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A REPORT ON A BRIEF TRIP TO ASSESS THE STATUS OF SHORT-TAILED BATS IN THE RANGITAUA, OHAKUNE AREA, APRIL 1994

(Short Answers in Conservation Science)

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A REPORT ON A BRIEF TRIP TO ASSESS THE STATUS OF SHORT-TAILED BATS IN THE RANGATAUA, OHAKUNE AREA, APRIL 1994

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INTRODUCTION

Daniel & Williams (1984) reported that short-tailed bats *(Mystacina tuberculata)* were still present in Tongariro National Park but provided little further information on the species status and distribution in the area at that time. Among the original records used by Daniel and Williams (1984) (Appendix 1) there were three confirmed reports from the forests to the south and west of Ruapehu during the period 1960-69 and two further unconfirmed reports during 1980. There were no subsequent records of short-tailed bats in the area until December 1993 when a Department of Conservation worker found a dead short-tailed bat in the forest at Rangataua. During the next few months a resident in the nearby settlement of Rangitaua brought Ohakune Field Centre staff two short-tailed bats killed by his cat.

In response to the discovery of the first specimen at Rangitaua, John Luff (D.o.C., Ohakune) undertook night-time searches of forests in the Rangitaua and Ohakune area during the summer of 1993-94. Using a Bat Box III bat detector set at 27 khz, Luff located short-tailed bats at a number of sites (Figure 1). He also heard male short-tailed bats singing.

The trip described in this report was undertaken during April 1994 to assess the size of the population and determine whether the area was suitable for research on the species.

METHODS

Echolocation calls

Echolocation calls were monitored using the automated bat detecting system described in O'Donnell & Sedgeley (1994). Each unit comprised a Batbox III bat detector, a voice activated tape recorder and a talking clock, all placed in a waterproof plastic box. The bat detector was set at 27 khz and the clock was set to chime each hour. Field trials indicate that the system will record short-tailed bats echolocating within a zone extending up to 20 m of the front of the unit but sensitivity is lower in other directions. Seven units were used. The units were left out overnight in the areas to be surveyed. Ideally they were placed about 1 m above the ground on a stump or log. Light vegetation, such as ferns and grass, within 0.5 m of the unit was removed to reduce extraneous ultrasound.

Trapping

Mist nets: Standard passerine mist nets with 1.25" mesh were used. The nets were set up within the forest suspended from a back-bone rope strung through the canopy. Rigs of up to three nets, placed one above the other, were used. The bottom of the lowest net was placed as close to the ground as possible. Nets were attended at all times when they were open, and were closely inspected every 15 minutes. In order to allow for comparisons between different sites mist nets capture rates are calculated as the number of bats caught per standard 40 ft mistnet/hour.

Harp trap: A double-frame harp trap, supplied by Austbat Research Equipment, Australia was used. This has a trapping area 2.4 m high and 1.8 m wide.

Droppings

Captured bats were held in calico bags until processed. Plastic bags were not used as they create large amounts of ultra-sound which discomfits the bats unnecessarily. Any droppings left in the bag were collected labelled and dried for future dietary analysis.

Capture details

Bats were weighed with a 30 g Pesola spring balance while held in a small calico bag (90x135 mm). Forearm length was measured with a 150 mm vernier calliper. Bat age was assessed by examining the degree of fusion of the cartilage in the wing joints (Parnaby, 1992). Reproductive status was assessed by examining the condition of the teats & vulva in females, and the testes and epididymis in males (Parnaby, 1992; Philips & Inwards, 1985). Bats were also inspected for wing injuries, worn or lost teeth, and ectoparasites.

Radiotelemetry

Receivers: Telonics TR2 & TR4.
Antennas: Three-element folding Yagi hand-antennas.
Miniature radio-transmitters: Holohil, Model BD2 (Field life >28 days).

