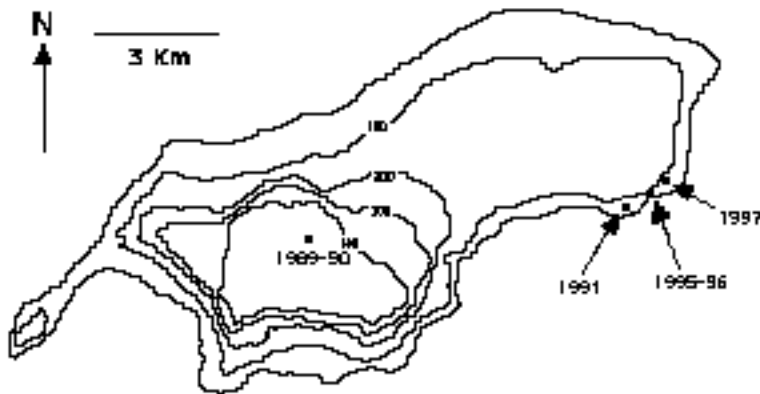


Figure 1. Locations of rail release sites, 1989-1997. Black squares indicate the location of a release site.

Release Method

In an effort to reduce mortality and dispersal, increase site fidelity, and increase the chances of successful nesting and reproduction, a temporary 1.6-ha enclosure was constructed in the eastern end of the former release area (Fig. 1). The enclosure was constructed of 6 ft high 1 inch chicken wire and was tacked to trees in the forest using staples, wire, and plastic ties. Rails were shipped to Rota via commercial airplane. Ten rails (5 males, 5 females) were released on August 4, 1997 inside the enclosure. On September 9, 1997, 2 more females were released inside the enclosure. Two smaller 5 m x 5 m pens were also constructed approximately 400 m west of the large enclosure. These smaller pens were for holding two pairs of rails, one pair of which had successfully bred in captivity. These pairs were placed in their pens on September 9. Two additional males were released on the same date along the trail 300 m west of the large enclosure near a female that had recently escaped. A lone male was also released in the seabird colony near yet another female. All birds had serially numbered aluminum bands on the right leg and were equipped with backpack-mounted radio transmitters.

Predator Control

As many as 24 live traps were set along the trail in the release area to control feral cats (*Felis catus*) and monitor lizards (*Varanus indicus*). The number of traps set varied due to some of the traps being periodically stolen. Stolen traps were later replaced. Cat traps were placed approximately 100 m apart along the trail for a distance of about 2 km. Numerous traps were also placed 50-100 m off the main trail on side trails. Canned cat food was used as bait. Traps were set for capture all day as monitor lizards were also targeted for capture. Following capture of a cat or monitor, the animal was killed with a pellet gun, weighed, measured, classified to age and sex, and its gut contents checked for remains of rails.

Radiotelemetry

All 19 rails were equipped with backpack mounted radio transmitters (AVM Inc.). Radio-marked birds were located using a Telonics TR-2 portable receiver/scanner and a hand-held

antenna. Locations of radio-marked rails were recorded. If rails dispersed out of the release area and away from the trail, general topographical and geological features were used to describe the bird's location. Birds were never flushed so as to not disturb any nesting pairs and/or broods and to not drive birds from the release area. Data was collected on survivorship, mortality, and dispersal.

Supplemental Feeding

Supplemental food stations were set up inside the enclosures and in the release area in an attempt to get the rails to stay in the release area. The food (captive diet) was presented in the same manner on Rota as it was in captivity on Guam. Every morning, fresh food was put in a plastic dish under a tent of aluminum and wood to protect it from rain. Once it was determined that a station was being used, a temporary blind was placed near the station to visually monitor the birds. Feeding and mating behaviors were recorded.

RESULTS

Four cats (1 male, 3 female) and 2 monitor lizards were trapped during 1,236 trap nights for the year (3.24 cats per 1,000 trap nights, 1.62 monitors per 1,000 trap nights).

Rail mortality was 32% as six birds were confirmed dead. One of these deaths was due to cat predation, one bird died of apparent starvation, and the causes of death for three are unknown. One death was attributed to an infection when a bird (F340) became entangled in loose thread from its radio harness, nearly severing the medial toe of its left foot. This bird was seen limping severely and was hand captured. Upon further inspection, it had lost 62 gr from its pre-release weight. An attempt was made to save the bird, but it died prior to being sent to Guam later that day. The necropsy showed the bird died of starvation as a result of the infected foot.

Twelve rails (63%) survived to the end of the monitoring period. Five of the birds (42%) escaped from the enclosure during the monitoring period. One bird (M283) either escaped and dispersed from the release area or its transmitter failed. There was a problem with some of the transmitters exhibiting frequency drift. This may contribute to difficulties associated with locating lost birds. Rails that escaped from the enclosure or were released outside moved a mean distance of 756 m away from the release site with the longest documented distance being 2.9 km. Five rails were in the enclosures an average of 10 days (range = 3-18 days) before escaping.

Six rails were observed using the supplemental feeding stations set inside the enclosure, which facilitated observation of birds from blinds set nearby. Of the 6 feed stations, 5 were used regularly by 9 different rails. A male (M300) and female (F679) formed a pair bond and were seen together numerous times at one station. They were never observed with any chicks. This pair exhibited some territoriality as they were seen chasing another rail from the food station on one occasion.

