

JOB PROGRESS REPORT RESEARCH PROJECT SEGMENT

STATE: Territory of Guam

PROJECT NO.: E-2-1

SUB-PROJECT .: A

JOB NO.: 2

JOB TITLE: Area-Wide Control of Brown Tree Snakes (1470)

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

SUMMARY

Electrical snake barriers were placed on trees at seven of the nine nests built by Mariana crows, *Corvus kubaryi*, during the FY98 breeding season. Six of the nine nests were made by a Rota/Guam pair, two by a Rota/Rota pair, and one by a Guam/Guam pair. Of the four clutches produced during the season, two contained inviable eggs and two were preyed on before the eggs were collected. Of the eight crows released into the wild in FY97, four continue to survive and have mated. The average number of days survived by these eight birds is 298.5 days (SD = 240.9) as of September 30, 1998.

BACKGROUND

Roadside counts by the Guam Division of Aquatic and Wildlife Resources (DAWR) have documented the decline of the native forest birds of Guam (DAWR 1974-1988). Studies by Conry (1988) and Savidge (1987) have indicated that predation by brown tree snake is the main cause of this decline.

Since these studies, attempts to develop effective means of protecting active nests of Mariana crows have been made. Clearing of vegetation in direct contact with the nest tree, snake trapping, use of galvanized sheet metal girdles, and use of the adhesive resin Tanglefoot ® have all been used as snake barriers around nest trees. The use of sheet metal girdles and Tanglefoot was partially successful but resulted in the mortality of nest trees and was discontinued. One fledgling was produced from a nest in 1989 as a result of Tanglefoot protection.

Since 1990, active nests have been protected successfully with the use of a combination of electrical barriers placed on the trunks of active nest trees and clearing of vegetation around the tree (Aguon et al. 1992). Successful protection of active nests resulted in the fledging of three crows from two nests in 1992 (DAWR 1992) and two from two nests in 1994 (DAWR 1994). These were the first fledglings in the wild since 1985 (Michael 1987), with the exception of the one produced as a result of Tangle-Foot protection in 1989.

OBJECTIVES

Develop methods for controlling brown tree snake predation on active nests of native birds and apply these methods to protect active crow nests.

PROCEDURES

1. Develop methods for snake-proofing active native forest bird nest sites.

2. Implement snake-proofing methods at Mariana crow nest sites.
3. Efforts to trap unbanded wild crows were made by placing noose traps on feeding platforms and active nests. Noose traps were not left unattended.
4. The crows were instrumented with a 7 or 10 g radio transmitter (see DAWR [1997] for harness design) after they were weighed, measured for wing, tail, tarsus, bill length, and banded with a numbered band (size 4) and a unique combination of color-bands.
5. Crow movements were monitored. For each observation, the date, time, weather conditions (percent cloud cover, wind speed, and presence or absence of rain), habitat type, activity of the bird, species of tree used, location in tree, and height above ground were recorded.
6. Recovered remains of any released birds that died were necropsied to determine possible cause of death. When possible, specimens will be kept for museum purposes as partial skeletons or skins.

RESULTS

Nest Protection

Field use of electrical barriers to protect nests of the Mariana crow from brown tree snake and monitor lizard, *Varanus indicus*, predation continued this fiscal year. The design of this barrier is illustrated in DAWR (1997). This design proved highly effective during field experiments in 1995 (DAWR 1995). Electrical barriers, powered by 12-volt lead acid batteries, were also equipped with solar panels, which lessened the frequency of battery replacement.

Intensive searches were carried out in northern Guam to locate crow territories and nests during the breeding season (approximately November to May). When an active nest was discovered, an electrical barrier was installed on the trunk of the nest tree at night prior to completion of the nest. Night installation was done to avoid undue disturbance to the nesting birds. Installation before completion of the nest allows for the removal of snakes by trapping prior to egg-laying. Trapping for snakes usually involved 10 traps around the nest tree and one in the nest tree. Care and feeding of the mice used as bait in the traps and maintenance of the barrier occurred on a regular basis under the cover of darkness, usually during the early morning hours before sunrise.

Breeding activity improved slightly this year. As a result of the releases of adult crows in FY97 (DAWR 1997), nine nests were built by three pairs. Six of these nests were built by a Rota/Guam pair in the upper Tarague Plateau area. Two clutches of 3 eggs each were collected from this pair, but none of the eggs were viable. One nest had a single egg, and another was destroyed by Supertyphoon Paka in December. Two nests of this pair were preyed on before the eggs could be harvested. In both cases, protective barriers had to be built on horizontal branches, which compromised their effectiveness. Electrical barriers are usually placed on vertical trunks, but because of storm damage to many potential nest trees, this pair nested in trees with horizontal branches. Laboratory tests of barriers placed on horizontal branches need to be conducted to determine potential weaknesses of the design (Table 1).

Table 1. The number of nests found during the 1997-1998 breeding season, with the stage of the nest when found, species of nest tree, and date it was snake-proofed†.

| No. | Pair ID | Location | Nest No. | Date Found | Nest Stage | Tree sp. | † |
|-----|-------------------|---------------|----------|------------|----------------|----------------------|----------|
| 1 | Pipeline/Pengua#1 | Pipeline | 325 | 11/23/97 | Building | <i>Ficus</i> | 11/25/97 |
| 2 | Pipeline/Pengua#2 | Pipeline | 326 | 12/8/97 | Platform | <i>Ficus</i> | N/A |
| 3 | Pipeline/Pengua#3 | Tagua | 327 | 1/5/98 | Early cup | <i>Aglaia</i> | 1/14/98 |
| 4 | Pipeline/Pengua#4 | Pipeline | 328 | 1/22/98 | Platform | <i>Ficus</i> | 1/22/98 |
| 5 | Faia/Ahgao | Upper Tarague | 330 | 2/11/98 | Complete | <i>Drypetes</i> | N/A |
| 6 | Pipeline/Pengua#5 | Pipeline | 329 | 2/8/98 | Early platform | <i>Ficus</i> | 2/19/98 |
| 7 | Mag 8 Overlook | MSA-pipeline | 331 | 3/11/98 | Platform | <i>Tristorops is</i> | 3/12/98 |
| 8 | Pipeline/Pengua#6 | Pipeline | 332 | 3/11/98 | Platform | <i>Ficus</i> | 3/18/98 |
| 9 | Faia/Ahgao#2 | Bowl | 333 | 3/16/98 | Base/early cup | <i>Guamia</i> | 3/18/98 |

