JOB PROGRESS REPORT
RESEARCH PROJECT SEGMENT

STATE: Territory of Guam

PROJECT NO.: E-2-1
SUBPROJECT: C
JOB NO.: 1

JOB TITLE: Development of an Experimental Population of Guam Rails in the Commonwealth of the Northern Mariana Islands

PERIOD COVERED: October 1, 1997 to September 30, 1998

SUMMARY

Nineteen (12 males, 7 females) Guam rails (*Gallirallus owstoni*) were released at the Sagua'gagha area of Rota on June 17. Twelve of the rails (5 males, 7 females) were released into a 2.5 ha forest enclosure, while 2 breeding pairs were released in separate 25 m^2 holding pens. Extensive efforts were made to remove predators from the general release area. All birds were instrumented with radio transmitters. Mortality was 47%, as nine rails were confirmed dead. One rail (5%) survived to the end of the monitoring period. Eighty-four percent (n=16) of the birds escaped the enclosures during the monitoring period. There was a problem with some of the rails breaking off their antennas. Rails that escaped the enclosure dispersed widely from the release site, with the longest documented distance being 5.4 km. Sixteen rails remained in the enclosures a mean of 9.7 days (range = 1-36 days) before escaping. Rails used supplemental feeding stations set inside the enclosure, which facilitated observation of birds from blinds set near the stations. Work continued on the rail project this year despite a failure to renew a Memorandum of Agreement between Guam, the U.S. Fish and Wildlife Service (USFWS), and the Commonwealth of the Northern Mariana Islands (CNMI).

INTRODUCTION

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.

OBJECTIVES

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

2. Release up to 120 captive-produced rails per year from the propagation facility of the Division of Aquatic & Wildlife Resources (DAWR) to initiate establishment of rails on Rota.

3. Release captive-produced rails from the propagation facilities of cooperative mainland zoos to initiate establishment of rails on Rota.

4. Monitor survival, dispersal, reproduction and establishment of released rails through radio telemetry.

5. Construct a temporary, large scale, enclosure to reduce dispersal, increase site fidelity, and increase the chances of successful nesting and reproduction.

6. Sign a new cooperative agreement with the CNMI and USFWS to continue the introduction program on Rota.

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 an "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.

Beginning in 1995, the release site was moved further inside the forest to the east from the 1991 release site (Figure 1). So far, 167 rails have been released on Rota, 21 in December

1989, 33 in February 1991, 15 in March 1995, 30 in August 1995, 15 in September 1995, 15 in April 1996, 19 in April 1997 and 19 in June 1998. Extensive efforts were made to remove predators from the release area. Successful breeding by captive-reared Guam rails released on Rota was documented in December 1995 following the release of 45 birds in a 6-week period. The pair that reproduced stayed within the predator controlled release site, and the male was observed escorting a 3 week-old chick to a supplemental food station. The male and chick were captured in a cat trap in January 1996, but have not been seen since.

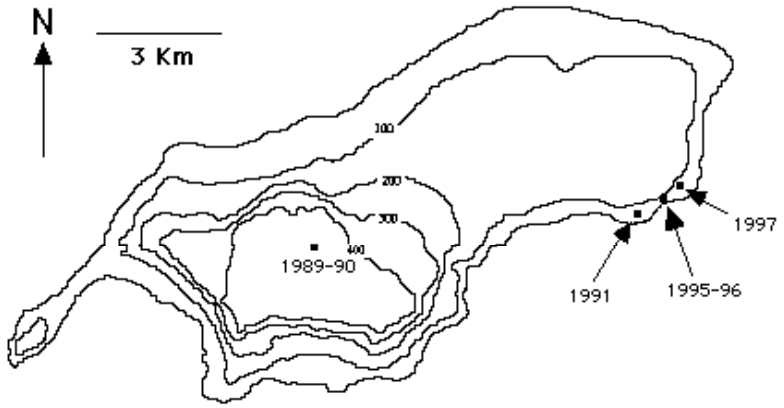

Figure 1. Locations of rail release sites (1989-90) in Rota, CNMI. Black squares indicate release site locations.

METHODS

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. 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.

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. 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. Nineteen rails (12 males, 7 females) were released on June 17, 1998 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. All birds had serially numbered aluminum bands on the right leg and were equipped with backpack-mounted radio transmitters.

