

**JOB PROGRESS REPORT  
RESEARCH PROJECT SEGMENT**

**STATE:** Territory of Guam

**PROJECT NO.:** E-2-3  
**SUB-PROJECT NO.:** C  
**JOB NO.:** 1

**JOB TITLE:** Establishment of an Experimental Population of Guam Rails on Rota or Other Northern Mariana Islands

**PERIOD COVERED:** October 1, 1999 to September 30, 2000

**SUMMARY**

One hundred and seventeen Guam rails were released on Rota in January, August, and September 2000. Forty-three birds were released at the Sagua'gagha area and 74 in Gampapa. Forty-nine rails were equipped with radio transmitters. Transmitter life span was increased from 8 months (January release) to 18 months (September release) with stronger batteries. Five cats and 1 monitor lizard were trapped in an extensive effort to remove predators from the release area. Fourteen radio-marked birds were confirmed dead, 2 died due to feral cat predation. Seventeen radio-marked birds continue to survive beyond FY00. Rails released in January lived an average of 34 days, with 1 bird living over 249 days. Rails released in September survived an average of 13 days, with 16 surviving beyond FY00. Rail movement averaged 782m (100-2750m) from the release site.

Reproduction was not observed with rails released in FY00. However, 3 nests belonging to rails from previous releases were found. A 2-week census in April detected rails in the Sagua'gah'ga and Gampapa areas. A biologist was also hired in September to assist in the Guam rail recovery efforts.

**INTRODUCTION**

Census data collected between 1960 and the early 1980's documented the reduction in range and numbers of the Guam rail, *Gallirallus owstoni* (Witteman et al. 1990). In 1984, the Guam rail was listed on the U.S. Endangered Species List, as approximately 20 rails were known to remain in the wild. In 1982, DAWR decided to develop a captive breeding program for the Guam rail and by 1986 collected all known remaining rails (N= 21). The extirpation of the Guam rail from the wild was due primarily to the predation pressure of the introduced Brown treesnake (*Boiga irregularis*). The captive propagation program was organized under the auspices of the American Association of Zoological Parks & Aquariums (now the American Zoo & Aquarium Association or AZA) and includes the cooperation of 18 mainland zoos. The

rails demonstrated an immediate propensity for breeding in captivity and to date over 800 rails have been produced in captivity (Orndorff 2000).

The captive management of the Guam rail includes the meta-population approach, which calls for the establishment of more than one genetic reservoir (Foose et al. 1986). This has been accomplished by dispersing the captive rails into 2 primary captive populations on Guam and in U.S. zoos. The reintroduction of Guam rails to a part of its historical range on Guam is a recovery objective. Therefore, the establishment of an experimental wild population was proposed (U.S. Fish & Wildlife Service, 1989), not only to serve as a third genetic reservoir to prevent genetic drift and inbreeding, but to ensure the maintenance of behavioral adaptations for the wild. Furthermore, it has been demonstrated that reintroduction of captive produced animals are less likely to succeed than translocations of wild-caught animals due to behavioral deficits (Griffith et al. 1989). It cannot be predicted when domestication will occur in the captive populations, therefore the establishment of an experimental population of Guam rails should be accomplished as soon as possible. Finally, experience gained in releasing Guam rails on Rota will provide valuable information, and perhaps birds, useful for future reintroduction on Guam.

## **OBJECTIVES**

- 1) Establish a non-essential, experimental wild population of the Guam rail in suitable snake-free habitat on Rota, Commonwealth of the Northern Mariana Islands (CNMI).
- 2) Release at least 120 captive-produced rails per year from the DAWR propagation facility of 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.

## **PROJECT HISTORY**

In 1987, a cooperative agreement was signed between the Government of Guam, CNMI, and the U.S. Fish and Wildlife Service (USFWS) outlining the responsibilities of each entity for the introduction. An environmental assessment was prepared for the USFWS covering the introduction of the Guam rail to Rota. DAWR reached an informal agreement with Dr. Stuart Pimm, University of Tennessee, by which a graduate student resided on Rota to monitor the initial 2 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 “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 1 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, 33 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.