A Rota/Rota pair (Faia and Ahgao) built two nests, but both were abandoned. Their first was already abandoned when found. The second nest was probably abandoned due to disturbance by hill mynas, *Gracula religiosa*. Two mynas were shot near the nest.

The Mag 8 Overlook pair (a Guam/Guam pair) built a single nest in the Munitions Storage Area (MSA). A dummy egg was placed in the nest to entice the birds to incubate in order to capture the birds. The female was caught, banded, and radio-fitted. Unfortunately, the radio transmitter malfunctioned two weeks later. Prior to capturing the female, the pair had incubated for 20 days. This is the second consecutive season that this pair has accepted and incubated a dummy egg. This suggests that crow pairs that are unable to lay eggs can be enticed to incubate eggs that do not belong to them and thereby act as surrogate parents.

While snake proofing is important in improving the nesting success of crows by preventing snake predation, other additional factors are limiting reproductive success. The lack of breeding activity this season is more evidence of an aging population of crows on Guam. It is recommended that other management techniques be implemented (e.g., translocation of fertile eggs or nestlings from Rota) to improve the reproductive success of these birds.

Movements of Mariana Crows in the Wild

A review of the Mariana crow recovery program was recently completed by the National Research Council (1997). Their recommendations included releasing on Guam all Mariana crows being held in captivity at mainland zoos to help recovery efforts. Of the 12 birds eligible to be released in the 1996-1997 breeding season, two were from the DAWR breeding facility (a male and female), three pairs and a female were from the National Zoological Park Conservation Research Center, and a pair and female were from the Houston Zoo. Eight Mariana crows were eventually released into the wild on Guam during January, March, April, and June 1997, including five from the National Zoo, one from the Houston Zoo, and the two hand-reared Guam crows. Two crows remain in captivity at the Houston Zoo, while two others died after the report was published.

All crows were fitted with radio transmitters (7 g for females and 10g for males) to monitor their movement. Two 7 g transmitters lasted 90 and 30 days. Two other transmitters were recovered from the field after the birds died. The 10 g transmitters averaged 256 days (SD = 78.65, range = 150-334 days, n = 4).

Of the four remaining crows, Fadang settled the closest (0.64 km) to her release site. After Pengua lost her mate (Kafu) in the MSA, she paired-up with a Guam male, settling 6.02 km from her release site. She made six nesting attempts with this male. Ahgao and Faia, after a brief separation during the early part of their release, paired up again and settled 4.83 km from their release site in the upper Tarague Plateau region. They built two nests in this area, both of which were abandoned.

Survival of Released Crows

Four of the eight crows released in the wild in FY97 (DAWR 1997) continue to survive as of September 30, 1998 (Table 2). These include three females (Pengua, Fadang, and Faia) and a male (Ahgao), which have now existed in the wild an average of 515 days (SD = 45). Survival among the eight released crows has averaged 298.5 days (SD = 240.9) overall (Table 2).

Table 2. The number of days survived by crows released in early 1997. For birds that are still alive, the values are given through September 30, 1998. Transmitters (Tx) weighing 10 g and 7 g were fitted on the birds. † = Release/Nest Distance (km). £ = Type of Tx (g). = Life of Tx.

| | Name | Sex | Survival | † | £ | |
|----|-------------|-----|------------------|-------|----|------------------|
| 1. | Ahgao | M | 476 | 4.831 | 10 | 252 |
| 2. | Fadang | F | 560 | 0.642 | 10 | 150 |
| 3. | Faia | F | 476 | 4.831 | 10 | 291 |
| 4. | Kafu | M | 34 ² | | 7 | 46 ³ |
| 5. | Nunu | F | 63 ¹ | | 7 | 90 |
| 6. | Pengua | F | 547 | 6.024 | 7 | 30 |
| | | | | | 10 | 334 |
| 7. | Umumu | F | 13 ² | | | 14 ³ |
| 8. | Yoga | M | 219 ² | | 10 | 164 ³ |
| | | | | | 10 | 108 ³ |
| | Mean | | 298.5 | | | |
| | SD | | 240.9 | | | |

¹Nunu's radio failed after 63 days and her status is unknown.

²The death of these birds was confirmed. ³These radios were still functioning at the time they were recovered.

RECOMMENDATIONS

1. Implement proven methods for protecting nesting Mariana crows.

2. Conduct *in situ* tests of methods which prove effective in laboratory experiments on actual active nest trees.
3. Conduct laboratory tests of the efficacy of electrical barriers on horizontal trunks.
4. Explore the feasibility of area-wide snake control and exclusion of snake from larger areas encompassing nesting territories of crows with the use of barriers.
5. Explore and implement other methods or techniques to improve reproductive success of nesting birds to be used in conjunction with nest protection, i.e., translocation of crows from Rota.
6. Implement recommendations by the NRC for the recovery of the Mariana crow on Guam and Rota.

PROGRAM COSTS

The estimated cost for this project under E-2-1 is \$110,000.

LITERATURE CITED

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