

JOB PROGRESS REPORT RESEARCH PROJECT SEGMENT

STATE: Territory of Guam

PROJECT NO.: W-1R-6
SUB-PROJECT NO.: W-5
STUDY NO.: 1
JOB NO.: 1

JOB TITLE: Current Status, Distribution, and Natural History of Mariana Fruit Bats (1460)

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

SUMMARY

During FY98, Guam's population of Mariana fruit bats (*Pteropus mariannus mariannus*) ranged in size from an estimated low of 210-245 animals in October to a high of 910-980 animals in February. Numbers were low (< 200 animals) for most of the year at the island's only bat colony. However, abundance increased sharply after Typhoon Paka, with a count of 760 bats made in February, which represents the highest single count at the colony since 1980. The colony continued to roost at a single site on Pati Point for the fourth consecutive year. In March, the U.S. Fish and Wildlife Service (USFWS) published its proposal to list fruit bats throughout the Mariana Islands as threatened, an action that includes the downlisting of Guam's bat population from endangered to threatened. Two cases of insectivorous bats being accidentally transported to Guam were reported in FY98.

BACKGROUND

The Mariana fruit bat has been studied by the Division of Aquatic and Wildlife Resources (DAWR) since 1962 (DAWR 1964-1997). Considered a delicacy by Chamorro residents, bat abundance declined during the 1960s and 1970s until only a few solitary animals remained (Perez 1972, Wheeler and Aguon 1978, Wiles 1987a). A second species, the little Mariana fruit bat (*P. tokudae*), also occurred on the island, but is now extinct (Wiles 1987a). Reasons for the declines were primarily overhunting and some loss of habitat (Wheeler 1979). Both *Pteropus* occur on the U.S. and Guam Endangered Species Lists. The island's population of Mariana fruit bats grew to an estimated 850-1,000 animals in the early 1980s, probably from immigration of bats from Rota (Wiles 1987a, Wiles and Glass 1990). However, numbers have gradually declined since 1983 because of continued illegal hunting and suspected predation by brown tree snakes (*Boiga irregularis*) (Wiles 1987a, 1987b, Wiles et al 1995). During FY97, Guam's fruit bat population ranged in size from an estimated high of 425-470 animals to a low of 210-245 animals (DAWR 1997).

Guam experienced its most destructive storm since 1976 when Typhoon Paka hit the island on 16-17 December. Sustained wind speeds were estimated at 150 mph, with gusts of up to 185 mph. Information on the typhoon's impacts on wildlife and other natural resources appears in DAWR (1998). The storm also caused significant damage on southeastern Rota. On 2-3 November, Typhoon Keith passed between Rota and Tinian, with destructive winds hitting the northern portions of Rota.

OBJECTIVES

To continue status surveys and natural history studies and to provide for continued protection of habitat as recommended in the Mariana Fruit Bat Recovery Plan (Wiles 1990).

PROCEDURES

1. Survey fruit bat distribution and numbers in Guam and the Commonwealth of the Northern Mariana Islands (CNMI).
 - a. Conduct annual surveys of fruit bats along Guam's northern cliffline with periodic surveys made elsewhere on the island. The emphasis of surveys should be to search for solitary bats and additional bat colonies.
 - b. Conduct monthly censuses at known bat colonies on Guam.
 - c. Assist the CNMI Division of Fish and Wildlife with surveys of fruit bats on other islands as needed.
2. Record information on the behavior and reproduction of fruit bats in colonies.
3. Determine habitat use of fruit bats. Visit abandoned roosts and record information about terrain and the size and abundance of vegetation present.
4. Monitor fruit bat imports to Guam from other Pacific islands.
5. Investigate illegal hunting of fruit bats on Guam. Visit abandoned roosting sites of colonies to determine illegal hunting effort. Assist conservation officers with investigations of bat poaching.

RESULTS

Locations of Bat Colonies on Guam

The island's only known fruit bat colony occupied Roost 1 on Pati Point at Andersen Air Force Base (AAFB) throughout FY98 (Tables 1 and 2). The colony did not change locations after Typhoon Paka, despite several important roosting trees being snapped or blown down, which merely caused the bats to relocate to neighboring trees. The colony has used this location since July 1994. It has been a preferred roosting site for many years (DAWR 1987-1997).

The DAWR received a second-hand report from a fairly reliable source of a small day roost of eight bats seen in a single tree along the cliffline near the municipal dump at Asiga, Malojloj, sometime between March and May.