The release site was moved further inside the forest beginning in 1995, to the east from the 1991 release site. Currently, 267 rails have been released on Rota to include: 21 (12/89); 33 (2/91); 15 (3/95); 30 (8/95); 15 (9/95); 15 (4/96); 19 (4/97); 19 (6/98); 50 (2/99); and 50 (8/99) (DAWR 1995-1999).

## **METHODS**

### **Study Site Description**

The Sagua'gah'gha January release site is 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.

The August and September release site in Gampapa is forest edge habitat. Located 2000 m north from the January release site, the new location is native limestone forest edge with patches of sabana, ironwood, and coconut groves found through the general Gampapa area.

### **Release Method**

Guam rails were transported to Rota via commercial airplane. Forty-three rails (23 males, 20 females) were released 24-26 January, 15 rails (8 males, 7 females) were released on 23 August, and 59 rails (32 males, 27 females) were released in September. All birds were tagged with a numbered aluminum bands on the right or left leg. Rails released in August also had a unique combination of color-coded aluminum bands on their legs.

## **Predator Control**

Up to 18 live traps, baited with canned cat food, were set along trails in both rail-release areas to control feral cat (*Felis domesticus*) and monitor lizard (*Varanus indicus*) populations. Cat traps were placed 100-200-m apart along the main trails. Other traps were placed strategically in areas known to have rails. Traps were set throughout the day to capture all cats and lizards. Captured animals were euthanized, weighed, measured, aged, sexed, and gut contents checked for remains of rails.

## **Radiotelemetry**

Forty-nine birds (24 in January, 25 in September) were equipped with backpack mounted radio transmitters (@ Holohil Systems Ltd.). Radio-marked birds were located using a Telonics TR-2 portable receiver/scanner and a hand-held flexible yagi antenna. To aid in locating the released birds, stations were established at 25-m intervals at both release sites along the Sagua'gah'gha main foot-trail and the Gampapa Picto-cave road. When appropriate, birds were flushed to determine if nests or broods were present. Records of sightings and date of sightings and other pertinent information were collected to determine survivorship, mortality, and dispersal rates. Extensive ground searches were made to locate birds that dispersed and whose radio signals could not be found in the release area.

## **Supplemental Feeding**

Supplemental food stations were setup for rails in the release area in an attempt to reduce dispersal, from the release area. As with the captive rails, food (captive rail diet) was placed under a tent made of aluminum sheeting and wood. Every morning food stations were replaced with fresh food. A blind was placed at active stations to monitor and identify the birds. Feeding and mating behaviors were also recorded.

## **Survey**

A 2-week census in April conducted to determine the size and distribution of the rail population on Rota. Playback surveys and fixed-point observations were conducted in known and historic rail locations, as well as in areas that might have rails. Playback surveys, using a recorded rail territorial call (using a @Lohman Game Caller) played 4 times at two-minute intervals, were performed at 100-m intervals. Two persons, 1 conducting the playback and one as an observer 50m away, recorded audio and visual observations. Fixed-point observations took place 2 hours before and after sunrise and 2 hours before and 1 hour after sunset.

## **RESULTS**

### **Predator Control**

Five cats and 1 monitor lizard were trapped during FY00 (Table 1). Rail remains were not present in the alimentary track of these animals.

Table 1. Predator trapping results on Rota, for FY 00.

<b>Month</b>	Feral Cats	Monitor Lizards
January	1	1
August	3	0
September	1	0
<b>Total</b>	5	1

### **Mortality, Survival, and Movements**

Based on radio-marked birds with known fates (N=31, either counted dead or alive at the end of the reporting period), mortality was 45% and survivorship was 55% (Table 2). Assuming the mortality rate of non-radio-marked birds was the same as radio-marked birds, an estimated 34 birds are still surviving as of 30 September 2000. If birds with unknown fates were considered alive at the end of the reporting period, the number of birds alive would increase to 83 birds. If birds whose fates were unknown were considered dead at the end of the reporting period, the number alive would be 41 birds.