The radio-transmitters were encased in dental acrylic to prevent destruction by the bats during grooming. Although the dental acrylic increases the transmitter's weight from 0.76g to about 1.00 g it greatly improves the field life. Transmitters were attached in the middle of the back, posterior to the scapular region, using "F2" contact adhesive made by Ados. To improve adhesion a small patch of fur was clipped to about 0.5-1 mm long with a "Personal beard trimmer" made by Wahl. The edges of the comb of the trimmer were ground away to provide a 10 mm wide cutting edge. The transmitter base and the shaved area on the bat were degreased with acetone. After the acetone had completely evaporated F2 adhesive was applied to the skin and the transmitter, then both surfaces were allowed to dry for 5 minutes before the transmitter was put in place using forceps. Transmitters were applied while the bat was held in a bag with only the area of the back the transmitter was to be applied to exposed.

RESULTS

Bat detectors

The seven bat detector units were put out on three consecutive nights (8, 9, & 10 April 1994) in three areas (Ohakune Mountain Road, the middle road through Rangataua Forest, & Rotokura Ecological Area) at a total of 21 sites (Fig 2). The weather was ideal on all three nights: mild, dry and calm (Appendix 2). Units failed at three sites and functioned successfully at the other eighteen. Bat passes were recorded at 14 (i.e.78 %) of the 18 functional sites. There was a total of 394 bat passes; an average of 21.9 passes/functional site or 28.1 passes/active site. Fig 2 shows the total number of passes at each site.

Bat activity occurred throughout the night with periods of peak activity varying at different sites (Fig 3). For pooled data the peak activity, measured as the maximum number passes/hour, occurred between 19:00-20:00, that is the second hour after sunset (17:54-58). There were very few passes in the first hour after sunset except at one of the sites north of Lake Rotokura, which recorded 5 passes and may be close to a roost.

Capture effort and capture rate

Mist nets and a harp trap were placed at 6 sites in three areas (Table 1).

Table 1. Capture sites used during the trip.

Site	Area	Location
1	Rotokura Ecological Area	100m east of L. Rotokura track at N. end
2		20m east of the lake track 200m from the north end
3	Rangitaua Forest	300m N. of ralway 400m E. of township
4	Ohakune Mountain Rd	200m along Blyth Track from entrance
5		Blyth Track entrance
6		100m east of the road, 200 m below Blyth Track

Trapping was begun between 30 minutes and 60 minutes after sunset, i.e. just as the forest becomes dark. Mist nets were opened on 4 nights at 3 sites for a total of 16 hours. Five bats were caught. The capture rate in the mist nets was 0.313 per 40 ft mist net/hour. The harp trap was used on 4 nights at different sites for a total of 41 hour. Three bats were caught, though one had been caught previously on the same night in a nearby mist net. The capture rate for the harp trap was 0.073 bats per hour.

Despite some of the mist nets extending up to 6 m above the ground all bats were caught between 1.5 m and 2 m above the ground.

Capture Details

Forearm lengths are within the published range of measurements for *Mystacina tuberculata rhyacobia* (Hill & Daniel 1985).

All captured bats were adults, but there was no sign of reproductive activity in any of them. A small number of mites were noted on all bats. No bat-flies were seen.

Table 2. Summary statistics for the weights and forearm lengths of bats caught 2-7 April 1994, Ohakune.

	n	Mean	sd	min	max
Forearm (mm)	7	44.07	0.740	43.2	45.35
Weight (gms)	7	15.01	1.702	12.6	17.0

Radiotelemetry

Radio-transmitters were fitted to two female bats, one at Lake Rotokura on 2 April, the other 200 m along the Blyth Track on 6 April.

The female at Lake Rotokura was tracked moving around and presumably foraging within a few hundred metres of the original capture site to the north west of Lake Rotokura for several hours on three nights (2, 4 & 5 April). On the night of 5 April the minimum air temperature recorded at Ohakune Field Centre was 1 degree and the grass temperature reached -3.5 degrees, but the radiotagged bat remained active until at least 4 a.m. On the night of 6 April the signal was only heard briefly for a few moments early in the night before it disappeared. No signal was located on the night of 9 April. On the nights of 5 & 6 April the signal suddenly appeared about 100 m north of Lake Rotokura at 18:54 & 19:00 (i.e. 52 & 60 minutes after sunset) respectively. (Short-tailed bats on Codfish Island usually leave their roost about 60 minutes after sunset.) The nature of the signal indicated a series of short, erratic flights which typically occurs when bats leave a colonial roost.

