2000 Technical Report #2

Wildlife and Vegetation Surveys

AGUIGUAN 2000

Performed
By

CNMI Division of Fish and Wildlife
Wildlife Section

and

Tinian Department of Lands and Natural Resources
Fish and Wildlife and Conservation Sections

MARCH 31-APRIL 8, 2000

Please cite as: Cruz, J., L. Arriola, N. Johnson, and G. Beauprez. 2000. Wildlife and Vegetation Surveys Aguiguan 2000. Technical Report #2 CNMI-DFW, unpubl.

SUMMARY OF WILDLIFE SURVEYS AGUIGUAN ISLAND

MARCH 31-APRIL 8, 2000

Performed by:

CNMI Division of Fish and Wildlife
Wildlife Section
P.O. Box 10007
Lower Base, Saipan 96950

and

Tinian Department of Lands and Natural Resources
Fish and Wildlife and Conservation Sections
Box 178
San Jose, Tinian 96952

Executive Summary

Aguiguan is a unique and important island in terms of its native wildlife. It is the southern most island inhabited by the endangered Micronesian megapode (*sasangat*) and maintains about 10% of the archipelago-wide population of endangered Guam swiftlet (*chachaguak*). It is the only island other than Saipan to support Golden white-eyes (*canario*) in the Marianas. In the past, low numbers of the endangered Nightingale reed-warbler (*gaga karisu*) lived on the island as well.

During the surveys of birds, lizards, mammals, and crabs conducted in April 2000 by Fish and Wildlife staff from Rota, Tinian, and Saipan, we did not detect any Nightingale reed-warblers on Aguiguan. It is possible that the reed-warbler is colonizing Aguiguan from a source population such as Saipan's and then going locally extinct, as is often the case with small populations. Although Micronesian megapodes are still not numerous on the island, apparently numbers have been slowly increasing and we estimate that there is an island-wide population of about 51. Guam swiftlet numbers have remained fairly stable over the last 15 years. New swiftlet caves are being found and investigated with every extended visit to Aguiguan, and undoubtedly more swiftlet roosts will be discovered in the future.

Generally, however, forest bird populations (such as starlings, fantails, and white-eyes) are not doing well on Aguiguan. Their populations remained stable between 1982 and 1992, but, with the exception of White-throated ground-doves and Philippine turtle-doves, there were far fewer forest birds detected in 2000 than previously. This may correlate with low levels of forest regeneration due to over-browsing by feral goats. No feral animal surveys were performed, however, effects of goat grazing were observed throughout the native forest. Several parts of the island no longer support ground cover and *Lantana camara* has become more widespread in the upper reaches of the island and in the open field regions. Evidence of goats is obvious in the native limestone forest on the north side of the island, where there is practically no understory or ground cover. With less habitat and lower food supplies, fewer forest birds can survive.

Photo: Overgrazing by numerous feral goats has wiped out the young plants in Aguiguan's forest that would ordinarily replace older trees as they senesce and die.

Coconut crabs were surveyed by our Conservation Officers. Crab size appears to remain small, in keeping with previous observations, and there is no reason to suspect that hunting pressure on large sized crabs has lessened in the recent past. Mariana fruit bats were also surveyed. From individual fruit bat sightings, evening station counts, and finding two small aggregations, we estimate the fruit bat population on Aguiguan is 150-200. It appears that fruit bat numbers increased during the late 1980's after a hunting moratorium was imposed, and have remained stable on Aguiguan for the last 10 years.

Seven species of lizards were documented. The blue-tailed skink was the most abundant one. Monitor lizards were also abundant: a total of 18 lizards were captured using snare traps and an average of 9 lizards were observed per hour during visual surveys. Monitor lizards seemed to be more abundant in introduced forest. The only species of rat captured on Aguiguan was the Pacific rat. Rat capture rates have increased since the last survey in 1995. The cause of the increase may be seasonal population fluctuations.

Recommendations for managing the wildlife and habitat on Aguiguan include control of feral animals via increased hunting, removal of the noxious weed *Lantana camara*, maintaining the moratorium on hunting fruit bats, and restoration of degraded areas with native plantings.

Introduction

Aguiguan and its small companion, Naftan Island, are part of the southern arc of the Marianas archipelago along with Guam, Rota, Tinian, and Saipan. In recent years, Aguiguan has received very little attention from the scientific community. However, the U.S. Department of Agriculture Soil Conservation Service surveyed and classified the soils there in 1985 (Young 1989). Archaeological surveys were conducted in 1990 (Butler 1992), and the birds were surveyed in 1982 (Engbring *et al.* 1986) and 1992 (Craig and Chandran 1992). Several field trips by CNMI biologists have documented the kinds of seabirds, lizards, bats, and forest birds that inhabit the island, as well as persistent problems with large numbers of feral goats (*e.g.*, Kosaka *et al.* 1983; Reichel *et al.* 1987; Worthington and Taisacan 1995). People from Tinian visit Aguiguan periodically to hunt goats and capture Coconut crabs. A hunting moratorium on fruit bats has been in effect since 1985.

Aguiguan alone of the southern Mariana islands is uninhabited and has remained so since 1945. It is locally called Goat Island reflecting the large population of feral goats that occupy it. Native limestone forest still covers a portion of the island, although damage by feral goats is obvious. Much of the vegetation on the island's upper reaches has been severely degraded causing extensive erosion and unimpeded growth of the noxious weed *Lantana camara*. Administered by the municipality of Tinian, permission to land on the island is required from the Mayor's Office.

The CNMI-Division of Fish and Wildlife in conjunction with the Tinian Department of Lands and Natural Resources conducted forest bird, reptile, rodent, bat, and crab surveys on Aguiguan from 31 March until 8 April in 2000. The purpose of the surveys was to assess the status of the island's wildlife populations in preparation for improving management of the island's resources. The results of these surveys is reported below.