Table 2. Fates of 49 radio-marked rails released on Rota in FY00.

<b>Month</b>	Dead	Radio Failure	Mortality Signal	Lost Signal	Alive
January	6	1	7	9	1
September	8	0	0	1	16
<b>Total</b>	14	1	7	10	17

Two of the 14 deaths were due to cat predation, 1 was probable predation, 1 was vehicular, and 7 were unknown causes. One death was attributed to an infected wound caused by a loose thread from the harness that became entangled around a bird's toe. The constant pulling of the harness as the bird walked probably resulted in abrasions on the back leading to an infection. Results of 2 necropsies are still pending. Of the 18 radio marked birds with unknown fates, 7 birds had mortality signals turned on but the transmitters were not recovered, 1 radio failed prematurely, and contact was lost with 10 birds (Table 2).

For the 249 day reporting period, rails released in January lived an average of 34 days (3–249 days) and moved a mean of 879m (150–2750m) from the release site. Birds released in September survived an average of 13 days (17 day reporting period, range = 2–17) and moved an average of 692m (range = 100–2,062.5 m) (Tables 3, 4). Seventeen birds (1 from January, 16 from September) lived to the end of the reporting period.

Table 3. Radio-marked Guam rails released on Rota during January 2000. Data headings include: A = Age (yrs); B = Date released in FY00; C = Date recovered in FY00; D = Distance from release site (m) and E = Fate (RNR = radio never recovered).

Band #	Frequency	Sex	A	B	C	D	E
2103	164.015	M	<1	Jan 24	Feb 13	175	Lost Signal.
2102	164.947	M	<1	Jan 24	Feb 3	2750	Dead.
2124	164.868	M	<1	Jan 24	Feb 24	150	Lost Signal.
2156	164.957	F	<1	Jan 24	Mar 14	1125	Radio Failure.
2128	164.146	F	<1	Jan 24	Feb 24	350	Lost Signal.
2123	164.830	F	<1	Jan 24	Feb 9	625	Dead.
2122	164.749	F	<1	Jan 24	Feb 25	2000	Lost Signal.
2119	164.066	F	<1	Jan 24	Mar 16	175	Mortality Signal. RNR.
2111	164.587	M	<1	Jan 25	Feb 7	200	Lost Signal.
2140	164.671	M	<1	Jan 25	Feb 2	1500	Mortality Signal. RNR.
2105	164.054	M	<1	Jan 25	Feb 11	175	Dead.
2113	164.212	M	<1	Jan 25	Feb 4	1325	Mortality Signal. RNR.
2155	164.381	M	<1	Jan 25	Feb 17	2500	Lost Signal.
2112	164.207	F	<1	Jan 25	Sep 20	1375	Alive as of 9/30/00.
2115	164.183	F	<1	Jan 25	Mar 14	1775	Dead.
2163	164.576	F	<1	Jan 25	Feb 5	200	Mortality Signal. RNR.
2042	164.033	M	<2	Jan 26	Jan 29	325	Dead.
2149	164.176	M	<1	Jan 26	Jan 31	unk	Mortality Signal. RNR.
2118	164.393	M	<1	Jan 26	Feb 7	175	Dead.
2134	164.478	M	<1	Jan 26	Feb 24	175	Lost Signal.
2104	164.605	F	<1	Jan 26	Feb 7	200	Mortality Signal.
673	164.687	F	<1	Jan 26	Feb 24	1375	Lost Signal.
2120	164.226	F	<1	Jan 26	Feb 1	200	Mortality Signal.
2114	164.431	F	<1	Jan 26	Feb 25	1375	Lost Signal.

