

**JOB PROGRESS REPORT
RESEARCH PROJECT SEGMENT**

STATE: Territory of Guam

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

JOB TITLE: Reproductive Biology of the Mariana Crow and Other Endangered Species (1460, 1470)

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

SUMMARY

Based on Mariana crow call surveys and locations of known individuals, the crow population on Guam was estimated at 12 birds. This number includes Rota crows released on Guam. Nine nests were recorded during this breeding season. Three eggs, all enviable from two clutches, were collected from the same breeding pair. Two nests, one a single-egg clutch, were lost probably due to snake predation.

BACKGROUND

The Mariana crow is found only on Guam and Rota and is the only species of crow in Micronesia. Though once found throughout Guam, surveys in 1981 estimated 380 crows (Engbring and Ramsey 1984) were present in northern Guam. This number was much lower than the estimate of 1,300 crows on Rota in 1982 (Engbring et al. 1986). By 1986, Michael (1987) reported that only 100 crows remained on Guam. By then, most of Guam's native forest birds had disappeared as a result of brown tree snake predation (Savidge 1987, Conry 1988, Engbring and Fritts 1988).

In 1990, DAWR began annual crow surveys using tape-playback of crow calls to monitor their status. The initial survey found about 100 crows still present in northern Guam. Though crow numbers had decreased since 1981, distribution remained the same (DAWR 1990).

Efforts to reverse the decline of the Mariana crow began in 1986 with attempts to protect active nest sites from snake predation. Sheet metal sleeves and Tanglefoot®, an adhesive resin, were placed around trunks of active nest trees to act as a snake barrier and snake trapping was begun. During the early 1990s, increased nest protection was achieved with the development of electrical barriers and effective snake trapping (DAWR 1991).

A review of the Mariana crow recovery program was recently completed by the National Research Council (1997). This report compliments and reiterates recommendations in the recovery plan for the Mariana crow (Beck and Savidge 1990). One of their recommendations was that all Mariana crows being held in the National Zoological Park Conservation Research Center and Houston Zoo be released on Guam. In 1997, the crow population on Guam was augmented by the release of 8 captive crows (6 from the zoos and two from the DAWR's facility) into the wild in northern Guam. At the end of FY97, four of the released birds were still surviving, the status of one was unknown, and three died 13-219 days after their release.

OBJECTIVES

To inventory Mariana crows and their nest sites to implement recovery efforts, including predator control and other reproductive enhancement efforts (Beck and Savidge 1990).

PROCEDURES

1. Recorded-call playback surveys for Mariana crows were conducted in northern Guam during the month of July (Figure 1). At each station, tape-recorded calls were played for 2.5 minutes. This was followed by a 2-minute silent period during which the observer listened for crows. The numbers, distance, and plumage condition of the crows observed were recorded.
2. Areas in northern Guam were searched for Mariana crows during the breeding season (October to May). Active nests were monitored and appropriate measures to protect nests were taken. The locations of active nests were mapped (Figure 4).
3. Young, if found, were monitored.

RESULTS

Surveys

Fourteen transects totaling 211 stations were used to survey crows in eight regions of northern Guam during July (see DAWR 1991 for transect locations). Birds were present on two (14%) transects (Table 1), which is the same number as last year (DAWR 1997). Eight crows were recorded during the survey, with six birds in the Munitions Storage Area (MSA) and two single birds southeast of Northwest Field (Table 1). Four other individuals are known to survive in the wild, giving a current population estimate of 12 birds for Guam. This estimate represents a 25% decline over last year's total (DAWR 1997).

Table 1. Summary of results from playback of tape-recorded Mariana crow calls conducted in July 1998. The location of the transect and these crows are shown in Figures 1 and 2, respectively. July 98 crow population estimate = 8+4 = 12 birds. † = known number.