Forest Bird Surveys

Forest birds were surveyed using Variable Circular Plot (VCP) methodology on 1 April, 2000. Teams of two to three people followed four (4) transects described by Engbring *et al.* (1986) that had been used for similar forest bird surveys in 1982 and 1992 (Fig. 1). Listening stations were located 150 m distant from each other along each transect. One person from each team counted birds both visually and by song, estimating the distance for each detection. Because the Nightingale reed-warbler (*Acrocephalus luscinia*), an endangered species, was observed in very small numbers on the island in 1992, we also employed play-back methodology to try and elicit a response from this species. After a 5-minute count, a tape recording of the reed-warbler was played for one minute and then a further two minutes was spent at each station listening for a response.

Fourteen species of birds totaling 924 individuals were counted during the survey. Density was approximately 14.7 birds per station, but no Nightingale reed-warblers were observed (Table 1). One seabird species, the Great frigatebird (*Fregata minor*) was counted incidentally and two descendents from domestic roosters were recorded. Guam swiftlets (*Collocalia bartschi*) were detected while foraging, but more accurate estimates of their numbers are available from departure/arrival counts at their nesting caves in the evenings (see report of this survey below). Of the remaining forest birds, the most common was the Bridled white-eye (*Zosterops conspicillatus*). Rufous fantails (*Rhipidura fufifrons*), Golden white-eyes (*Cleptornis marchei*), and Micronesian honeyeaters (*Myzomela rubratra*) were also numerous. Mariana fruit-doves (*Ptilinopus roseicapilla*), Micronesian starlings (*Apolis opaca*), White terns (*Gygis alba*), and Collared kingfishers (*Halcyon chloris*) were plentiful. White-throated ground-doves (*Gallicolumba xanthonura*), Micronesian megapodes (*Megapodius laperouse*), and Philippine turtle-doves (*Streptopelia bitorquata*) were uncommon to rare.

Table 1. Numbers of forest birds detected along 4 transects on Aguiguan, 1 April 2000.

Bird Species	Transect (Number of Stations)				Total	# birds/ Station
	1 (15)	2 (16)	3 (16)	4 (16)		
Bridled white-eye	60	33	73	51	217	3.44
Rufous fantail	17	48	26	59	150	2.38
Golden white-eye	16	47	20	60	143	2.27
Micronesian honeyeater	19	27	49	29	124	1.97
Mariana fruit-dove	16	17	16	27	76	1.21
Micronesian starling	20	31	16	7	74	1.17
Collared kingfisher	11	12	14	20	57	0.90
White tern	5	20	13	4	42	0.67
White-throated ground-dove	15	1	0	0	16	0.25
Micronesian megapode	2	9	0	1	12	0.19
Philippine turtle-dove	3	0	0	0	3	0.5

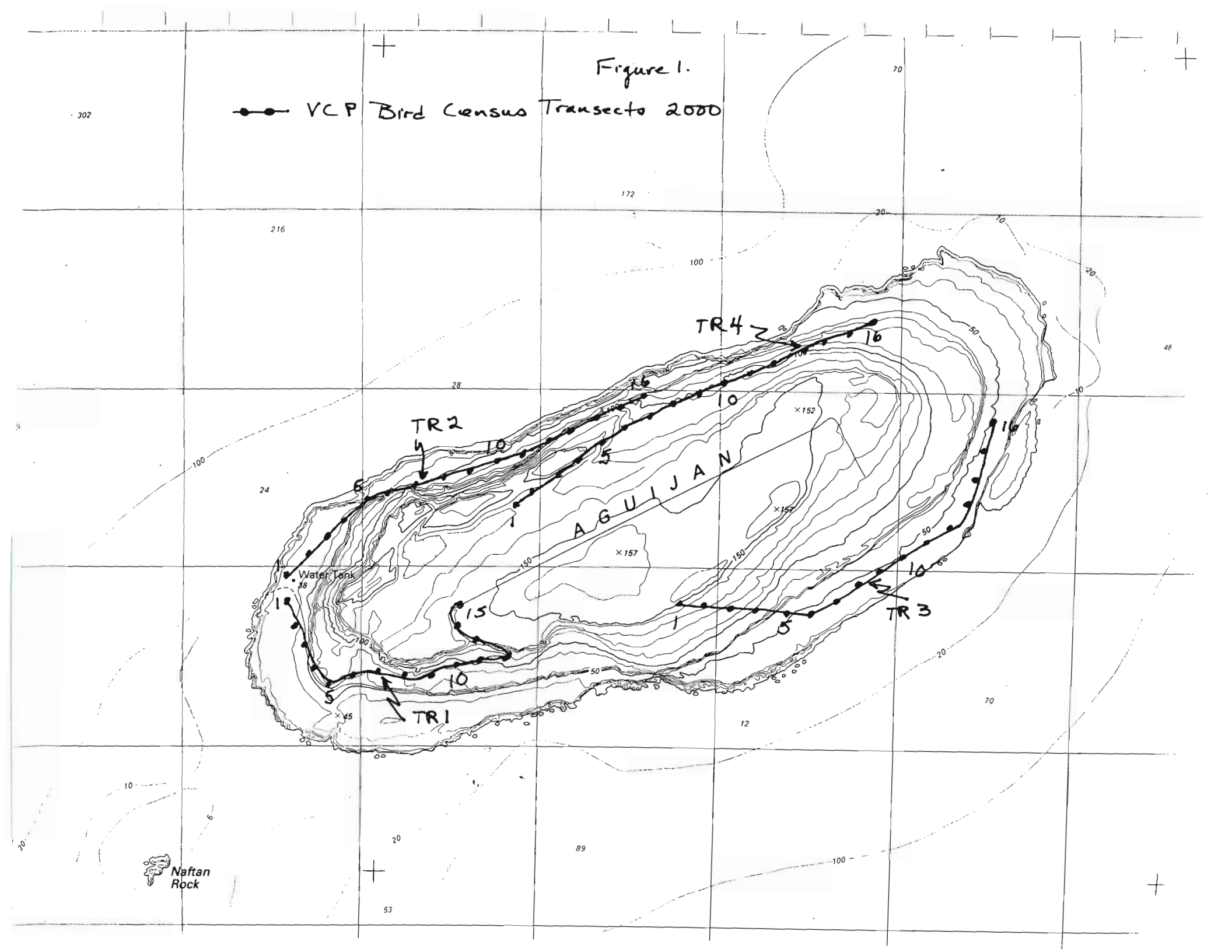


Figure 1.
VCP Bird Census Transects 2000
TR4
TR2
TR3
TR1
AGUIJAN
Water Tank
Naftan Rock