The female bat from the Blyth Track area was only radiotracked on one night, 8 April. The signal suddenly appeared north-west of Blyth Track about 400 m from the Ohakune Mountain Road at 19:14 (76 minutes after sunset). Again the flight pattern was typical of a bat that has just left a colonial roost. The bat flew around for 76 minutes, initially to the south of Blyth Track then across the Mountain Road before returning up the nearby stream and disappearing in the area it had first appeared.

I was not able to locate the signal from either transmitter during extensive day searches.

DISCUSSION

Failure to locate radio signals from the radiotagged bats is unremarkable, it is often difficult, and sometimes impossible, to locate radiotagged bats in their roost during the day. Under ideal conditions the maximum range (ground to ground) of these radiotransmitters is 800 m but when bats are deep within a roost in a large tree the maximum range can be reduced to a few metres, on occasion the signal can be completely attenuated by the roost.

The survey with bat detectors recorded high levels of short-tailed bat activity on three transects spread over 10 km. The transects were all within a single continuous

tract of old growth beech forest extending more than 14 km from the north-west side of the Ohakune Mountain Road to the Karioi pine plantation. Highest activity levels were recorded in the altitudinal zone between 800-1100 m a.s.l, that is above major disturbance from logging but below the montane forest. As the tract of forest is relatively homogeneous and continuous it seems reasonable to assume that similar activity levels would be recorded throughout the tract, that is over more than 50 square kilometres (i.e. 5,000 ha) of suitable forest.

The activity levels measured at Ohakune during this trip were comparable with levels measured on Codfish Island in September 1993 (Table 3, unpublished data). (It should be noted that 2 of the bat detector sites on Codfish Island were within 50 m of an active roost known to contain >400 bats and scored 215 & 256 passes.)

Table 3. The results of surveys with automated bat detectors at Ohakune (April 1994) and on Codfish 1. (September 1993).

	Ohakune	Codfish
N. of sites	18	29
% of sites with passes	78	76
Passes /site	21.9	24.0
Passes/ active site	28.1	31.6

There are many factors which might invalidate the assumption that levels of bat activity
measured by bat detectors provide a good indication of the density of bats in an area. In particular activity levels are affected strongly by changes in bats behaviour as a result of breeding activity, prey density, season and weather. Surveys at Ohakune and on Codfish Island were both undertaken during periods of ideal weather conditions (calm, mild, dry) but there may have been other differences affecting activity levels. If it is accepted that activity levels determined by bat detectors provide an indication of bat density then the bat densities at Ohakune and on Codfish Island can be assumed to be similar.

The minimum population of short-tailed bats on Codfish Island (estimated from roost-counts in 1993) is 1,000 individuals (unpublished data). The total area of Codfish Island is 1336 ha, but the area of suitable habitat for short-tailed bats is probably closer to 1000 ha. Thus bat density on Codfish Island is probably close to 1 bat/ha. A similar density of bats at Ohakune (from the north-west side of the Mountain Rd to the Karioi pine forest) would mean there are approximately 5,000 short-tailed bats in the area.

The block of forest visited during this trip is contiguous with a large (> 50 square km) tract of old growth forest which extends 10 km to the north of the Ohakune Mountain Road up into the Hauhungatahi Wilderness Area. In 1960 a dead short-tailed bat was found in the centre of this forest tact (Appendix 1). Surveys should be carried out to confirm whether short-tailed bats also remain in this area.

CONCLUSION

The population of short-tailed bats in the forest tract extending from the Ohakune Mountain Road to the Karioi pine plantation is a large one, possibly exceeding 5,000 individuals. The area is well suited to field-work, road access is good, the terrain is relatively easy to work in and the Ohakune Field Centre is well placed to provide a research base. The only problems are that the terrain is not well suited to radiotracking and the large number of recreational visitors to the area might result in interference to equipment.