Predator Control

As many as 18 live traps were set along the trail in the release area to control feral cat (*Felis domesticus*) and monitor lizard (*Varanus indicus*) populations. Trap numbers set varied

due to some of the traps being periodically stolen. Cat traps were placed 100-200 m apart along the trail for a distance of about 2 km. 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 lizard, 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 (Holohil Systems Ltd.). Radio-marked birds were relocated using a Telonics TR-2 portable receiver/scanner and a hand-held antenna. Locations of radio-marked rails were recorded according to the station (every 25 m along the main trail) to which they were the closest. 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 to avoid disturbing potential nesting pairs or broods and driving the birds from the release area. Data were collected on survivorship, mortality, and dispersal. Two aerial searches were made from a Cessna 185 operated by Freedom Air to locate dispersed birds whose radio signals could not be found in ground searches. On both occasions, staff from the Rota DLNR Division of Fish and Wildlife accompanied DAWR staff in the aircraft.

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

Predator Control

Nine cats (9 males) and 1 monitor lizard were caught during 888 trap nights during FY98 (4.85 cats/1,000 trap nights, 0.54 monitors/1,000 trap nights).

Mortality, Survival, and Dispersal

Mortality of released rails was 47%, with nine birds confirmed dead (Table 1). Six of these deaths were due to cat predation. Two additional birds had mortality signals turn on, but the transmitters were unrecoverable. One bird was scavenged and its cause of death was unknown, while another bird also died of unknown causes. One death was attributed to an infection (acute hemorrhagic bacterial enteritis).

Only one rail (5%) is known to have survived to the end of the monitoring period. Eighty-four percent (n=16) of the birds escaped the enclosures during the monitoring period. There was a problem with some of the rails snapping off their antennas. This may contribute to difficulties associated with locating lost birds. Rails that escaped from the enclosure moved a mean distance of 1,167 m (range 75-5,400 m) from the release site. Rails (n=16) remained in the enclosures a mean of 9.7 days (range = 1-36 days) before escaping (Table 1).

Rails used supplemental feeding stations set inside the enclosure, which allowed birds to observed from blinds set near the stations. Two of the 5 feeding stations used regularly.

Table 1. Movements, survival, and mortality of rails released on Rota, CNMI on June 17, 1998. Δ = # days survived through 9 September. † = # of days in pen before escape. £ = # of days survived after escape. € = distance moved after escape/release (m).

Freq	Sex	Δ	†	£	€	Fate
365	M	16	15	1	450	Dead 7/3. Probable cat predation.
608	F	97+	---	---	----	Alive in pen as of 9/9.
658	M	5	2	3	1700	Dead 6/22. Cat predation.
620	F	72+	72	---	----	Missing from pen as of 8/28.
871	M	11	9	2	450	Dead. Scavenged in seabird colony 6/28.
699	M	2+	1	1+	625	Missing as of 6/19.
579	M	21	17	4	500	Dead 7/8. Cat predation.
790	F	36	2	34	575	Dead 7/23. Cause of death unknown.
596	M	9	8	1	450	Dead 6/26. Probable cat predation.
688	F	48	1	47	825	Dead 8/4. Probable cat predation.
183	M	---	---	---	----	Missing. Broken antenna at release.
396	F	12	2	10	3375	Mortality signal 6/29. Not recovered.
937	M	21+	21	---	125	Missing. Broken antenna.
958	M	9	4	5	450	Dead 6/26. Bacterial infection.
040	M	36+	35	1+	1450	Missing. Alive 7/23 from air.
739	M	7	3	4	1525	Dead 6/24. Probable cat predation.
719	F	16	12	4	75	Mortality signal 7/3. Unrecoverable.
913	F	42	21	21	5400	Missing since 7/29.
386	M	7	1	6	700	Missing since 6/24.

DISCUSSION

A total of 9 male cats were trapped this fiscal year (4.85 cats/1,000 trap nights). This is an increase over the capture rates in 1997 (3.56 cats/1,000 trap nights) and 1996 (3.90 cats/1,000 trap nights), but is less than the 1995 rate (7.86 cats/1,000 trapnights). The increase in capture rate and the high number of deaths contributed to feral cat predation (n=6) in 1998 may be an indication that the birds dispersed more widely and out of the effective cat trapping area. Indeed, mean dispersal increased for birds that escaped from the enclosure from 756 m in 1997 to 1,167 m in 1998. The drought that affected the area in 1998 after Supertyphoon Paka may have contributed to the birds and cats dispersing farther in search for food and water. It is advisable to continue trapping for feral cats and to periodically relocate traps to minimize the chances that cats may habituate to their locations. Supplementary food and water should also be placed out for the rails, especially during periods of dry weather, to help minimize dispersal and increase survival. It is also advisable to increase the cat trapping effort by either increasing the number of traps, by actively hunting cats at night, or both.