DISCUSSION

The capture rate of cats in 1997 was similar to the rate in 1996 (3.90 cats/1,000 trap-nights), but was less than the 1995 rate (7.86 cats/1,000 trap-nights). This drop in capture rate and the low number of rail deaths attributed to feral cat predation in 1996 and 1997 may be an indication that trapping is reducing the cat population. It may also be possible that cats still in the area are habituating to the traps. To avoid the habituation to trap location by cats, traps were periodically relocated.

The capture rate of monitor lizards in 1997 was down from 1996 (3.90 lizards/1,000 trap-nights). Although the traps are certainly biased toward mid-sized lizards (the traps exclude very small and very large lizards), the decrease in the number of monitors captured may indicate that trapping is effective in keeping their numbers down. Although there is no direct evidence that monitors prey on adult rails, chicks, or eggs, they are a potential predator of all these.

No rat trapping was conducted in 1997 due to time constraints associated with constructing the enclosures and the risk that traversing a rat trapping grid on a daily basis may be a disturbance to the rails. Despite a lack of direct evidence indicating rats have predated rail nests or chicks, rats remain as potential predators on both. Based upon previous trapping, the density of rats in the release area is extremely high.

The 1.6-ha enclosure constructed in the release area was successful in increasing the survival of the birds as 12 rails (63%) lived to the end of the monitoring period, however, five birds (42%) escaped during the monitoring period. Of the five birds that escaped, only two lived to the end of the monitoring period. Further, of the three birds released outside the enclosure, two died within eight days of release. If the birds did escape or were released outside the enclosure, their dispersal averaged 756 m from the release site (range 0-2.9 km). This is comparable to 1996's value of 519 m.

The fence was also successful in reducing cat predation as none of the birds that stayed inside the enclosure were preyed on by cats, whereas at least one rail death outside the enclosure was attributed to cat predation. One of the cats trapped during the monitoring period was captured in a trap set next to the fence line. The fence may have acted as a drift fence directing the cat toward the trap.

Previously paired birds were housed in separate release cages (5 m x 5 m). One pair had successfully bred in captivity on Guam, while another pair was young and had not bred previously. The older pair stayed in their pen the entire monitoring period (22+ days), but showed no signs of breeding or nesting during this time. The male of the younger pair escaped within 2 hours of being put in the enclosure so the decision was made to immediately release the female as well. A supplemental feeding station was put in the area in hopes of reducing dispersal, but the female quickly moved far to the east while the male moved slowly to the west. The pair never reunited following their separation. The small enclosures may help to reduce dispersal and mortality, provided the rails don't escape from the enclosure. The enclosures may also need to be made larger in order to accommodate a breeding pair. A larger enclosure may

reduce stress and give the birds more room to move, forage, find adequate nesting sites, and hide from the investigator when food and water is brought in daily.

Survivorship may be partially dependent on supplemental feeding as rails that escaped from the enclosure did not live as long as birds that stayed in the enclosure and used supplemental food stations. One rail (F509) died of apparent starvation inside the enclosure, just 8 days post-release. It is unknown if this bird was physiologically compromised prior to release. Its pre-release weight was only 195 g, the lightest of any of the released birds. Additionally, this bird was part of the second release cohort in September. If the birds in the enclosure from the August release had already set up and were defending territories, this female may have been excluded from foraging at the food stations by the other birds. Supplemental food stations may have played a role in defining (or defending) territories inside the enclosure and may be the reason why 42% of the birds escaped from the enclosure. There also may not have been enough resources for the number of birds inside the enclosure. Of the 5 birds that escaped from the large enclosure, 4 were female.

There was significant frequency drift with the transmitters as 13 (68%) drifted an average of 0.007 Mhz from their original frequencies (range = 0.002-0.010). The lost signal of M283 may be attributed to frequency drift and possible subsequent radio failure. Some of the lost signals may also be attributed to birds dispersing so far from the release site that the chances of finding them were significantly reduced or from birds getting into areas inaccessible with a hand-held antenna.

RECOMMENDATIONS

1. Continue to trap and remove feral cats and monitor lizards from Sagua' gahga forest and surrounding areas.
2. Control rat populations by using kill traps in the immediate release area at least 1 month prior to release, but discontinue trapping once birds are released to reduce disturbance to birds and the chances of capturing birds in the traps.
3. Attach radio transmitters to all released birds in order to obtain more data regarding dispersal, mortality, and reproduction.
4. Investigate ways to improve the enclosure to reduce the escape rate of rails.
5. Investigate the possibility of changing the release site or releasing some birds to an area where dispersal may be limited
6. Continue to release cohorts of 15-20 birds minimum, every 3-6 months until the birds become established. Attempt to release at least one mated pair in each cohort.
7. Begin periodic aerial surveys to find radiomarked birds that may have dispersed from the release area.

8. Continue the use of supplemental feeding stations as this may help to reduce dispersal and facilitates observation of birds.
9. Investigate alternative radio transmitter suppliers.

ACKNOWLEDGMENTS

The DFW staff on Rota was extremely helpful in supplying manpower and vehicles. Conservation officers assisted in carrying the rails and fencing into the forest. DFW biologist Stan Taisacan assisted in various aspects of the program, including transportation and office support. USFWS biologists provided assistance with monitoring released rails.

PROGRAM COST

The estimated cost of the project is \$90,333.

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