If there is support from conservancy and field centre staff, and the local iwi this area could be an ideal area to study short-tailed bats.

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REFERENCES

Daniel, M.J. & G.R. Williams 1984. A survey of the distribution, seasonal activity and roost sites of New Zealand bats. *N.Z. Journal of Ecology 7:* 9-25.

Hill, J.E. and M.J. Daniel 1985. Systematics of the New Zealand short-tailed bat *Mystacina* Gary, 1843 (Chiroptera: Mystacinadae). *Bull. Br. Mus. Nat. Hist. (Zool.)* 48(4): 279-300.

O'Donnell, C.J.F. & J. Sedgeley 1994. An automatic monitoring system for recording bat activity. *Dept. Conservation Tech. Series* No. 5, Dept. Conservation, Wellington.

Parnaby, H. 1992. *An interim guide to identification of insectivorous bats of south-eastern Australia.* Technical Reports of the Australian Museum. Pub. Australian Museum, Sydney.

Philips, W.R. & S.J. Inwards, 1985. The Annual Activity and breeding cycles of Gould's long-eared bat, *Nyctophylus gouldi* (Michroptera: Vespertilionidae)

Appendix 1. Details of bat sighting records from the Ohakune area for the period 1960-84.

Date	Grid Ref NZMS 1	Grid Ref NZMS 260	Original Report	Probable location
Confirmed reports				
1960	N121 950E 660N	S20 210 120	Ohakune slopes of Ruapehu - Specimen	Ngahuinga Stream near the edge of the Hauhungatahi Wilderness Area
1960	N121 962E 480N	S20 260 000	Rangitaua 5 miles in towards Ruapehu - Specimen	End of the road through the centre of the Rangitaua Forest)
1969	N122 020E 490N	S20 270 940	Lake Rotokura - seen in tree roost	
Unconfirmed reports				
1980	N122 019E 479N	S20 270940	Lake Rotokura, bat heard squeaking	Lake Rotokura
1980	N121 867E 538N	S20 130 000	NW Ohakune Stream, bat seen flying	Taonui Stream?

Appendix 2. Climatic and astronomical records for the period 1-11 April 1994.

Climatic records
Recorded outside the Ohakune Field Centre at 9:00 a.m. each day.

	Rain	Temp (deg. C)		
Date	(mm)	Max	Min.	Grass
2April	0	16.0	4.0	-0S
3	19.5	17.4	10.6	8.0
4	0	13.8	6.2	5.5
5	0	17.5	1.0	-3S
6	0	16.0	6.0	2.6
7		18.0	4.0	-1.0
8			7.2	2.0

Sunrise and sunset times
(For the correction to obtain Ohakune sunset and sunrise times from Wellington data see p. 21 Carter Observatory Astronomical Handbook)
Ohakune: longitude 167° 39' E; latitude 46° 45' south.

Date	Sunrise	Sunset
1-April	6:34	18:10
2	6:35	18:08
3	6:36	18:06
4	6:37	18:04
5	6:38	18:02
6	6:39	18:00
7	6:40	17:59
8	6:42	17:58
9	6:43	17:56
10	6:44	17:54
11	6:45	17:52

Last colour goes 18:30 on 5 April i.e. 28 mins. after sunset
First light appears 5:30 on 6 April, i.e. 69 mins. before sunrise
First colour appears 5:58 on 6 April, i.e. 41 mins. after sunrise