Comparing the numbers of birds/count station that we recorded on Aguiguan in April 2000 with those detected in March 1982 and April 1992 (Table 2) revealed that the relative abundance of all but the rarest of species have declined on Aguiguan since 1992. The number of birds detected on Aguiguan was significantly lower in 2000 than in 1992 (t test = 2.62, $P < 0.01$). This is in contrast to earlier findings. Raw totals and abundance of birds/station are very similar between 1982 and 1992. Craig *et al.* (1992) concluded that most populations had remained stable for that 10 year period with a possible decline in populations of Mariana fruit-doves and Micronesian honeyeaters. Presently, all populations with the exception of White-throated ground-doves, Philippine turtle-doves, and Micronesian megapodes were detected far less frequently than previously.

Table 2. Comparison of relative abundance at count stations and density estimates from 1982 (Engbring *et al.* 1986), 1992 (Craig *et al.* 1992) and 2000 (this study). The symbol ‡ represents species for which insufficient data were available for use in the VCP analysis.

Bird Species	# birds/ station 1982	# birds/ station 1992	# birds/ station 2000	Birds/ha 1982	Birds/ha 1992	Birds/ha 2000
Bridled white-eye	6.23	7.79	3.44	19.30	219.3	14.74
Rufous fantail	3.45	4.14	2.38	3.82	52.81	10.97
Golden white-eye	3.39	3.71	2.27	6.15	49.70	‡
Micronesian honeyeater	5.65	3.06	1.97	5.70	23.88	5.58
Mariana fruit-dove	5.77	2.09	1.21	0.76	2.68	0.40
Micronesian starling	1.58	1.92	1.17	1.11	4.92	4.40
Collared kingfisher	1.20	1.26	0.90	0.11	0.62	0.49
White tern	1.72	1.71	0.67	--	--	--
White-throated ground-dove	0.14	0.12	0.25	0.09	0.42	‡
Micronesian megapode	0.11	0.17	0.19	0.03	0.04	‡
Philippine turtle-dove	0.11	0.17	0.50	--	--	--

It was possible to calculate the density (birds/ha) for six species on Aguiguan in April 2000 (Table 2) using the computer program DISTANCE. The same analytical techniques were applied to the data from 1982 and 1992 by other researchers. The results of the three analyses are widely disparate. In one case the density estimate in 1992 was an order of magnitude higher than that in 1982 while the 2000 estimate was more in line with that of 1982 (*e.g.* Bridled white-eyes). In other cases the 2000 density

estimate and the 1992 estimate were very similar (*e.g.*, Micronesian starlings) but quite different from the 1982 estimated density. These examples highlight the limited utility of this analytical technique with VCP data as a useful tool for helping to track bird numbers for management purposes. The relative abundance of birds at each count station is probably more illustrative of current population trends than the density estimates. Unfortunately, these trends are distinctly downward for most bird species (Fig. 2).

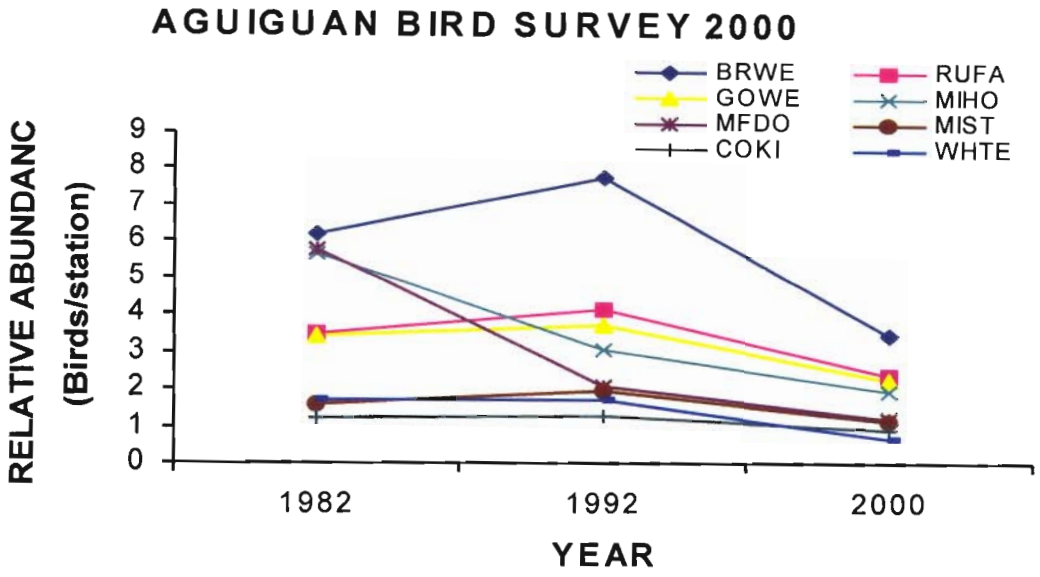


Figure 2. Decline of bird species over an 18 year period on Aguiguan Island.