Table 4. Radio-marked Guam rails released on Rota during September 2000. Data headings include: A = Age (yrs); B = Date released in FY00; C = Date recovered in FY00; D = Distance from release site (m) and E = Fate (HST = Harness string wrapped around toe).

Band #	Frequency	Sex	A	B	C	D	E
604	164.829	M	<1	Sep 13	Sep 30	250	Alive as of 9/30/00.
2146	164.183	M	1	Sep 13	Sep 19	750	Dead.
2168	164.888	M	<1	Sep 13	Sep 22	375	Dead. Cat predation.
2186	164.749	M	<1	Sep 13	Sep 30	250	Alive as of 9/30/00.
2318	164.626	M	<1	Sep 13	Sep 30	437.5	Alive as of 9/30/00.
665	164.033	F	<3	Sep 13	Sep 23	250	Dead.
2020	164.146	F	2	Sep 13	Sep 30	500	Alive as of 9/30/00.
2314	164.364	F	<1	Sep 13	Sep 21	500	Dead.
689	164.087	M	<3	Sep 14	Sep 24	1062.5	Dead. HST
2150	164.723	M	<2	Sep 14	Sep 30	687.5	Alive as of 9/30/00.
2171	164.585	M	<1	Sep 14	Sep 26	375	Dead. Cat predation.
2313	164.947	M	<1	Sep 14	Sep 18	500	Dead. Hit by vehicle.
2311	164.382	F	<1	Sep 14	Sep 30	1750	Alive as of 9/30/00.
2306	164.054	F	<1	Sep 14	Sep 30	375	Alive as of 9/30/00.

690	164.642	F	<2	Sep 14	Sep 30	375	Alive as of 9/30/00.
2304	164.279	F	<1	Sep 14	Sep 25	2062.5	Lost Signal.
2125	164.044	M	<2	Sep 15	Sep 30	1500	Alive as of 9/30/00.
2158	164.608	M	1	Sep 15	Sep 30	562.5	Alive as of 9/30/00.
2196	164.066	M	<1	Sep 15	Sep 17	100	Dead.
2097	164.969	M	<2	Sep 15	Sep 30	500	Alive as of 9/30/00.
2116	164.396	M	<2	Sep 15	Sep 30	437.5	Alive as of 9/30/00.
2183	164.332	F	<1	Sep 15	Sep 30	1500	Alive as of 9/30/00.
2195	164.654	F	<1	Sep 15	Sep 30	637.5	Alive as of 9/30/00.
2301	164.924	F	<1	Sep 15	Sep 30	1125	Alive as of 9/30/00.
650	164.708	F	3	Sep 15	Sep 30	437.5	Alive as of 9/30/00.

### Supplemental Feeding

Six food stations were set up in the release area with 2 at the actual release site. Rails with and without transmitters were observed visiting the food stations at the release site.

### Survey

A total of 18 hours and 22 minutes (8 h and 35 min. between 0430–0840 h, 9 h and 47 min. between 1657–1931 h) covering 10,050 m of roads and trails in the Taksunok, Sagua’gah’ga, and Gampapa areas revealed 15 rails. Nine birds were detected at Sagua’gah’ga and Taksunok including a 1 pair. In Gampapa, 6 birds responded to playbacks.

Three fixed-point observations conducted at Sagua’gah’ga and one 775 m from the first release site. Four hours and 52 minutes of listening revealed 10 birds, including 3 pairs. These observations took place after playbacks had been done in the area on earlier days so some birds heard could be the same as those that responded to playbacks.

A survey was also conducted by using playbacks at 8 locations around the Rota Resort, once at the Rota Swimming Hole, and once at Alaguan Vista overlook between 0547–0840 h. No birds were detected.

In August, 1,025 m of roads and trails were surveyed in Gampapa using playbacks. One hundred and forty-five minutes (78 min. between 0546–0704 h, 67 minutes between 1815–1922 h) revealed no birds.