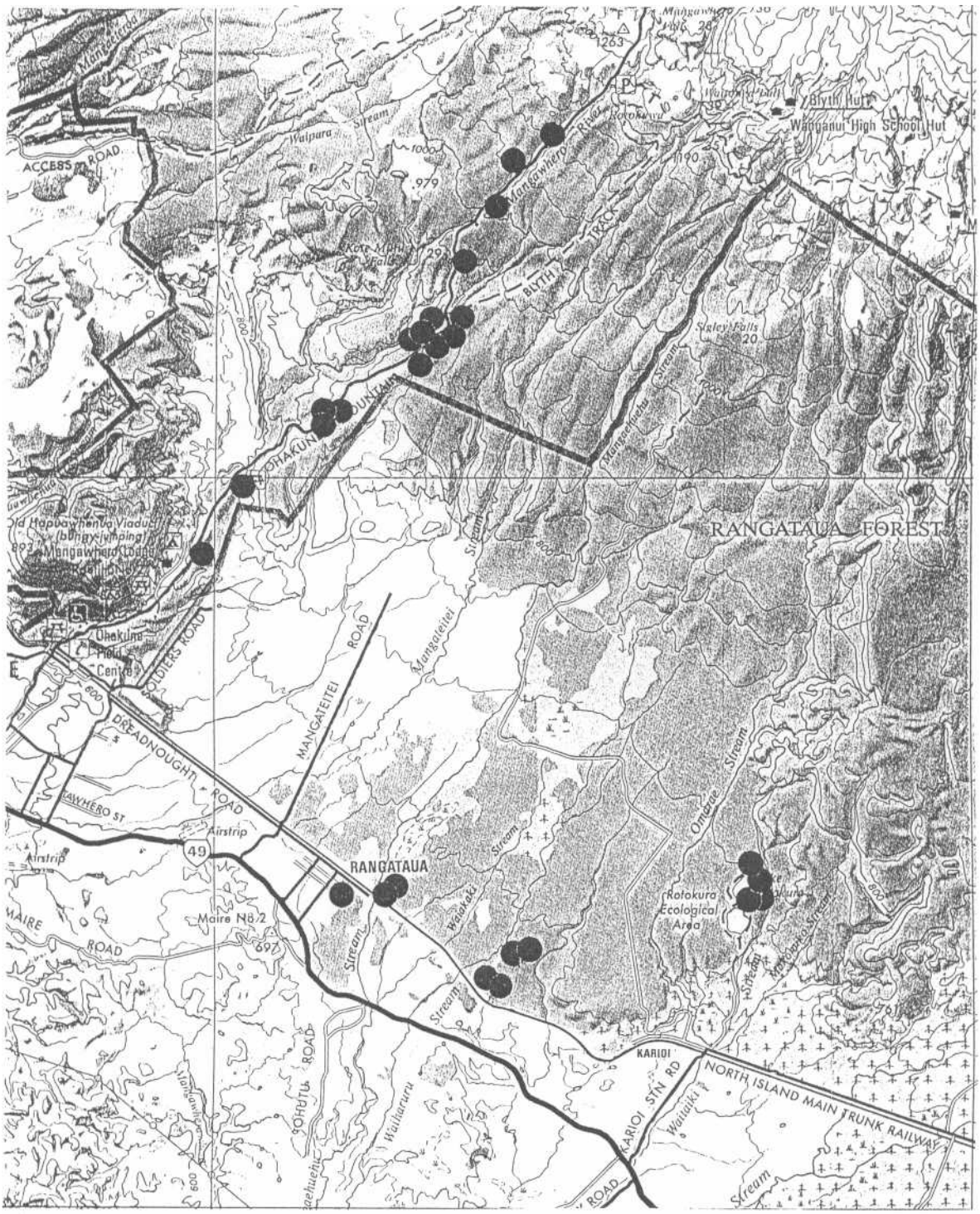
Moon Phase

Phase	Date	Time
Full moon	Mar 27	23:11
Last Quarter	April 3	14:56
New moon	April 11	12:18

Moon rise and set times

Date	Moonrise	Moonset
1-Apr	21:33	11:55
2 Apr	22:33	12:51
3-Apr	23:37	13:40
4-Apr		14:21
5-Apr	0:41	14:57
6-Apr	1:44	15:27
7Apr	2:46	15:55
8-Apr	3:46	16:21
9-Apr	4:46	16:46
10-Apr	5:45	17:12

Figure 1. Short-tailed bat reports from John Luff, summer 1994



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