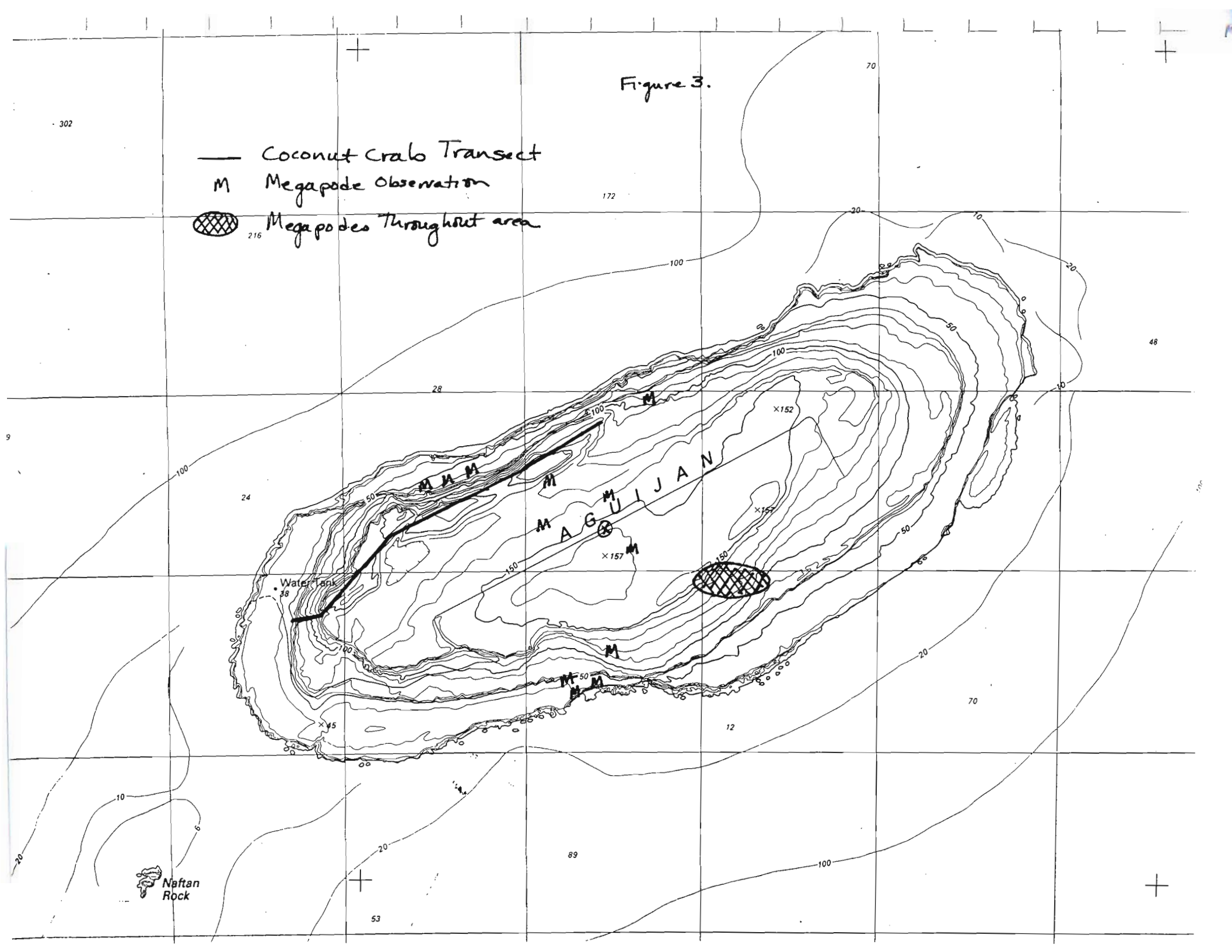
The Micronesian Megapode was observed or heard calling on a regular basis during the field trip. Areas of observation or vocalization included Transect 3 & 4, in camp, the south and north sides of the island, and within 300 m north of camp (Fig. 3). Only adults were observed during these surveys.

Although megapodes are still not numerous on the island, apparently numbers have been slowly increasing (Table 2) since 1982 when the total population was estimated to be 14 (Engbring *et al.* 1986). We calculate that if Aguiguan has 475 ha of forested area (out of 718 ha), and with 0.19 detections in a 75 m radius circle, then there is an island-wide population of about 51 megapodes.

Nightingale Reed-warbler Survey

During the forest bird survey each team of observers played tape recorded calls of Nightingale reed-warblers to try and elicit a response from birds that were not necessarily vocalizing on their own. Tapes were played for one minute after each 5

Figure 3.


Coconut Crab Transect
M Megapode Observation
Megapodes Throughout area
MAGUIJAN
Water Tank
Naftan Rock

minute point count and then an extra two minutes was spent listening for a response. Tape recorded calls were also played opportunistically as survey teams performed other work, as when hiking to swiftlet caves when areas that had not been systematically surveyed were traversed. However, no reed-warblers were heard either during formal surveys or at any other time.

Nightingale reed-warblers (NIRW) were documented in low numbers in 1982 (Engbring *et al.* 1986) along a 1 km stretch of cliffs extending NE of the Winch. A bird survey in July 1983 recorded NIRW in the same area as well as in the southwestern most point of the plateau (Kosaka *et al.* 1983). In June 1984, three NIRW were located using similar methods to our present survey (Lemke *et al.* 1984). No NIRW were heard during visits in Jan.-Feb. 1985 (Lemke *et al.* 1985), but 5 were heard in Feb.-Mar. 1987, mostly centered around the NW side of the island (Reichel *et al.* 1987). It was later supposed (by the same observers) that the long song of the Golden white-eye had been mistaken for that of NIRW. Again in June 1988 and Sept. 1989, no NIRW were seen or heard despite playing tapes near most locations where the birds had been reported in previous years (Reichel *et al.* 1988; Rice and Reichel 1989). NIRW were not detected again until May 1992 when two birds were both seen and heard on the southeastern slope of the island (Craig and Chandran 1992).