### Reproduction

No nests were discovered from rails released this year. However, 3 nests from 2 pairs were discovered from birds released in FY 99.

## **DISCUSSION**

Cats trapped increased from 1 cat in January to 4 cats in August and September. Cat traps were stationed along the Old Japanese Road in Sagua'gah'ga since FY95 and then relocated in August to the new release site in Gampapa. After a significant increase in the number of cats caught in just 1 month, it is evident that continuously moving traps around may help in predator control.

Within 10 days after the Sagua'gah'ga release, 54% of the birds were below the cliff line in the seabird sanctuary. During FY99, 100 rails were released in this area and it is speculated that the rails released in January were released in territories of established rails. Therefore, the new rails had nowhere else to go but over the cliff. In addition, 1 rail was found dead pushed up against a fence with the back of his neck attacked within the release site. A rail will attack and kill another rail by grabbing the victim behind the neck with its beak. The wound on the dead rail from Rota was identical to those found on dead rails killed by other rails at the captive breeding facility on Guam. As releases have been taking place in this site since FY95, it was decided to change the site for the next release.

Evidence is mounting indicating that rails prefer scrub habitats along the forest edge to the interior of the forest. All FY99 and FY00 nests were found in coconut groves with an understory of *Pennisitum*, and cattle fields of grasses and vines. All but 2 rails detected in the April survey were in open habitat. The Gampapa area was then selected as the new release site composed of forest, edge habitat and open fields.

### **Current Status of the Program**

Guam rails continued to be monitored on Rota by Stan Taisacan, formerly of the CNMI, Division of Fish and Wildlife. Mr. Taisacan is contracted by DAWR to assist with monitoring rails especially when DAWR staff are not on Rota. Releases of at least 50 Guam rails per group will continue into FY01.

## **RECOMMENDATIONS**

- 1) Continue to trap and remove feral cats and monitor lizards from Gampapa forest, fields, and surrounding areas.
- 2) Continue to release cohorts of 50 rails minimum, every 3-6 months until the birds become established.
- 3) Intensify radio-tracking. Analyze dispersal patterns of released birds and identify home ranges.
- 4) Improve census techniques.

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

## **ACKNOWLEDGEMENTS**

The Cincinnati Zoo sponsored Guam rail keeper Chris Edelen to participate in the January 2000 release. Chris assisted with predator control, and monitoring movements and survival of rails.

## **PROJECT COST**

The estimated cost of this project is \$35,000.

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## **LITERATURE CITED**

Division of Aquatic and Wildlife Resources (DAWR). 1961–1999. Job Progress Reports - Federal Aid to Fish and Wildlife Restoration. Guam Department of Agriculture.

Foose, T.J., R. Lande, N.R. Flesness, G. Rabe, and B. Read. 1986. Propagation plans. *Zoo Biology* 5:139-146.

Griffith, B., J.M. Scott, J.W. Carpenter, and C. Reed. 1989. Translocation as a species conservation tool: status and strategy. *Science* 245: 477-245.

Orndorff, D. 2000. Guam rail studbook. Zoological Society of San Diego.

USFWS 1989. Establishment of an experimental population proposed for Guam rail. *Endangered Species Technical Bulletin*, Vol. XIV:4-7

Witteman, G.J. and R.E. Beck, Jr. 1991. Decline and Conservation of the Guam rail. pp. 73-178 *in* Maruyama, N, B. Bobek, Y. Ono, W. Regelin, L. Bartos and P. Ratcliffe eds. 1991. *Wildlife Conservation, Present Trends and Perspectives for the 21st Century*, Proceedings of the International Symposium on Wildlife Conservation, The 5<sup>th</sup> International Congress of Ecology. Yokohama, Japan. 44pp.

Witteman, G.J., Robert E. Beck, Jr, Stuart L. Pimm and Scott R. Derrickson, 1990. The decline and restoration of the Guam rail, *Rallus owstoni*. *Endangered Species Update* 8: 36-39.