Surveys of Fruit Bats on Guam

Count results at Roost 1 followed the same seasonal pattern noted in most previous years (DAWR 1985-1997). Fruit bat numbers were low from October to December, then began a rapid and dramatic increase from late December to February, when numbers peaked at 760 animals (Table 2). Abundance declined quickly in March and was low again from April until September. Pre- and post-Typhoon Paka counts on 3 and 18

December, respectively, showed only a small decline (Table 2), indicating little direct mortality of animals due to the storm.

The 23 February census is the largest number of bats recorded at a single roost on Guam since the colony reappeared in the northern part of the island in 1980 (DAWR 1980-1997). As previously noted (Wiles and Glass 1990, DAWR 1990-1997), the increase in abundance is attributed to the immigration of animals from Rota, as no other colonies are known to occur on Guam. Count results show that the increase did not occur as a single event. Instead, three separate increases of about 200 animals each were noted over a 10-week period (Table 2), indicating that bats may have flown to Guam in groups of up to that size or as individuals.

Table 1. Approximate dates of use of the roost used by the only known colony of Mariana fruit bats on Guam in FY98.

Roost Number	Roost location	Approximate period of use by bats
1	North Pati Point	2 July 1994 - present

Table 2. Counts of Mariana fruit bats at roosts on Andersen AFB, Guam in FY98.

Date	Roost Number									Total	
	1	14	15	16	17	18	19	20	21		
8 Sept 1997	125	-	-	-	-	-	-	-	-	-	125
29 Oct	125	0	0	0	0	0	0	0	0	0	125
3 Dec	168	-	-	-	-	-	-	-	-	-	168
18 Dec	158	-	-	-	-	-	-	-	-	-	158
22 Dec	*	0	0	0	-	0	0	0	0	0	*
30 Dec	358	-	-	-	-	-	-	-	-	-	358
27 Jan 1998	556	0	0	0	-	0	0	0	0	0	556
23 Feb	760	-	-	-	-	-	-	-	-	-	760
4 Mar	374	0	0	0	0	0	0	0	0	0	374
30 Mar	297	-	-	-	-	-	-	-	-	-	297
28 Apr	173	0	0	0	-	0	0	0	0	0	173
29 May	163	-	-	-	-	-	-	-	-	-	163
30 June	145	-	-	-	-	-	-	-	-	-	145
11 Aug	160	-	-	-	-	-	-	-	-	-	160
28 Aug	145	-	-	-	-	-	-	-	-	-	145
6 Oct	204	-	-	-	-	-	-	-	-	-	204

- = site was not checked for bats; * = colony was present, but complete count was not made.

The colony's decline seemingly occurred more rapidly than its buildup. Numbers fell by more than half, or 384 animals, during the 10-day period from 23 February-4 March (Table 2), suggesting the possibility of a mass exodus back to Rota. The colony's size decreased more gradually after that, with losses of 77 bats from 4-30 March and 124 bats from 30 March-28 April.

The movement of fruit bats to Guam began soon after Typhoon Paka and may have been related to cumulative forest damage on Rota, although the evidence for this is not strong. (An especially likely alternative hypothesis is that post-typhoon or holiday season poaching caused significant disturbance to the Rota population.) Forests in some parts of Rota displayed heavy storm damage, however, the destruction was less severe overall than on Guam (G. Hughes, pers. comm.; see DAWR 1998) or on Rota after Typhoon Roy

in 1988. Despite this, increased daytime observations of bats around the island and several animals seen feeding on unripe *Pandanus* fruit suggest that the Rota bat population may have experienced some food stress after the typhoon (E. Taisacan, pers. comm.). Interestingly, the growing numbers of bats at Pati Point never appeared stressed by lack of food at any time after Paka, despite the loss of foliage and fruit over large portions of the colony's foraging range for several months after the storm (DAWR 1998). During this time, bats in the colony showed normal sleeping and social behavior and did not depart earlier than normal in the afternoon to search for food, as would be expected in hungry animals. Similarly, unusual numbers of individual bats were never observed flying about northern Guam during the daytime after the storm. Presumably, Guam's bats were able to find sufficient food resources in the less damaged pockets of cliffline forest remaining after the storm, especially along the Tarague and Jinapsan clifflines.