This apparent pattern of "winking in and winking out" again is reminiscent of the behavior of small populations nestled in a matrix of other populations, or a metapopulation. It is possible that we are observing a situation where NIRW may be colonizing Aguiguan from a source population such as Saipan's and then going locally extinct, as is often the case with small or founder populations.

Swiftlet Surveys

DFW staff performed counts of the endangered Guam swiftlet in the evenings as the birds entered caves to roost for the night. Also, to help prevent depredation on swiftlet nests, 104 plastic bait stations of Combat™ cockroach bait were placed in 4 caves: Pillar, Black Noddy, Guano, and Landing. The placement of baits is a continuation of our program aimed at reducing the loss of nests that are displaced from their foundations due to insect damage. Bait replacement can only be implemented opportunistically on Aguiguan.

Counts of the Guam swiftlet were performed from 17:00 to 19:10 as they entered five roosting caves on 2 and 5 April, 2000. Ten other caves were checked during the day for nests, guano or other signs of swiftlet use. No signs of the presence of swiftlets were found, so entrance counts were not performed at these 10 caves. Caves where entrance counts were performed included: Black Noddy, Cliff, Pillar, Guano, and Landing. Caves where daytime searches for swiftlet sign were conducted but no entrance counts were performed included: New, Crevice, Dangkulo, Krisidu, Stairway,

and the caves labeled A,B,C,D, and E on Figure 4. Entrance counts documented at least 408 individuals using the five well known caves.

Photo: Cliff Cave, Aguiguan 2000

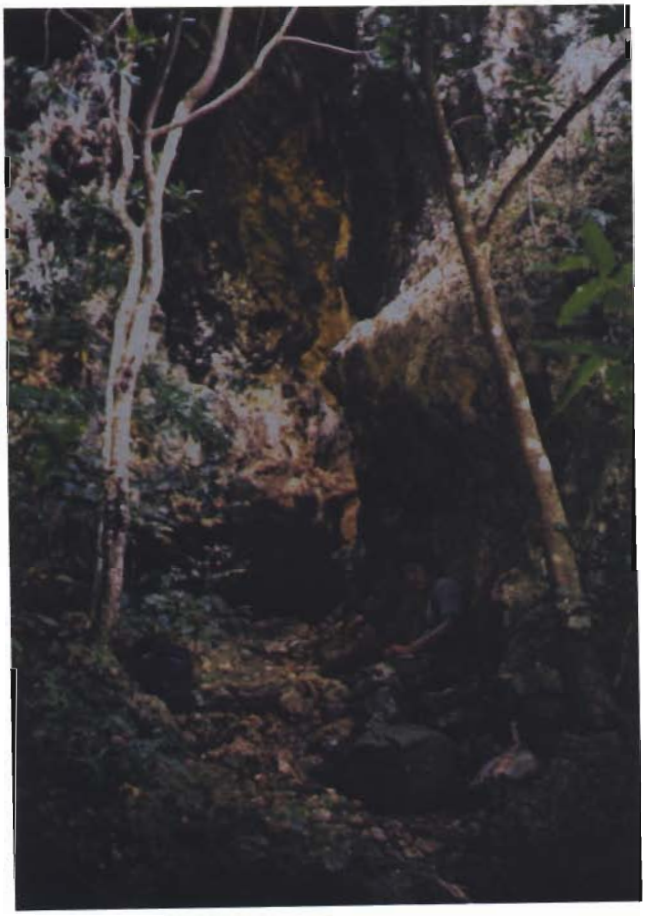
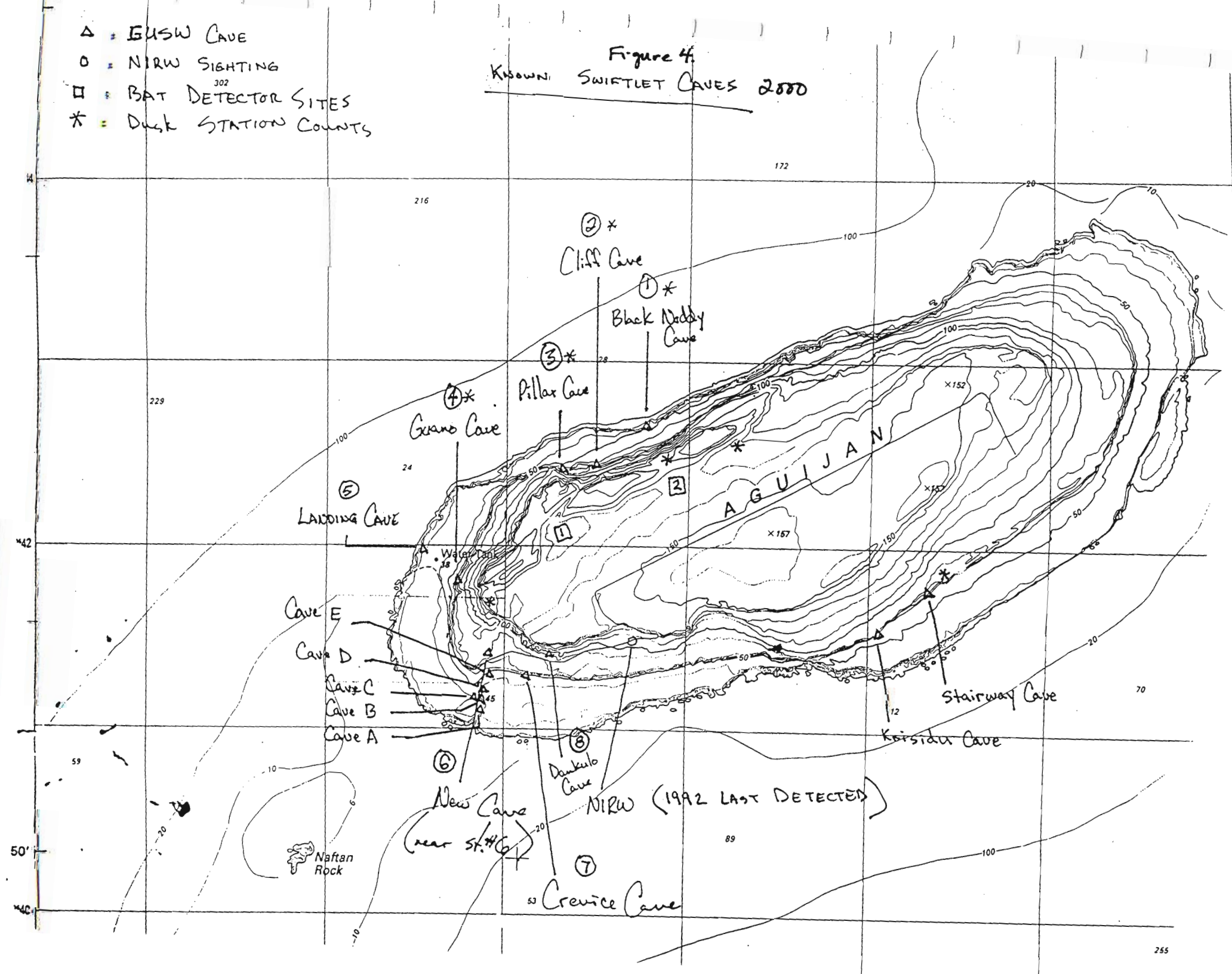