Transect	No. of stations	No. of crows	No. stations with crows	Crows missed in survey†
1	50	6	4	0
2	36	0	0	1
3	12	0	0	0
4	10	0	0	0
5	8	0	0	0
6	11	0	0	0
7	10	0	0	2
8	23	0	0	0
9	9	2	1	0
10	9	0	0	0
11	7	0	0	0
12	9	0	0	0
13	8	0	0	1
14	9	0	0	0
Total	211	8	5	4

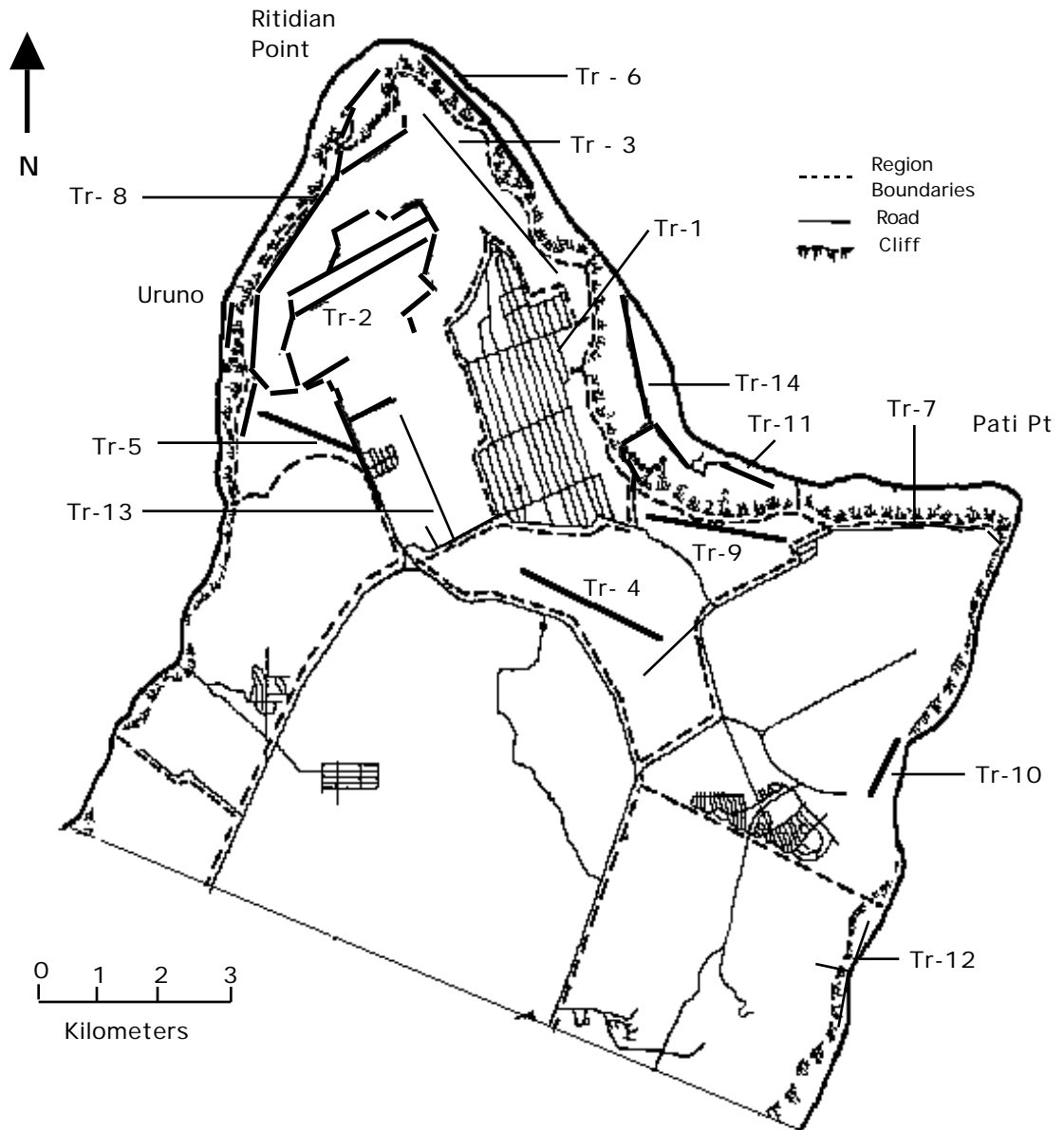


Figure 1. The location of Mariana crow survey transects on Guam.

Eight detections were made on Transect 1 in the MSA, but two were repeats of the same individuals and were excluded from the count totals. The six birds in the MSA (Figure 1) include five Guam crows and a Rota female known as “Fadang”, which was born in the Houston zoo and released on 14 March 1997.