Estimates of fruit bat numbers at the main colony on Pati Point can be made using the high and low roost counts for the year. Because some individuals were probably hidden by thick foliage during counts, the total number of adults in the roost was likely to be 5-10% higher than the actual number recorded. Assuming that about half the colony were harem females and that 10% of these had unweaned young (DAWR 1994), then the roost held an estimated high of 798-836 adults and 40-42 juveniles, or a total of 838-878 bats in late February, and a low of 131-138 adults and 7 juveniles, or a total of 138-145 bats in October.

Incidental sightings of single fruit bats or pairs of bats were made elsewhere on the island during the year, as follows: daytime sightings – Ritidian Point (9 sightings), Munitions Storage Area (formerly the Conventional Weapons Storage Area) on AAFB (8), Tarague basin cliffline (3), Northwest Field (1), 200-400 m west of Wettengel Elementary School in Dededo (1), Fadian Point (1), Harmon cliffline (1), the Ngachang area of Ordot (3), Ordnance Annex (1), Bubulao in Talofofo (2), and Nomna Beach in Malojloj (1); nighttime sightings – Tagua Point on AAFB (1), Northwest Field (1), single bats flying between AAFB and NCTAMS at Potts Junction (2), a bat flying across Route 3 from Gugagon, Dededo to NCTAMS (1), Haputo Beach on NCTAMS (1), Route 1 at the west entrance of Andersen South (2), and the DAWR office in Mangilao (1, this bat flew over the office at dawn).

Excluding bats residing in the colony at Pati Point, an estimated 50-75 fruit bats are still believed to live solitarily or in small groups in northern Guam, primarily along the cliffline extending from Bijia Point to Iates Point. An additional 20-25 animals probably inhabit the Ordnance Annex and other forested areas in southern and central Guam. Based on these figures, Guam's islandwide population of fruit bats was small for much of the year, with an estimated low of 210-245 animals in October and a high of 910-980 animals in February.

During the review of the USFWS proposal to list Mariana fruit bats as threatened in the CNMI (see below), doubt was expressed by some CNMI citizens over the claim that bats fly between islands of the archipelago, as noted in U.S. Fish and Wildlife Service (1998). DAWR researchers believe that only a single colony of bats remains on Guam and therefore any increases in the numbers of animals at that colony must be due to immigration from Rota rather than from intra-island movement. However, DAWR personnel have been unable to conduct exhaustive searches of bat habitat in other parts of Guam to verify the lack of additional colonies. To this end, archaeologists with International Archaeological Research Institute, Inc. reported the completion of three extensive field studies in several poorly surveyed cliffline areas of northern Guam (R. Olmo, pers. comm.). These included 1) the area from Haputo Cove to Double Reef on NCTAMS (a one-month survey from May to July 1998), 2) the area from FAA cove

southward through all of Hilaan (three weeks in 1998), and 3) the entire Tarague Basin and cliffline from Mergagan Point southeast to Tagua Point (two months in 1996). They encountered no colonies and saw almost no bats during this fieldwork. These observations, plus the likely absence of colonies near the private lands at Urunao and Jinapsan, support the contention that no bat roosts occur between Two Lovers Point and Pati Point.

Surveys of Fruit Bats on Other Islands

The DAWR did not assist in any bat surveys in the CNMI during FY98.

Illegal Hunting and Importations

Poaching has long been a major cause of mortality of *P. mariannus* in the southern Mariana Islands (Wiles 1987a, Wiles et al. 1989, Stinson et al. 1992). Poaching still occurs commonly on Rota and other islands in the Marianas (E. Taisacan, pers. comm., 1998). No reports of illegal hunting were again recorded on Guam this year.

Several illegal shipments of bats were confiscated by customs authorities on Guam and in the CNMI during the year (R. Born, USFWS, pers. comm.). Confiscations made on Guam totaled: two shipments from Rota of three and two bats, and six bats from Yap in one shipment. Confiscations on Saipan were as follows: one bat from Sarigan and one bat from Rota in two separate shipments.

Proposed Downlisting of the Mariana Fruit Bat Population on Guam

In March, the USFWS published its proposal to list Mariana fruit bats throughout the Mariana Islands as threatened (U.S. Fish and Wildlife Service 1998). This action would include the downlisting of Guam's bat population from endangered to threatened. A public comment period was opened from March to June and public hearings were held on Saipan and Rota in June. A final decision on the ruling is pending.