Photo: Elvin Masga, a Tinian Conservation Officer, is setting up to conduct a swiftlet arrival count at Pillar Cave on 2 April 2000.

△ = EGSW CAVE
○ = NIRW SIGHTING
□ = BAT DETECTOR SITES
* = DUSK STATION COUNTS

Figure 4.
KNOWN SWIFTLET CAVES 2000



Cave entrance counts of swiftlets have been performed on Aguiguan since 1985 (Table 3). If the incomplete count in 1992 is excluded from the trend, it appears that total numbers of swiftlets counted on Aguiguan has remained remarkably stable since 1987. The number of swiftlets counted in 1985 is more than twice as high as counts since then, with the number of birds detected in Black Noddy and Guano caves being the most variable. Clearly, with new caves being found and investigated with every extended visit to Aguiguan, more swiftlet roosts will be discovered in the future. The number of swiftlets detected in April 2000 is consistent with the majority of earlier counts—certainly no precipitous decline of this endangered species was indicated.

Table 3. Cave entrance counts of Guam Swiftlets on Aguiguan 1985-2000. Caves not surveyed are represented by dashes (--). Caves not discovered until recent years are represented by an asterisk (*).

Location	1985[a]	1987[a]	1988[b]	1992[c]	1995[d]	2000[e]
Guano Cave	750	321	332	--	123	337
Pillar Cave	100?	89	34	60	65	53
Landing Cave	10	16	13	--	2	2
New Cave (#6)	*	*	39	--	0	0
Black Noddy Cave	10?	--	--	--	145	7
Cliff Cave	100?	--	--	40	26	9
TOTAL	970	426	418	100	361	408

[a]Reichel, J.D. and P.O. Glass 1988.
[b]Reichel, J.D. *et al.* 1988
[c]Rice 1992.
[d]Arriola 1998
[e]current survey

Coconut Crab Surveys

Coconut crabs (*Birgus latro*) were lured to baits, captured and measured during one night (April 4) on Aguiguan by Conservation Officers from Saipan and Tinian. Meat from coconuts that had been ground up and then fermented was placed in 15 rocky crevices along a transect located on the northwestern plateau of the island (Fig. 3). In areas with no rocky crevices, the bait was placed on the ground and covered with rocks. Baits were set out 150 m apart in limestone forest during the day and the transect was checked repeatedly between 10 p.m. and 2 a.m. that night.

A total of 58 crabs weighing between 50 and 1,100 g were captured. Average mass was 293 g (± 207.1 g SD), average carapace length was 69 mm (± 13.8 mm SD) and average carapace width was 66 mm (± 17.6 mm SD). Up to nine crabs were caught at a single bait station (mean 3.7 crabs ± 2.74 crabs per station), with two stations failing to attract any crabs.

Photo: Conservation Officers setting up the Coconut crab survey transect on Aguiguan, 2000.

Female crabs (n = 13) were significantly smaller than male crabs (n = 41) both in terms of carapace length (female mean = 61 mm ± 10.4 mm SD vs. male mean = 72 mm ±13.8 mm SD, t-test = -3.09, $P_{\text{two-tailed}} < 0.004$) and width (female mean = 57 mm ± 12.0 mm SD vs. male mean = 69 mm ± 18.3 mm SD, t-test = -2.56, $P_{\text{two-tailed}} < 0.015$). Female crabs were also lighter than male crabs (female mean = 199 g ± 137.9 g SD vs. male mean = 324 g ± 217.9 g SD, t-test = -2.38, $P_{\text{two tailed}} < 0.02$).

In 1954, when the island was under sugar cane and pineapple production, the population of Coconut crabs was estimated to be about 620-750 (Davis 1954). In September 1990, after agricultural practices had ceased, Conservation Officers from DFW counted "125 crabs of small size" near the Winch camping area, although their report does not detail how the count was done (H. Cabrera 1990 unpubl. trip report). Our data do not allow an estimate of the size of the population remaining on the island. However, we have recorded for the first time the gender of the crab and so now we are able to make a comparison between their morphologies. Overall, crabs were small in size (range of carapace width 46-150 mm) in keeping with previous observations, and there is no reason to suspect that hunting pressure on large sized crabs has lessened in recent years.

Herpetological Surveys

The purpose of the herpetological surveys on Aguiguan was to document reptile species present on the island, to assess the relative abundance of monitor lizards (*Varanus indicus*) on the island, and to collect monitor lizard gut contents for analysis of diet.

