Maps and Photos

Source: A Rapid Biodiversity Assessment of the Nakauvadra Range, Ra Province, Fiji: 23

Published By: Conservation International

URL: https://doi.org/10.1896/054.057.0105

Chapter 4

Bats of the Nakauvadra Range, Ra Province, Fiji

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SUMMARY

This survey is probably one of the first bat surveys to be carried out in the Nakauvadra Range. Three main survey techniques were used: mist nets and harp traps, bat detector and general observations. Only three species of bats were recorded: *Pteropus tonganus*, *P. samoensis* and *Emballonura semicaudata*. The latter two species are listed in the IUCN Red List as Near Threatened and Endangered respectively. No roost of any of the bat species was recorded within the area covered during the survey. More surveys are needed to locate possible roosting sites and monitor the presence of other bat species that forage within the area.

INTRODUCTION

There are fifteen species of mammals native to Fiji, of which six are terrestrial (bats belonging to the order Chiroptera) and nine are marine (whales belonging to the order Cetacea) (IUCN 2007). There are fourteen non-native species of mammals present in Fiji, all of which are terrestrial and have been introduced to Fiji in the last 3000 years since the arrival of humans (Pernetta and Watling 1978). This survey focussed on the native bat species present in the Nakauvadra Range.

To date there has been no record of terrestrial mammal research conducted in the Nakauvadra Range area. Fiji's native bats are poorly studied, yet this group should be of high conservation importance as they include an endemic monospecific genus (*Mirimiri acrodonta*) and several near endemic species. Additionally, Fiji's bats play an essential role as seed dispersers, pollinators of flowers and in controlling nocturnal insect populations in rainforest and other terrestrial ecosystems (Manueli 2001, Palmeirim et al. 2007).

Some of the previous work on bats in Fiji includes a collecting trip in 1990–1991 by the Australian Museum, the results of which are published in Flannery (1995); work by Dr. Jorge Palmeirim (Universidade de Lisboa, Portugal) in 2000-2001 (Palmeirim et al. 2007); and studies on *Pteropus samoenis* by Dr. Ruth Utzurrum (Department of Wildlife and Marine Resources, American Samoa, Pagopago) in 2002. The work by Palmeirim and the Australian Museum provide good baseline data for bat research in Fiji.

The main objectives of this survey were to:

a) produce a checklist of the bat species found in the Nakauvadra Range;
b) focus on the rare and endangered species and their habitats; and
c) gather data on species distribution, diversity and abundance.

METHODS AND STUDY AREA

Three main methods were used to survey the bat fauna of Nakauvadra:

1) Mist nets and harp traps;
2) Bat detectors and;
3) General observation.

The location of sites and surveys are shown on Map 5.

Mist nets and harp traps

A 12 x 2.7 m mist net was used to trap larger fruit bats and a harp trap was used to trap smaller bats. The use of nets and harp traps was mainly to verify the identity of the bat species. The mist net and harp trap were used to sample bats in lowland forest (< 400 m elevation) and upland cloud forest (> 500 m).The mist net and harp trap were only set up for use from dusk to dawn and were regularly checked every hour.

Bat detector

A Tranquillity II bat detector was used to detect the presence of microbats in caves. It was also used during the night around the camp by walking a 50 m non-linear transect to detect foraging microbats.

General observations

We made general observations while walking through and around the forest during the day and hiking from one camp to another. Any species of fruit bat observed were noted.

RESULTS

Species found

Only three species of bats (50% of the bat species found in Fiji) were recorded during the survey. They are presented in Table 4.1 along with their conservation status as assessed by the IUCN. The most common species observed was *P. tonganus* with more than 200 bats recorded for a period of one hour just before sunset from a clearing along Vuniqesa Creek at Camp 2 on 24th of November. All the bats seen during that hour were flying in from the south, from an area outside the Nakauvadra Range. *P. samoenis* was rare and during the eight days in the field only four were observed during the day. Only three *E. semicaudata* were detected during the survey.

Table 4.1. Checklist of species of native bats found in the Nakauvadra Range and their IUCN status

Common Name	Scientific Name	IUCN Status	Notes
Insular flying fox	*Pteropus tonganus*	Lower risk	Common, but no roost within Nakauvadra
Samoan flying fox	*Pteropus samoensis*	Near Threatened	Rare, no roost recorded
Polynesian sheathtailed bat	*Emballonura semicaudata*	Endangered	Only noted using bat detector, no observed or caught

Effectiveness of different field methods

Harp traps and mist nets were generally unsuccessful in capturing bats during the survey period (Table 4.2). The bat detector was able to detect the sheath-tailed bat *Emballonura semicaudata* which can be detected between 30 – 35 KHz (Palmeirim pers. comm.). The fruit bats *Pteropus tonganus* and *P. samoensis* were easily observed during the survey during general observations.