Insectivorous Bats

Two separate cases of insectivorous bats being accidentally transported to Guam were reported in FY98. The first occurred on 26-27 October, when two bats were discovered alive inside a well-sealed concrete house on Nimitz Hill. The couple living there had returned from a trip to Bali only a few hours before finding the first bat, thus it is likely that the animals were accidentally carried inside a souvenir packed in their luggage. Neither bat was recovered for identification. On 28 November, Guam customs officers answered a report of a dead bat found aboard a recently arrived ship in Apra Harbor. The bat was retrieved and turned over to the DAWR. It was sent to the National Museum of Natural History (USNM 568000) and identified as *Nyctalus noctula*. Prior to ship's arrival at Guam, it had stopped in Hong Kong from 12-15 November, where this species is an uncommon resident. A full report on the finding of the three bats is in preparation.

RECOMMENDATIONS

1. Survey bat numbers and distribution along Guam's entire northern cliffline once or twice annually. Searches for additional colonies may be productive because continued poaching at bat roosts on Rota can cause large numbers of bats to move to Guam (Wiles and Glass 1990).

2. Continue observations at Guam's bat colonies. Information on reproductive biology, behavior, and social organization will be used to supplement data already gathered.
3. Summarize data previously collected and write reports on the diet, reproduction, and amount of snake predation on fruit bats.
4. Conduct a study of the vegetation, terrain, and proximity to development of known roosting sites to determine what site characteristics are important in the selection of roosting sites by fruit bat colonies.
5. Known bat roosting and foraging areas should be patrolled regularly by DAWR conservation officers.
- . Continue to assist the CNMI as needed with island censuses and other biological studies. Studies conducted on Rota would be most valuable for understanding the aspects of Guam's fruit bat population.
7. Continue to monitor illegal fruit bat imports entering Guam.

PROGRAM COST

The estimated cost of the fruit bat project under W-1R-6 is \$22,000.

LITERATURE CITED

- Division of Aquatic and Wildlife Resources. 1964-1997. Job Progress Reports - Federal Aid to Fish and Wildlife Restoration, Guam. Guam Dept. Agric., Mangilao, Guam.
- Division of Aquatic and Wildlife Resources. 1998. Survey and inventory of non-game birds, Appendix 1. *in* Job Progress Reports - Federal Aid to Fish and Wildlife Restoration, Guam. Guam Dept. Agric., Mangilao, Guam.
- Perez, G.S.A. 1972. Observations on Guam bats. *Micronesica* 8:141-149.
- Stinson, D.W., P.O. Glass, and E.M. Taisacan. 1992. Declines and trade in fruit bats on Saipan, Tinian, Aguijan and Rota. pp. 61-67 *in* Wilson, D.E. and G.L. Graham (eds.). Pacific island flying foxes: proceedings of an international conservation conference. U.S. Fish Wildl. Serv. Biol. Rep. 90(23). 176 pp.
- U.S. Fish and Wildlife Service. 1998. Endangered and threatened wildlife and plants: proposed reclassification from endangered to threatened status for the Mariana fruit bat from Guam, and proposed threatened status for the Mariana fruit bat from the Commonwealth of the Northern Mariana Islands. *Federal Register* 63(58):14641-14650.
- Wheeler, M.E. 1979. The Marianas fruit bat: management history, current status and future plans. *Calif.-Nev. Wildl. Trans.* 10:149-165.
- Wheeler, M.E. and C.F. Aguon. 1978. The current status and distribution of the Marianas fruit bat on Guam. *Aquatic Wildl. Resour. Div., Tech. Rep. No. 1.* 29 pp.
- Wiles, G.J. 1987a. The status of fruit bats on Guam. *Pac. Sci.* 41:148-157.

- Wiles, G.J. 1987b. Current research and future management of Marianas fruit bats (Chiroptera, Pteropodidae) on Guam. *Aust. Mammal.* 10:93-95.
- Wiles, G.J. 1990. Guam Mariana fruit bat and little Mariana fruit bat recovery plan. U.S. Fish Wildl. Serv., Portland, Oregon. 57 pp.
- Wiles, G.J. and P.O. Glass. 1990. Inter-island movements of fruit bats (*Pteropus mariannus*) in the Mariana Islands. *Atoll Res. Bull.* 343:1-6.
- Wiles, G.J., C.F. Aguon, G.W. Davis, and D.J. Grout. 1995. The status and distribution of endangered animals and plants in northern Guam. *Micronesica* 28:31-49.
- Wiles, G.J., T.O. Lemke, and N.H. Payne. 1989. Population estimates of fruit bats (*Pteropus mariannus*) in the Mariana Islands. *Conserv. Biol.* 3:66-76.

Report prepared by: Gary J. Wiles