Diurnal lizards were sampled using adhesive mouse traps (Bauer and Sadlier, 1992; Rodda *et al.*, 1993). Three transects were sampled, one each in savanna, introduced forest dominated by tangantangan (*Leuceana leucocephela*), and native limestone forest (Fig. 5). Twelve traps were placed flush with the ground every 25 meters along each transect. Traps were placed in the morning (0700-0900) and run for 4-6 hours on 3 consecutive days.

Nocturnal lizards were also sampled using adhesive mouse traps. Two transects were sampled, one each in introduced forest and native limestone forest. Twelve traps were set along each transect, spaced every 25 meters, and were stapled to the trunks of trees 0.5-2.0 meters above the ground. Traps were placed 1 hour prior to sunset and checked the following morning. Traps were run for 3 consecutive nights.

Monitor lizards were sampled using loop-snare traps and also using visual surveys. Eight traps were placed along a transect in introduced forest while seven traps were placed on a transect in native forest. Traps were spaced at 50 meter intervals and were stapled to trees from 0-1 meter off the ground. Traps were baited with rotten meat or dead rats. Traps were run for 3 days.

In an attempt to detect the presence of the snake-eyed skink (*Cryptoblepharus poecilopleurus*) and the tidepool skink (*Emoia atrocostata*), 13 adhesive traps were placed in sites likely to capture these species in rocky strand and grassy habitat at the lower camp landing point between 0600 and 1300 hours on 1 April 2000.

All lizards captured were taken back to base camp, euthanized, measured, field-tagged, and preserved. Monitor lizards had their gastrointestinal tract removed and preserved for later analysis of diet. Upon returning to Saipan, all specimen identification was verified and specimens were catalogued and placed in the DFW collection.

Tables 4 and 5 show the results of adhesive trapping for skinks and geckos. Seven species of lizards were documented. The blue-tailed skink (*Emoia caeruleocauda*) was the most abundant lizard captured (n = 56). In 1995, Campbell reported having trapped the mutilating gecko (*Gehyra mutilata*), the house gecko (*Hemidactylus frenatus*), and the tidepool skink for the first time on Aguiguan. Of these 3 species, *G. mutilata* and *H. frenatus* were trapped again in 2000, but *E. atrocostata* was not. The absence of *E. atrocostata* may be due to the fact that we placed only 13 traps for one morning at the landing beach whereas Campbell placed 50 traps in 1995.

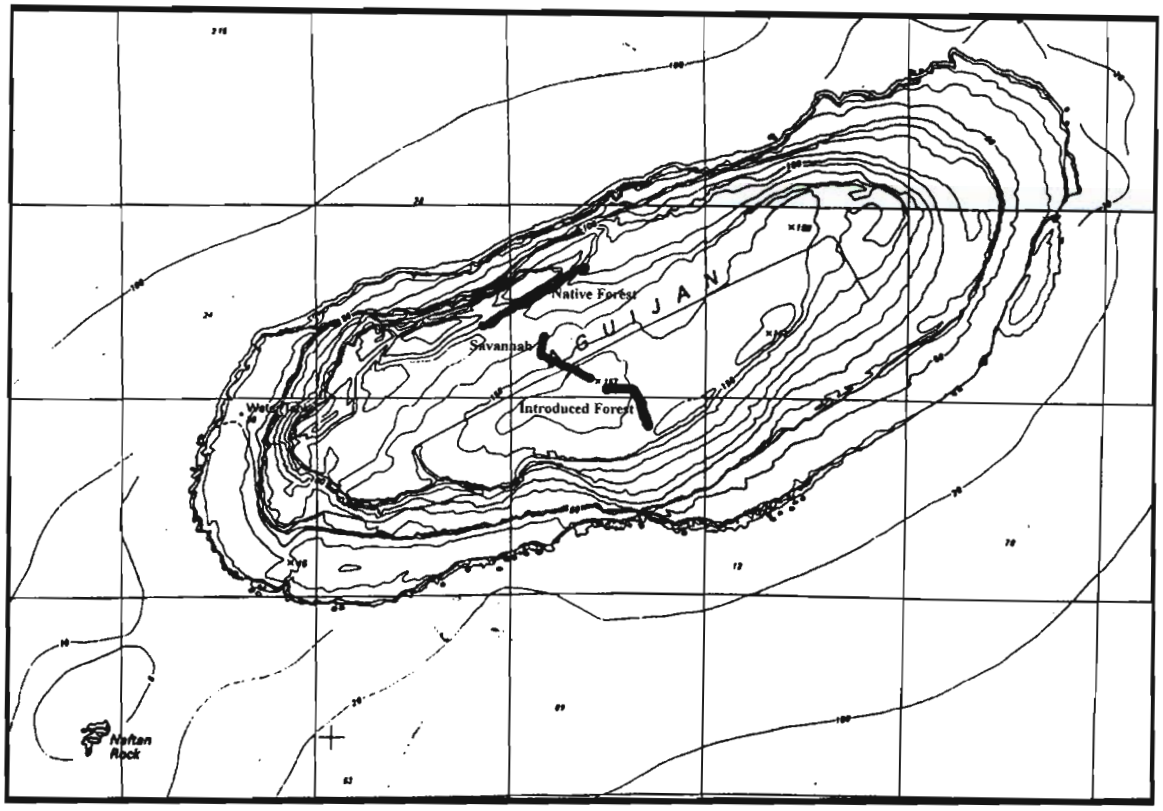


Figure 5. Aguiguan Island showing transects used to sample reptiles in savannah, introduced forest, and native forest, 1-5 April, 2000.

Table 4. Results of adhesive trapping to determine lizard presence and abundance on Aguiguan, 1-4 April, 2000.