DISCUSSION

Pteropus tonganus

This was the most common species recorded in Nakauvadra however, we did not find a roost. The local guides also did not recall recording any big roosts in the area surveyed. All the *P. tonganus* observed were noted to be flying in from the south. This could represent a major roost which should be located as it has an impact on the vegetation of

Table 4.2. Summary of areas where mist net, harp trap and bat detector transects were located and their results

Date	Site	Elevation	Harp Trap	Method	
				Mist trap	Bat detector
19/11	Takina	756m	No bats	No bats	No bats
20/11	Vunilaci (Camp 1)	305m	No bats	No bats	*Emballonura semicaudata*
23/11	Vuniqesa (Camp 2)	270m	No bats	No bats	*Emballonura semicaudata*
24/11	Vuniqesa (Camp 2)	270m	No bats	No bats	No bats
25/11	Rock Lookout	610m	No bats	No bats	No bats

the Nakauvadra Range. Some *Pteropus* bat species are known to forage from about three to close to eight kilometres from their camps (Markus and Hall 2004). This could be a factor causing *P. tonganus* roosts to be outside Nakauvadra as they need larger areas to forage but this need to be further studied. Much of the vegetation system of the Nakauvadra Range is still well intact and could support roosts of *P. tonganus*. Future studies of the area should aim to encompass a much larger study area in order to locate roost sites.

Pteropus samoensis

Only four individuals were observed which is relatively low. However, studies done on this species in American Samoa have shown that it is rarer than *P. tonganus* with the density ranging from 1-18 bats/km² (Brook 2001). This species roosts in smaller colonies and prefers to roost in primary forest compared to *P. tonganus* which tends to forage in agro-forest and cultivated forest areas as well (Banack 1998). The presence of *P. samoensis* indicates that the forest on the Nakauvadra Range is still well intact. There is a need for future surveys to estimate the population size and identify roost sites of this species within the Nakauvadra Range.

Emballonura semicaudata

The absence of caves from the Nakauvadra area surveyed means that there are fewer chances of insectivorous bats being found as they only roost in caves (Tarburton 2002). However, three bats of this species were noted using the bat detector which indicates that they fly in to forage at Nakauvadra. The closest known roost is in the Yasawa Islands which is more than 50 km away (Palmeirim et al. 2007). This species, like *P. samoensis*, prefers to forage in well forested areas (Esselstyn et al. 2004). There could be caves in the Nakauvadra area which we did not find in this survey and future surveys of this species should make the location of caves a priority.

One problem encountered during this survey was that the majority of the locals had mistaken this species for the White-rumped swiftlet (*Aerodramus spodiopygius*), a bird which also nests in caves and sometimes also under large boulder and cliff overhangs. Sites which the locals had marked out on the map where caves are found were actually cliff and large boulder overhangs where the White-rumped swiftlets were nesting (Map 5).

CONCLUSIONS AND CONSERVATION RECOMMENDATIONS

Conservation significance of the Nakauvadra range for bats

The conservation significance of the bats of the Nakauvadra Range is difficult to determine at this stage as there is still more research and surveys that need to be carried out. Only three species were recorded, two of which are listed as vulnerable and endangered. No roosts for any species were located during this survey and there is a need for more surveys spread over the Nakauvadra Range to locate existing roosts and bat colonies. At this stage there is a need to conserve this area because (i) bats use it as a

feeding ground and (ii) there are still large tracts of intact native vegetation cover. This is similar to the findings of other large forest areas surveyed including the Sovi Basin and the Wabu Reserve.

Future work

More surveys need to be conducted to locate the presence of any roosting colonies of each bat species and also to monitor population size of the different bat species foraging in the Nakauvadra Range. Since no roosts for any of the three species were located during this survey it was impossible to carry out density or abundance estimates for bats in the area. Other species like the Fiji blossom bat (*Notopteris macdonaldi*) could also be present in the Nakauvadra Range. There is also a need for community awareness and education in the villages and communities surrounding the Nakauvadra Range. People need to know the difference between the White-rumped swiftlets and the Polynesian- sheath tail bats and how to tell whether bats are present in a cave. Local communities also need to be taught about the importance of bats and their ecological role, something which has been neglected in many Fijian communities where bats are not seen as important species, but only a nuisance.

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