No crows were recorded on Transect 7 in the Pati Point area, however, a pair known as the “Pipeline Pair” and comprised of a Guam male and Rota female (“Pengua”) continues to survive there (Figure 1). This pair made five nesting attempts during the breeding season. No other crows remain in this area.

The Tarague region harbors two pairs of crows (Figure 2). On the western side of the area a Guam-born pair, known as the “Mag 8 Overlook Pair”, was recorded during the MSA survey (Transect 1). This pair ranges eastward to the Tarague cliffline. A Rota pair

comprised of “Faia” and “Ahgao” occupies the upper eastern Tarague plateau (Figure 1; 8,

9 Pair) and made two known nesting attempts during the year. The ranges of the two pairs overlap slightly, but no interactions were observed.

Crows were not recorded in Northwest Field. A hand-reared female Guam crow was released there in February 1997, but her radio failed, making observations difficult. Her status is presently unknown.

When the number of birds recorded during the survey is added to the number of missed birds (excluding repeats) minus the loss of the released hand-reared bird, an estimate of about 12 crows is obtained. This represents a 25% decrease from last year’s estimate. The decrease is a result of the death of several captive crows released in the wild. The number of crows on Guam continues to be very low (Figure 3) because of the lack of reproduction. This population will not persist much longer without translocating crows from Rota to Guam.

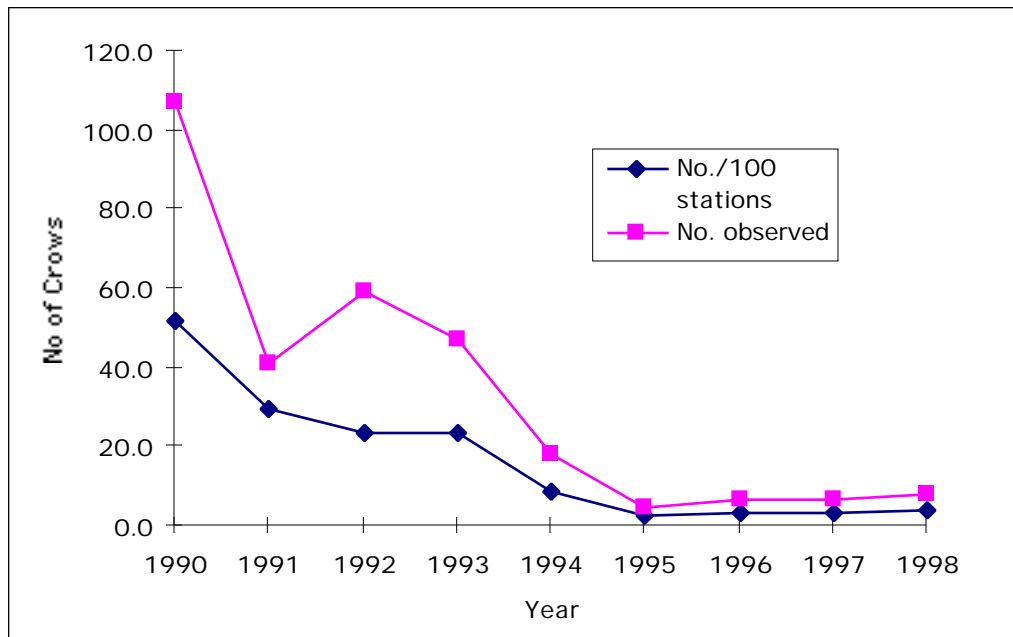


Figure 3. Yearly results of Mariana crow playback surveys conducted on Guam. The number of birds estimated in 1998 includes four Rota crows released in the wild in 1997.

Active nests

Nesting activity increased during the 1997-1998 breeding season. Nine nests were recorded this year (Table 2, Figure 4) compared to a single nest during 1996-1997. Three eggs pulled from two nests were inviable. Two other clutches were preyed on possibly by monitor lizards (*Varanus indicus*). This was the second consecutive year that no eggs hatched.