Habitat	#Traps	#Hours	Trap Hours	#Lizards	Lizards/ 100 Tr Hrs
Ground Trapping					
Rocky Beach	13	6.50	84.50	2	2.37
Savanna	36	15.00	540.00	18	3.33
Introduced Forest	36	16.75	603.00	40	6.63
Native Limestone Forest	36	15.70	565.20	14	2.48
Total	121	53.95	1792.70	74	4.13
Tree Trapping					
Introduced Forest	36	39.80	1432.80	8	0.56
Native Limestone Forest	36	39.80	1432.80	4	0.28
Total	72	79.60	2865.60	12	0.42
Aguiguan Total	193	133.55	4658.30	86	1.85

Monitor lizards were very abundant on Aguiguan (Table 6). A total of 18 lizards were captured using snare traps (34 lizards per 100 trap days), and an average of 8.9 lizards were observed per hour during visual surveys. Monitors seemed to be more abundant in introduced forest, but additional data needs to be collected to confirm this. Gut contents have not been analyzed as of the writing of this report. Anecdotally, a monitor lizard was observed eating a Golden white-eye chick that it had retrieved from its nest in a *Guamia* tree. The nest was about 8 feet off the ground.

Table 5. Presence and abundance of lizards trapped on Aguiguan, 1 - 4 April, 2000.

	HABITAT				
	Rocky Beach	Savanna	Introduced Forest	Native Limestone Forest	Total
Family Gekkonidae					
Mutilating gecko	0	0	3	0	3
Oceanic gecko	0	0	1	4	5
House gecko	0	0	2	0	2
Mourning gecko	0	0	1	0	1
Family Scincidae					
Snake-eyed skink	1	0	0	0	1
Blue-tailed skink	1	12	29	14	56
Family Varanidae					
Monitor lizard	0	0	12	10	22
Totals	2	12	48	28	90

Table 6. Results of monitor lizard snare-trapping and visual surveys conducted on Aguiguan, 1 - 5 April, 2000.

Habitat	# Trap Days	# Lizards	Lizards/ 100 trap days
Introduced Forest	32	11	34.38
Native Limestone Forest	21	7	33.33
Total	53	18	33.96

	Hours of Survey	# Observations	Lizards/Hr.Obs.
Introduced Forest	0.47	5	10.64
Native Limestone Forest	2.23	19	8.52
Total	2.7	24	8.89

MARIANA FRUIT BAT LOCATIONS & EVENING STATION COUNT LOCATIONS (3/31/00 - 4/5/00)

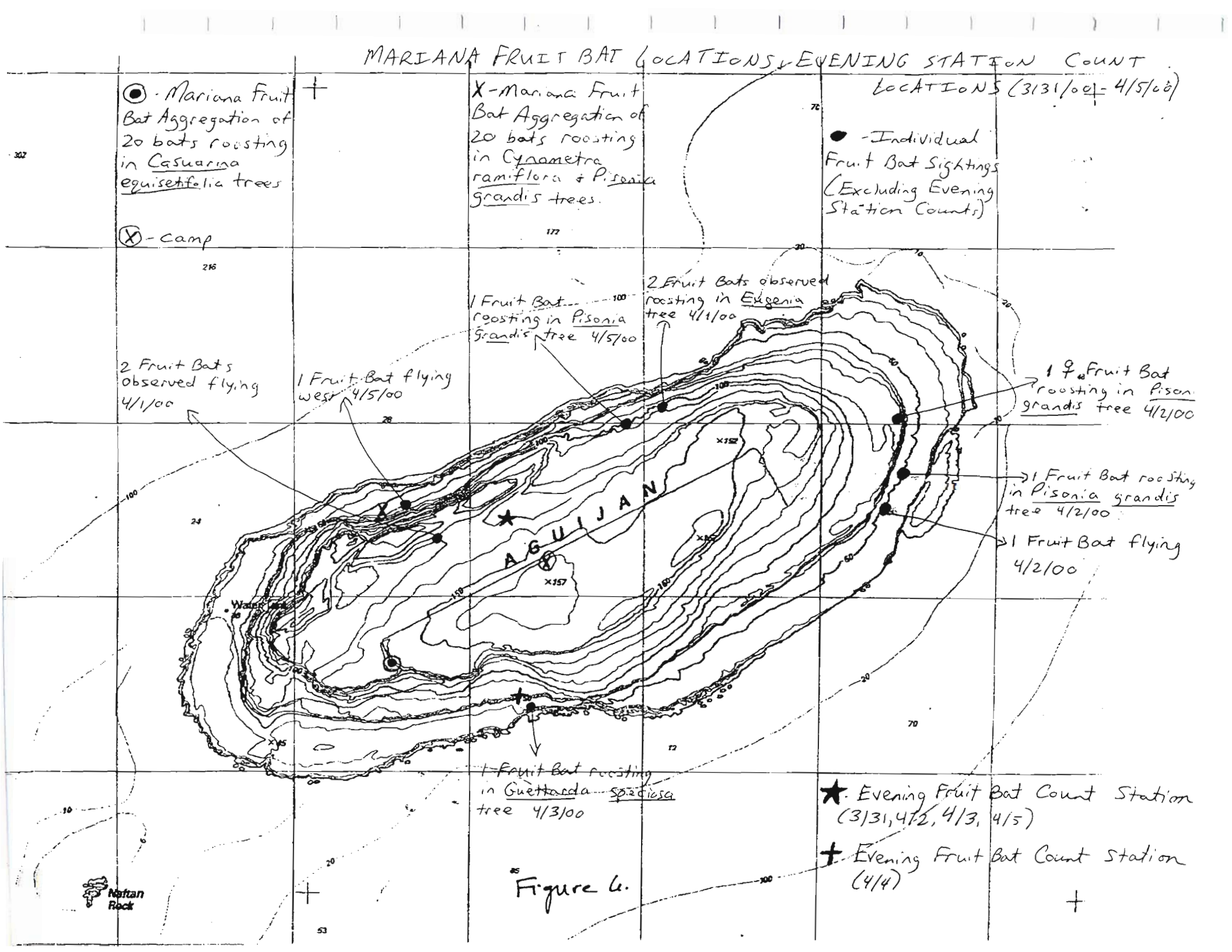


Figure 4.