Only one monitor lizard was captured in cat traps during 1998 (0.54 lizards/1,000 trap nights), down from two animals in 1997 (1.62 lizards/1,000 trap nights) and 10 animals in 1996 (3.90 lizards/1,000 trap nights). Although the traps are biased toward medium-sized monitor lizards (they exclude very small and very large lizards), the decrease in the number of monitors captured may be an indication that trapping is effective in keeping their numbers down. Although there is no direct evidence that monitor lizards prey on adult rails, chicks, or eggs, they are a potential predator of all of these. Continuing to trap and remove monitor lizards from the area is advisable.

No rat trapping was conducted in 1998 due to time constraints associated with constructing the enclosures and the possibility that traversing a rat trapping grid on a daily basis might disturb the rails. Although there is no evidence to show that rats have depredated rail nests or chicks, rats are still a potential predator of both. Based on personal observation, the

density of rats in the release area is extremely high. Conducting rat trapping prior to release and then discontinuing it once the birds have been released may reduce the density of rats in the enclosure without disturbing the rails.

The 2.5 ha enclosure constructed in the release area was not successful in increasing the survival of the birds as 84% (n=16) escaped during the monitoring period. Of the 16 birds that escaped, none lived to the end of the monitoring period. Mean survival once outside the enclosure was 10.9 days (23.2 days for females, 3.25 days for males). However, one female survived at least 97 days inside the enclosure to the end of the monitoring period. Birds stayed in the pen an average of 9.7 days before escaping. As previously mentioned, dispersal from the release site increased from 756 m in 1997 to 1,167 m in 1998.

The fence successfully protected the one rail that stayed in the enclosure from feral cats, whereas at least six of the rail deaths outside the enclosure were attributed to cat predation. Also, one bird released in 1997 (band #10305) was found in the gut of a cat trapped on 13 November 1997.

An attempt was also made to house previously paired birds in separate release cages (5 m x 5 m). The male of each pair escaped after 1 and 3 days, respectively, of being put in their enclosures, thus the decision was made to immediately release the females inside the larger enclosure. Both of these males died within 6 days of escaping. The small enclosures hold promise for keeping paired birds for breeding purposes. They 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 to accommodate breeding pairs. A larger enclosure may help to reduce stress and give the birds more room to roam, forage, find adequate nesting sites, and hide from the investigator when food and water is brought daily.

Survivorship may be partially dependent on supplemental feeding as rails that escaped from the enclosure did not live as long as rails that remained in the enclosure and used supplemental food stations. Only one rail stayed inside the enclosure for the entire 97-day monitoring period. Supplemental food stations may have played a role in defining (or defending) territories inside the enclosure. This may be the reason why 84% of the birds escaped from the enclosure. There may not have been enough resources for the number of birds inside the enclosure, and the birds may have been forced out to find resources due to the dry weather. It is advisable to supply food and water for the birds while they are in enclosures to reduce dispersal and increase survival.

Some of the lost signals may be attributed to birds breaking their antennas at the base. This problem has been fixed for future releases as the base of the antennas have been reinforced with an extra layer of rubber coating and a spring.
The two aerial surveys were useful in finding birds that had dispersed from the release area. Aerial surveys should be continued to locate those birds that have dispersed from the release area or are in areas inaccessible on foot.

CURRENT STATUS OF PROGRAM

The first release in FY98 was scheduled for April 1998. However, the November 1997 general elections resulted in changes with the Rota mayor and staff at the Department of Land and Natural Resources on Rota, and consequently delayed the rail project. The new mayor expressed his desire to have local residents benefit in some way from the rail project and requested that at least one resident be employed on the project. While the possibilities of providing such employment were being investigated, the mayor allowed a "good faith" release of Guam rails to take place in June 1998. No further releases took place during the reporting period. A renewed Memorandum of Agreement between Guam, the CNMI, and

the USFWS was still not signed as of September 30, 1998. Biologist Grant Beauprez returned to Guam from Rota on September 30, 1998.

RECOMMENDATIONS

1. Continue to trap and remove feral cats and monitor lizards from Sagua'gahga forest and surrounding areas.

2. Attach radio transmitters to all released birds to obtain more data regarding dispersal, mortality, and reproduction.

3. Investigate ways to improve the enclosure to reduce the escape rate of rails.

4. Investigate the possibility of changing the release site or releasing some birds to an area where dispersal may be limited

5. 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.

6. Continue periodic aerial surveys to find radio-marked birds that may have dispersed from the release area.

7. Continue the use of supplemental feeding stations as this may help to reduce dispersal and facilitates observation of birds.

PROGRAM COSTS

The estimated cost for this project under E-2-1 is $90,000.

ACKNOWLEDGEMENTS

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. Division biologist Stan Taisacan assisted in various aspects of the program, including transportation and office support. USFWS biologists provided assistance by monitoring released rails.

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