A Rota-Guam pair constructed six of the nine nests (Table 2). All were located in *Ficus* trees, except for one which was constructed in an *Aglaia mariannae* and later moved by DAWR staff to a nearby *Ficus* to allow snake-proofing. Nesting continued after the nest was relocated and the pair eventually laid two eggs. Unfortunately, neither egg was viable. Supertyphoon Paka destroyed one of this pair's nests.

A Rota/Rota pair built two nests in the Tarague plateau region (Table 2). One nest was already abandoned when it was discovered on February 11. The second nest discovered on March 16 in a *Guamia* tree was abandoned probably as a result of disturbance caused by two hill mynas (*Gracula religiosa*). Both birds were shot to prevent further disturbances

Table 2. Summary of crow nests built on Guam, the stage in which they were found, and their outcome in FY98. Productivity of crows is summarized in Table 3. Pairs A, B, and C are the Pipeline/Pengua, Faia/Ahgao, Mag 8 Overlook pairs, respectively.

No.	Pair ID	Nest No.	Date Discovered	Nest Stage	Tree Species	Date Snake Proofed	Outcome
1	A	325	11/23/97	Building	<i>Ficus</i> sp.	11/25/97	Incubation
2	A	326	12/8/97	Platform	<i>Ficus</i> sp.	N/A	Destroyed by typhoon
3	A	327	1/5/98	Early cup	<i>Aglaia mariannae</i>	1/14/98	Incubation
4	A	328	1/22/98	Platform	<i>Ficus</i> sp.	1/22/98	Abandoned
5	A	329	2/8/98	Early platform	<i>Ficus</i> sp.	2/19/98	Incubation
6	B	330	2/11/98	Complete	<i>Drypetes dolichocarpa</i>	N/A	Abandoned
7	C	331	3/5/98	Platform	<i>Tristoropsis obtusangula</i>	3/12/98	Incubation
8	A	332	3/11/98	Platform	<i>Ficus</i> sp.	3/18/98	Incubation
9	B	333	3/16/98	Base/early cup	<i>Guamia mariannae</i>	3/18/98	Abandoned

The Mag 8 Overlook pair was the only other pair known to have built a nest. Their nest was found in the MSA cliffline area on March 11 in *Tristoropsis* tree and was later snake-proofed. A dummy egg was placed in the nest on March 13, after no eggs were laid. Observations revealed that nest attendance was normal. This was the second season the pair was made to incubate a dummy egg. The female was caught, banded, and fitted with a radio transmitter, which unfortunately failed two weeks later.

A pair known as the "11B6" pair probably no longer exists. The banded female was not seen during this breeding season. The male is thought to have remated with the female,

“Fadang”. This pair made their first and only nesting attempt on February 11. Only a few sticks were placed in the branch of an *Elaeocarpus* tree before the structure was abandoned.

Reproductive success of Mariana crows on Guam has been documented since 1991 (Table 3). The principal cause of the low productivity is infertility probably due to senescence. With the release of Rota crows, a change from no egg-laying activity last season to egg-laying this season was observed. However, the absence of viable eggs continues to be a problem. Although techniques have been developed to control snake predation at nests through snake trapping and electrical barriers, reproductive success can only be improved by releasing young crows from Rota into the Guam’s aged crow population.

Table 3. Summary of Mariana crow nesting productivity on Guam from 1990-1998. No eggs were laid during the 1996-1997 season. The eggs laid during the 1997-1998 season were from a pair with a Rota female that was released early in 1997.

Clutch Size	90-91	91-92	92-93	93-94	94-95	95-96	96-97	97-98
1	4	2	4	1	6	1	0	2
2	0	1	2	2	0	1	0	1
3	0	0	2	4	2	2	0	0
No. of Clutches	4	3	7	7	8	4	0	3
Total Eggs	4	4	12	17	12	9	0	4
Mean Clutch	1.0	1.3	1.7	2.4	1.5	2.3	0	1.3
SD	0.0	0.6	1.0	0.8	0.9	1.0	-	0.6
No. Hatched	0	3	0	3	1	3	0	0
No. Fledged	0	3	0	2	0	2	0	0

RECOMMENDATIONS

1. Continue crow surveys.
2. Continue searches for active crow nests and take appropriate measures to protect them from snake predation.
3. Collect habitat use and reproductive information when crow nests are found.
4. Augment the crow population on Guam with crows translocated from Rota.

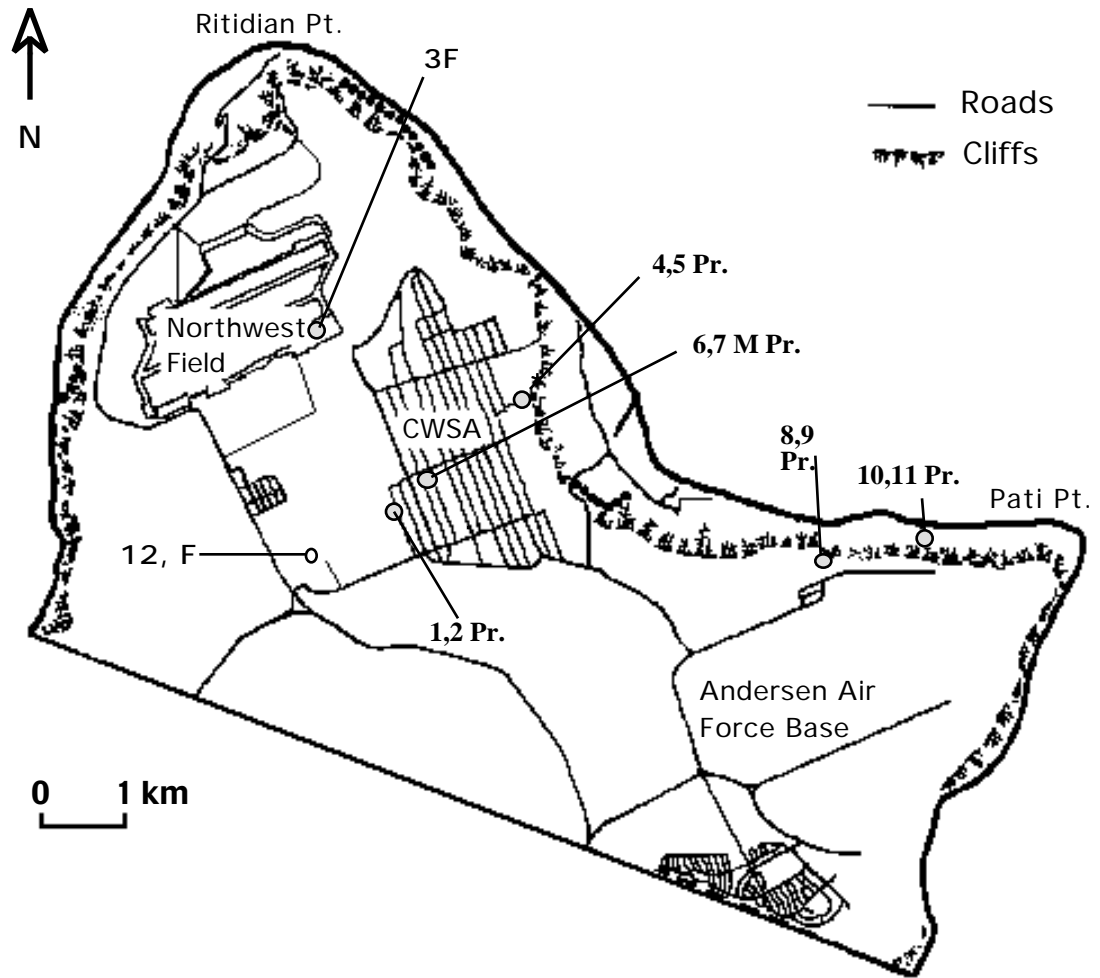
PROGRAM COST

The estimated cost of the Mariana crow project under E-2-1 is \$115,000.

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1&2 = 15B3 Pair, 3=Nunu, 4&5 = Mag 8 Pair, 6&7=Fadang/Male,
 8&9=Faia/Ahgao, 10&11=Pengua/Pipeline Male, 12,F = Reno
 Female

Figure 2. Location of known crows (in circles) at Northwest Field, Munitions Storage Area (CWSA), and Pati Point as of July 1998. Each location is noted as a, male (M), female (F), or a pair (Pr.). A hand-reared Guam crow's (3F) status is unknown. Pairs 1/2 and 4/5 are old Guam crows not capable of egg laying. Pairs 6/7 and 10/11 are composed of a Rota female crow and a male Guam crow. Pair 8/9 is composed of Rota crows.

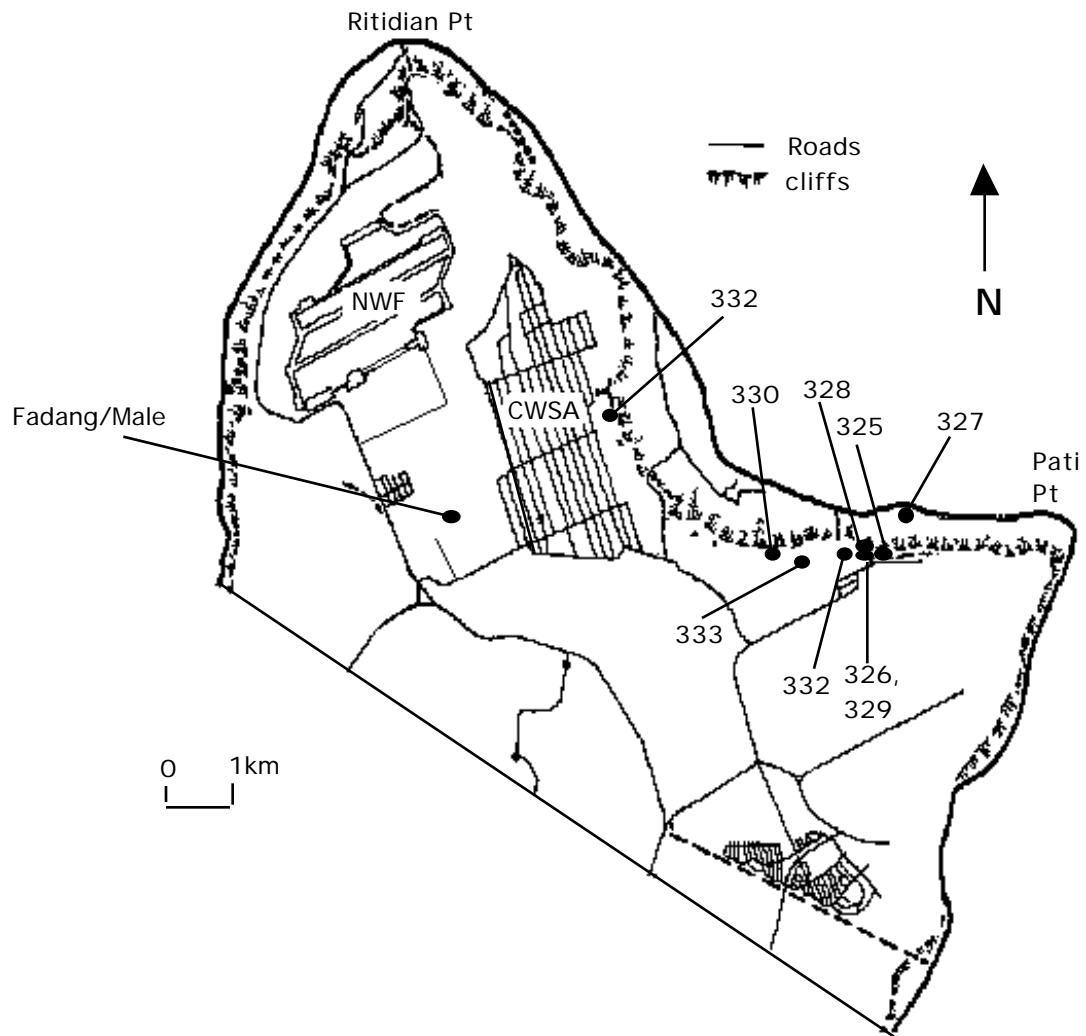


Figure 4. Locations of nests produced during the 1997-1998 crow breeding season. The Pipeline (Pengua and a male), Faia/Ahgao, and the Mag 8 Overlook pairs were the only pairs that constructed nests during the season. The Pipeline pair was the only pair that laid eggs.